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Corrosive Acid Poisoning - A case report

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Abstract

The ingestion of corrosive agents frequently produces adverse effect on the esophagus and the stomach or on both. Agents of alkaline pH usually result in esophageal injury, and agents of acid pH often cause gastric damage. Squamous epithelium lining the esophagus is sensitive to alkaline agents; however, alkaline agents upon reaching the stomach are rapidly neutralized by the gastric acidity of the stomach. Conversely, esophageal mucosa is resistant to acid agents, which in turn produce severe inflammatory changes throughout the gastric wall. Corrosive agents regardless of their pH acidity can be destructive in some instances to both esophagus and stomach. Rarely does one note necrosis of the entire stomach secondary to the swallowing of corrosive agents. Here a fatal case of corrosive acid ingestion was described with a brief review of literature.

Introduction

Injury to the gastrointestinal system as a consequence of either accidental ingestion or as a result of self-harm has become less of a common phenomenon. This could partly be attributed to the tighter legislation imposed by the government on detergents and other corrosive products and general public awareness. Corrosive agents, when swallowed, frequently have an adverse effect on the esophagus and stomach. There are a vast variety of chemicals commonly available in a modern western household that can be ingested either inadvertently or intentionally. Failure to recognize the seriousness of the accident and to provide adequate therapy could result in serious morbidity and mortality.

Case report

A 35 yrs old male was taken to the emergency wing of the hospital in unconscious state with alleged history of ingestion of an acidic substance. He was declared dead on arrival and the body was send to mortuary for postmortem examination to know the exact cause of death.

During autopsy no external injuries were found over the body of the deceased. During internal examination the mucosa of the esophagus was found to be blackened and charred (Fig 1).

Fig. 1: Showing blackening and charring of Esophageal wall.

In the peritoneal cavity about 350 ml of blackish fluid was present and the walls of stomach, liver, small and large intestine were stained with the same material (Fig 2).

Fig. 2: Showing chemical peritonitis.

On opening the stomach, it was found to contain about 200 ml of thick black mucous mixed material. The wall of the stomach was thinned out showing multiple small perforations (Fig 3). The rugosities were decreased in number and the stomach mucosa was deeply congested.

Fig. 3: Showing thinned out perforated stomach wall.

The cause of death given was chemical peritonitis consequent upon rupture of stomach wall as a result of ingestion of some corrosive substance. The viscera were send for toxicological analysis whose report confirms the corrosive substance to be sulfuric acid.

Discussion

Children account for more than 80% of accidental corrosive ingestion but ingestion in adult is more often of suicidal intent, and, therefore, tend to be more serious. The mortality rate is between 10% to 20% and rises to 78% in cases of attempted suicide. The extent of the injury depends on the type of agent, its concentration, quantity and physical state, the duration of exposure and the presence of food particles in the stomach. The dichotomy of oesophageal versus gastric injury in cases of acid and alkali ingestion has...
long been recognized by surgeons and gastroenterologists. Whilst acid is said to “lick the esophagus and bite the pyloric antrum”, alkaline tends to cause a more uniformly severe mucosal injury to the esophagus. Although acid injury is usually limited to the stomach, 6%-20% of patients have other associated oesophageal and small intestinal injuries.

Acid injuries cause “coagulation necrosis” on tissue contact; the coagulum formed hinders any further tissue penetration. On the other hand, caustic injuries induce “liquefaction necrosis”, a process that leads to the dissolution of protein and collagen, saponification of fats, dehydration and gastritis are common and patients have been kept fasting. Prehospital management is crucial that the attending medical officers are aware of the severity of such injury and able to identify life-threatening complications associated with the injury. The use of antidote such as water or milk does not seem to prevent stenosis. Endoscopy is the diagnostic procedure of choice in the absence of known perforation. Patients with perforation require immediate surgery. Gastric acid suppression with PPIs and H2-antagonists are often used in corrosive burn injury as esophagitis and gastritis are common and patients have been kept fasting.

References

A Rare Case of Giant Cell Tumor of Metatarsal

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Abstract

Giant cell tumor is osteolytic, mostly benign and locally aggressive tumor occurring in young adults at the epiphysis. Mostly long bones are involved (85-90%), most common site is around knee joint. 4% of tumors are found in iliac bone, spine and only 2% in hand. GCT of metatarsal is very rare with very few cases reported in literature. We report a case of GCT of first metatarsal in a 35 year old male. Patient was treated with excision of tumor, curettage and bone grafting.

Keywords

Metatarsal, excision, bone grafting.

Introduction

Giant cell tumor (GCT) of bone is a benign, aggressive tumor with features of frequent local recurrences and the potential for the metastasis and the malignant transformation. It usually occurs in young adult of 16-35 years in the epiphysial region. The male to female ratio is 3:5. Nearly 85-90% found in long bones, of which 50% occur in the region of knee. Other frequent sites are distal radius, proximal humerus and fibula. 4% occur in pelvic bone and spine. Involvement of small bones of hand and foot is very rare.1 Unni has reported an incidence of 2% in the hand and 1.5 % in the foot (phalanges being more involved than metacarpals and metatarsals). We are presenting a case of GCT of 1st metatarsal of left foot which is a very rare site for such tumor.

Case Report

A 35 year old male presented to us with the chief complaints of swelling over the dorsum of left foot for the duration of 1.5 years and pain in that foot for 6 months. Swelling was insidious in onset and has progressively increased in size. Pain was moderate in intensity, dull aching, continuous relieved by taking medication and rest, aggravated by activity. There was no history of any constitutional symptoms and trauma. On examination, there was a localised globular swelling 6 by 3 cm over the dorsum of right foot opposing 1st and 2nd metatarsal area with well defined margins and overlying skin stretched. Swelling was tender on deep palpation, hard in consistency, overlying skin was free.

Radiographs revealed an expansile osteolytic lesion of 1st metatarsal involving the articular surface of tarso-metatarso joint with cortical thinning. The classical 'soap bubble appearance' was also present [Fig.-1]. MRI was done to know soft tissue extension of tumor [Fig.-2].

Since we were suspecting giant cell tumor and therefore fine needle aspiration cytology was done to confirm our diagnosis. This tumor had the histological grade according to Campanacci et al was grade I. Patient was treated with excision of tumor, extensive curettage and bone grafting, bone graft taken from the iliac crest [Fig-3 & Fig-4]. After removal of sutures below knee cast was applied for 3 months. After subsequent follow ups graft was taken up and there was no recurrence clinically and radiologically.

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Giant cell tumor of the bone is a benign, but locally aggressive lesion. It is a relatively rare tumor composed of connective tissue stromal cells having the capacity to recruit and interact with multinucleated giant cells that exhibit the phenotypic features of osteoclasts.\(^1\)

Giant cell tumor predominates in the long bones [75-90% of cases] especially the femur [approximately 30% cases], tibia [25% cases], radius [10% cases] and humerus [6% cases]. Giant cell tumors of the bones of the hand are rare accounting for only 2% of cases and here too phalangeal location of the tumor is more common than metacarpals. GCT of foot is even rarer than GCT of hand. GCT of the hand & foot seems to represent a different lesion than conventional GCT in the rest of the skeleton.\(^2,3,4\) There is an 18% incidence of multicentric foci indicating that a bone scan should be a part of routine workup of these tumors.\(^5\) Overall they appear in a younger age group. They also have a shorter duration of symptoms averaging six months or less before a diagnosis is made. X-ray of foot reveals classical ‘soap bubble appearance’. MRI is done to reveal soft tissue extension and to plan treatment.\(^6,9\)

Also differential considerations based on the appearance and location of this tumor included giant cell tumor, giant cell reparative granuloma, aneurysmal bone cyst, chondromyxoid fibroma, brown tumor of hyperparathyroidism, myeloma, and an expansile metastatic lesion must be taken into consideration.\(^3,7\)

Despite the fact the GCT is not a sarcoma, the extent of tumor at the time of diagnosis and the high recurrence rate following limited resection often dictate the need of an en bloc resection through normal tissues to prevent local recurrence of the lesion. Such a treatment creates a significant skeletal defect and a challenging reconstructive problem. Reconstruction of the foot after en bloc excision is particularly difficult because of the need to restore the joint surface as well as bone and also foot is the weight bearing area so for the reconstruction bone that match the anatomy of the foot is used.\(^8\)

The various treatment modalities described in literature are curettage, curettage and bone grafting, irradiation, amputation, and resection with reconstruction. Local resection of the involved tumor with curettage and bone grafting with autograft is the preferred surgical treatment. First, no correlation has been found between the grade of giant cell tumor and the rate of recurrence. Therefore all giant tumors of foot should be considered locally aggressive. Although amputation may prevent recurrence, it is cosmetically deforming and decreases the function of the foot.

References

Blood Loss in Exsanguination Deaths
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Abstract
Deaths by exsanguination among various underlying causes of death were analyzed in order to expand the knowledge on the relation of extravasated blood volume to other documented parameters.

A consecutive series of 193 cases of ruptured thoracic aortic aneurysm (n=13), gunshot wounds (n=63), stab wounds (n=28), rib fractures (n=5), and blunt injury to thoracic aorta (n=84) were investigated.

The amount of internal bleeding into pleural cavities only varied greatly (200 - 3,400 ml) with a mean value of 1,174 ml, slightly higher among males. Age, body weight, cause and manner of death, external bleeding, alcohol inebriation, multiplicity of injuries, and degree of coronary heart disease did not significantly affect the amount of internal (pleural) bleeding. Also, post-mortem delay to autopsy did not correlate to the amount of extravasated blood, indicating that post-mortem bleeding is of no importance in these deaths.

Key Words
Exsanguination, survival time, pleural blood volume.

Introduction
At post-mortem examination of violent deaths it is often important to estimate the time period from the fatal injury to death. Little is known, however, about this time period and its relation to the fatal condition, but injuries to the heart or the great vessels and multiplicity of injuries are associated to shorter survival time.1-3 The importance of type of injury, presence of other injuries or disease, influence of drugs and of sex, age, body size, or of influence of time delay from death to autopsy may also bring up questions. In the present study, we aimed at expanding the knowledge on the possible relation between such factors and internal blood loss in various causes of exsanguination.

Material and Methods
Information on all consecutive medico-legal autopsies in Umeå, Sweden, 1992 - 2002 was obtained from the database of the National Board of Forensic Medicine. All victims who died from the following underlying causes of death (ICD-9)4 by exsanguination: ruptured thoracic aortic aneurysm, injury to heart and lung; gunshot wound or stab wound, rib fractures, and injury to thoracic aorta, were included.

Police records, hospital records, and autopsy reports, were examined.

The internal blood loss, approximated to the nearest 50 ml level, was documented separately for the pericardium, the pleural cavities and the abdominal cavity. Cases were excluded when no reliable data on the volume of blood loss was available, including if hospitalized ≥3h, and when bodies were decomposed. Coronary atherosclerosis was classified as none, mild, moderate, or severe.

The alcohol concentration was determined in femoral vein blood5. External hemorrhage was arbitrarily classified into "small", "moderate", "large" or "could not be estimated".

Statistical Methods
Statistical significance was calculated in Mann-Whitney test with 95% confidence intervals (CI) and Samples T-test and ANOVA for multiple comparisons. Time to death and its association with intracavital blood volume was analysed using Cox regression.

Results
In total, 193 individuals (153 males, 40 females) were included. Mean age was 51 years (range 12-90 years), males 51 and females 53 years.

Cause of Death
The material comprised cases with ruptured thoracic aortic aneurysm (n=13), gunshot wounds (n=63), stab wounds (n=28), rib fractures (n=5), and blunt thoracic aorta injury (n=84) (Table 1).

Internal Blood Loss
For 152 victims internal bleeding was limited to the pleural cavities only, with a blood volume of 200 - 3,400 ml (mean 1,174 ml; SD 623). In males (n = 126) the mean volume was 1,195 ml (SD 647, 95% CI 1,081-1,309 ml), not significantly larger (p=0.068) than among females (n = 26); 1,074 ml (SD 488, 95% CI= 876-1,271 ml).

In the total series of cases, the range of the mean volume of pleural blood was 940 - 1,390 ml, without significant difference (p=0.197) between the different cause of death groups (Fig 1A).

Fig.1A: The mean volume (ml) (+SD) of pleural bleeding in cases with bleeding to pleural cavities only by type of injury or disease (n=152)
The mean pleural blood volume in traffic victims was 1,296 ml, in all accidental deaths 970 ml, in suicides 1,036 ml, in homicides 1,121 ml, in natural deaths 1,409 ml, and in undetermined manner of death cases 1,025 ml (Fig 1B). There was no significant (p= 0.518) difference in pleural blood volume between different manner of death groups, nor (p=0.159) between natural death (n=11, 1,380 ml) and unnatural death cases (n=141; 1,160 ml).

Fig. 1B: The mean volume (ml) (+SD) of pleural bleeding in cases with bleeding to pleural cavities only by manner of death (n=152)

In victims without pleural bleeding, the mean volume of blood in the pericardial sac was 557 ml (SD 192, n=15), and in the abdominal cavity 900 ml (n=1).

Rate of Bleeding

Information about the approximate survival time was recorded in only 28 cases (15%), and was estimated to 5 min - 3h, giving a mean rate of bleeding of 0.5 ml/kg/minute (range 0.3 -0.9 ml/kg/min). In some victims, physical activity after the injury was objectively documented. E.g., one victim of stabbing descended the stairs from the first floor and collapsed on the ground floor.

External Blood Loss

In cases with “small” external blood loss the mean pleural blood volume was 1,322 ml, with “moderate” 946 ml, and with “large” 921 ml (Fig 1C). There was no statistically significant difference with regard to pleural blood volume (p=0.340).

Fig. 1C: The mean volume (ml) (+SD) of pleural bleeding in cases with bleeding to pleural cavities only by amount of external bleeding [none-small, moderate or large] (n=87).

Alcohol

Ethanol was detected in (45/152) 30% of the victims with pleural bleeding only (One case where urine only was tested had a urine alcohol concentration of 2.2 g/l.) There was no significant difference (p=0.572) in mean pleural blood volume between victims testing positive vs negative (1,105 ml vs 1,204 ml) (Fig 2A). Stab wound and gunshot wound victims had the highest proportion of test positive victims (53% and 37%, respectively); in the other cause of death groups 20-23% were test positive.

Fig. 2A: The mean volume (ml) (+SD) of pleural bleeding in cases with bleeding to pleural cavities only by blood alcohol concentration (BAC; g/l) (n= 151)

Multiplicity of Injuries

In 32 % (n=62) of the victims there was only one* significant lesion [in aorta (n=47), lungs (n=10) or heart (n=5)]. There was no significant difference (p=0.867) in internal pleural blood volume between victims with one* (95% CI 988-1,356 ml) vs more than one* lesion (95% CI 1,054-1,296 ml).

* disregarding minor skin injuries

Coronary Atherosclerosis

Sixty victims (31%) had no atherosclerosis (mean pleural blood volume 1,255 ml; SD 672). The mean pleural blood volume in victims with mild atherosclerosis (n=17) was 1,073 ml (SD 508), with moderate (n=49) 1,099 ml (SD 544), and with severe (n= 26) 1,198 ml (SD 717) – without statistically significant difference (p=0.296).

Age and Body Weight

Victims aged ≥60 years had a mean pleural blood volume of 1,031 ml (range 992 -1,050 ml), among those <60 years 1,274 ml (range 1,255 – 1,396 ml), a difference not statistically significant (p=0.303) (Fig 2B). Nor was there a significant correlation (p=0.385) between body weight and pleural blood volume (Fig 2C).

Fig. 2B: The mean volume (ml) (+SD) of pleural bleeding in cases with bleeding to pleural cavities only by age (yrs) (n= 152)
blood loss (mean 1,189 ml) than females (mean 935 ml). Sexes, where males had a significantly (p=0.038) larger total lost. Variations are reflected in our four individuals dying after a loss moderate situations, pleural cavities, with a mean volume of 1,174 ml. In clinical explains a relatively low rate of penetrating injuries in our series. Differ of course according to social setting, crime rate, availability and the amount of extravasated blood, both routinely findings that may aid in this estimation are the injury pattern reconstruction of the event. Two of the few objective autopsy unconsciousness or death is an important aspect in the estimation of the time period from the fatal injury to postmortem time delay and pleural blood volume (mean was removed in 15 minutes 9

30 minutes. With an estimated blood volume of 80 ml/kg this would correspond to a loss of ~11-34% of the total blood volume in 1/2h or less.

These findings differ from porcine studies showing that the time lag from trauma to death is 15-60 minutes at which time 40-60% of the total blood volume was lost12,13. In pigs bled at 1 ml/kg/min, the survival time was about 50 minutes, while animals bled at 1.25 ml/kg/min survived for 40 minutes15. Removal of 60% of estimated blood volume resulted in 33% mortality if the hemorrhage time was 28 min, but in 100% mortality if the time was shortened to 14 min12. It is unknown if the discrepancies between these experimental studies and our results on humans depend upon the experimental surgical procedures used.

A quite different situation with very rapid incapacitation from blood loss occurs if the blood flow to the brain is compromised. After bilateral cutting of common carotid arteries and jugular veins in sheep and calves, brain responsiveness was lost in 14-17 seconds16,17, after unilateral in 70 seconds18.

Sharp force wounds result in a lower bleeding rate than gunshot wounds, due to the elasticity of skin and soft tissues2, 3. In our study, stab wound victims had a (not significantly) larger pleural blood volume than victims of gunshot wounds, in agreement with the findings of Spitz et al2, indicating a lower bleeding rate in the former group1. Victims often show physical activity after the injury, sometimes to a surprising degree1-2. Stab wound victims were physically more active than firearm injury victims, related to a slower bleeding rate among the former2,3, but the acting capability and survival time may vary greatly1. These findings are confirmed also in the present study.

Since many persons were found dead, the exact survival time was unknown in the majority of cases (85%) in our study. In the near future, however, we can expect to have more accurate information about survival time in studies of surveillance camera recordings of people fatally injured.

Fifty-three per cent of the stab wound victims tested positive for alcohol, 37% of the gunshot victims, and 20-23% of the victims in the other cause of death groups1. We found no correlation between presence of alcohol and amount of pleural blood, and one previous report found no correlation between alcohol and post injury activity or survival time1.

Considerable amounts of blood can accumulate in the body cavities after post-mortem injury, 50-1,000 ml blood after post-mortem injury of lung tissue18, or 100-1,300 ml blood after post-mortem cutting of the aorta19. The shorter the post-mortem interval, the larger was the amount of bleeding19. In these two studies, however, the cause of death was natural death or asphyxia except for one single case of “multitrauma” without thoracic injury and without stated internal bleeding18 and with only 50 ml post-mortem bleeding. Not in one single case in these two studies, comprising altogether 70 cases, was the mechanism of death hemorrhage. It can thus be safely assumed that these reports are not representative for possible post-mortem bleeding in victims of exsanguination deaths. We found no correlation between time delay from death to autopsy vs amount of internal bleeding, indicating that post-mortem bleeding is not a major feature in exsanguination deaths. However, since the minimum delay from death to autopsy in our study was 1 day we cannot draw conclusions regarding possible post mortem bleeding in the early post-mortem period.

It is common knowledge among practising forensic pathologists that blood often may not be retrieved from decomposed bodies, but since decomposed bodies were excluded from our study, with a maximum post mortem time to autopsy of 15 days, this process was of no significance in our study.
Table 1: Cause of death in relation to mean volume of extravasated blood.

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Pleural blood only</th>
<th>Pericardial blood only</th>
<th>Abdominal blood only</th>
<th>Blood in all body cavities</th>
<th>Total (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruptured thoracic</td>
<td>1,390ml</td>
<td>575ml</td>
<td>n=0</td>
<td>n=0</td>
<td>13</td>
</tr>
<tr>
<td>aortic aneurysm</td>
<td>(n=5)</td>
<td>(n=8)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Injury to heart and lung; gunshot wound</td>
<td>1,090ml</td>
<td>n=0</td>
<td>n=0</td>
<td>1,150ml</td>
<td>63</td>
</tr>
<tr>
<td>Lung; stab wound</td>
<td>(n=55)</td>
<td>(n=8)</td>
<td></td>
<td>(n=8)</td>
<td></td>
</tr>
<tr>
<td>Injury to heart and lung; stab wound</td>
<td>1,239ml</td>
<td>537ml</td>
<td>900ml</td>
<td>1,275ml</td>
<td>28</td>
</tr>
<tr>
<td>Rib fractures</td>
<td>940ml</td>
<td>n=0</td>
<td>n=0</td>
<td>n=0</td>
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</tr>
<tr>
<td>Blunt injury to thoracic aorta</td>
<td>1,280ml</td>
<td>523ml</td>
<td>n=0</td>
<td>1,432ml</td>
<td>84</td>
</tr>
<tr>
<td>(n=74)</td>
<td>(n=3)</td>
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<tr>
<td>Total mean</td>
<td>1,175ml</td>
<td>575ml</td>
<td>900ml</td>
<td>1,279ml</td>
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<td>(Total n)</td>
<td>(152)</td>
<td>(15)</td>
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<td>(25)</td>
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</table>

Strengths of the present study are the large sample in an unselected population of exsanguinations deaths covering different mechanisms of hemorrhage and underlying causes of death and illustrating a representative panorama of the region, and the fact that the internal blood loss was carefully measured. Limitations of the present study are the difficulties to estimate the amount of external blood, and that soft tissue blood loss in closed skeletal injury and in retroperitoneal hemorrhage for obvious reasons could not be quantified. The former problem was to some extent reduced by a critical evaluation of the external blood loss, however arbitrary. Further, the survival time was obviously not recorded exactly.

Conclusions
This report confirms that the great majority of exsanguination victims are male, and that nearly half of all such deaths are caused by blunt thoracic trauma – although the proportion of different causes of death will vary according to the social setting investigated. The amount of internal bleeding varied greatly and was only slightly higher among males. However, age, body weight, cause of death, manner of death, estimated amount of external bleeding, alcohol inebriation, multiplicity of injuries, and degree of coronary heart disease did not significantly affect the amount of pleural bleeding. We also did not find any correlation between post-mortem delay to autopsy and the amount of extravasated blood, indicating that post-mortem bleeding is of no importance in these deaths.

Acknowledgement
We acknowledge the assistance of Hans Stenlund, Department of Public Health, Umeå University, in the statistical analyses.

References
Palatal Index & Osteometry: A parameter for sex determination
Arunachalam Kumar*, Remya K**, Kavitha K***
*Professor, **Lecturer, ***Tutor, Department of Anatomy K S Hegde Medical Academy, Mangalore 575018, India

Abstract

A scientific knowledge of the anthropological manifestation in facial skeleton is of paramount importance in the field of orthodontics, paedodontics reconstructive maxillofacial surgery and forensic odontology. Osteometry and non-metrical observations on the human skeleton have performed on basis of scientific compilations in determination of sex, racial and ethnic demonstrations. The bony palate sometimes shows some characteristic non-metric variations in its morphology. Increased arch dome height and presence of the palatine torus are among the better known. This study was undertaken to determine sexual differences, palatal dimensions in 32 female and 36 male crania of Indian origin were analyzed to arrive at metrical differences in male and female adult. Our observations while reveal that there is quantifiable dimensional reduction in all parameters of measurements in the female palate. The most striking finding of ours was that palatal bilateral asymmetry was present in skulls within the same sex.

Introduction

Osteometry, cephalometry, non-metric cranial and postcranial observations and the volumes of statistical data thereform form a reliable, time tested base of information used with a reasonable confidence in the identification, sexing and the assignment of skeletal components in man and animal1,2. Indices - cranial, pelvic and other such regression formulae and the like mathematical parameters are today used with an increased frequency in multidisciplinary approaches in fields like orthopedics to orthodontics. The availability of simpler, yet more accurate instrumentation techniques have made the study of physical anthropology an open one. Widespread applications are now made of osteometrical data in medicolegal sciences specially in establishing identities from mass disasters. Ethnic, racial and geographical features in facial and cranial bones have tremendous clinical bearing on the prognosis and aesthetics in maxillofacial and reconstructive surgery.

Unfortunately however lack of sufficiently exhaustive data banks on metrical values from the subcontinent populations has seriously handicapped the scope of practitioners in the specialties. The dimensions and variations of the normal bony adult palatal shelf are of vital value to oral surgeons. Little, if any, is available by the way of complications, on the size and sex of this complex multijointed gomphosial bony roof of the buccal cavity, in Indian medical and dental literature. This study attempts to dwell on the analysis of the palate in a bid to initiate more research in these less attended to parts of anatomy.

Material and Methods

68 adult crania, 32 female and 36 male, collected from the department of anatomy, were used in this study. Grossly malformed, sub-adult or skulls showing senile changes were eliminated from the purview of the work.

Table 1: MALE: Dimensions in millimeters

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<thead>
<tr>
<th>No.</th>
<th>B-C</th>
<th>A-B</th>
<th>A-C</th>
<th>A-D</th>
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<td>42</td>
<td>10</td>
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</tbody>
</table>

The bony palate was measured in 5 dimensions (Figure)

a) Pyramidal process to pyramidal process (B-C)
b) Incisive fossa to left pyramidal process (A-B)
c) Incisive fossa to right pyramidal process (A-C)
d) Incisive fossa to posterior nasal spine (A-D)
e) Arch height (E-F)

All measurements were made using anthropometric calipers to the nearest millimeter. The compiled data was analyzed for the maximum, minimum and mean values for

Fig. 1:

Table 1: MALE: Dimensions in millimeters

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email: deankshema@nitte.ac.in, ixedoc@hotmail.com
Osteometry and nonmetrical observations of human skeleton have formed the basis of many scientific compilations in the assignment of sex, race and its demarcations. This paper presents the metrical data from the bony palates and infers that the palatal index as the fairly reliable base for identifying the sex. The marked smaller values in all the parameters measured for the female palate as compared to the male conforms to the known morphometric reduction of the female skeleton. The most interesting observation of this study is however the bilateral differences seen in same palate.

The palate is known to mirror diseased processes in man, especially the congenitally acquired ones. Marfan’s Rubinstein-Taybi and Ellis Van Creveld Syndromes, the palatal arch height is of diagnostic importance and in congenital syphilis palatal perforation is of confirmatory value. Cleft palates, both unilateral and bilateral appear in regular frequency in normal population. The palatine torus, a bony ridge seen alongside the alveolar process is characteristic of certain ethnic populations. The palate is known to mirror diseased processes in man, especially the congenitally acquired ones. Marfan’s Rubinstein-Taybi and Ellis Van Creveld Syndromes, the palatal arch height is of diagnostic importance and in congenital syphilis palatal perforation is of confirmatory value. Cleft palates, both unilateral and bilateral appear in regular frequency in normal population. The palatine torus, a bony ridge seen alongside the alveolar process is characteristic of certain ethnic populations.

A scientifically deep knowledge of the anthropological manifestations in the facial skeleton is of paramount importance in the growing fields such as forensic odontogy, physical anthropology, orthodontics and paedodontics. The art of reconstructive facial surgery and role of the maxillofacial surgeon in the determination of the aesthetics outcomes makes the studies such as this of value and bearing.

Each dimension in either sex (Tables 1 & 2). Palatal Index was then collated for the sexes. All measurements were statistically evaluated to arrive at metrical differences in male and female adult Indian ethnic population (Tables 3 & 4).

Observations and results

In male B-C range was between 40mm to 50mm. B-C in female palate was between 35mm to 44mm. Mean difference was 5.18mm and standard deviation for male 3.1006 and female was 2.3832. The A-B in male was in the 42mm to 56mm range whereas in female it was between 42mm to 57mm. Mean difference was 2.87mm and standard deviation in male was 2.5871 and in female was 2.1784. Mean difference is 1.41mm and the standard deviation in male was 2.93 and in female was 2.55. E-F ranged between 8mm to 16mm in male and stood between 6mm to 13mm in female. The mean difference is 1.41mm and the standard deviation in male was 3.0903 and in female was 4.5613. A-D was 39mm to 44mm in the male and was 43mm to 57mm in the female. Mean difference is 2.93mm and standard deviation in male was 9.0610 and in female was 6.4674. A-C range in male was between 41mm to 57mm and was 43mm to 57mm in the female. Mean difference was 2.3832. The A-B in male was in the 42mm to 56mm range whereas in female it was between 42mm to 57mm. Mean difference was 5.18mm and standard deviation for male 3.1006 and female 4.7664.

The palate is known to mirror diseased processes in man, especially the congenitally acquired ones. Marfan’s Rubinstein-Taybi and Ellis Van Creveld Syndromes, the palatal arch height is of diagnostic importance and in congenital syphilis palatal perforation is of confirmatory value. Cleft palates, both unilateral and bilateral appear in regular frequency in normal population. The palatine torus, a bony ridge seen alongside the alveolar process is characteristic of certain ethnic populations.

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References

2. Kumar A, Pai ML and Das R, 1984, Foramen Magnum index for sexing adult Indian crania 1st World Conference of Forensic Medicine and Toxicology, Bhopal, India.
Reliability of Davidson Body to Determine the Nuclear Sex of the Individual: Interobserver variability between pathologists

Basavaraj P Bommanahalli*, Chandrashekar M*, Shashikala P**, Vijayakumar B Jatti***

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Abstract

Determination of the sex of the individual has great medicolegal importance to solve many criminal and civil problems. But, identifying the sex of hermaphrodites, pseudohermaphrodites, concealed sex and body in advanced state of putrefaction or mutilation, might be difficult. Where, determination of the genetic or nuclear sex by identifying Davidson body in neutrophils would solve issues. Thus, our study aimed to identify the sex of individual by screening neutrophils for the percentage of Davidson bodies and to check interobserver variability.

Peripheral blood smears of 200 subjects (a range of 1 yr to 90 yr) were studied by two pathologists. The pathologists were unaware of sex of the subjects. Smears were well made and stained with leishman stain. Percentage of Davidson bodies was recorded separately in all cases by both the pathologists. Later, the observation was correlated with sex. Interobserver concordance was calculated by Kendall's tau test. One way ANOVA test was used to find out relation between age and number of barr bodies. Davidson bodies were not seen in 103 subjects and all these were males. A wide range of 1 to 9% sex chromatin was found with the mean of 3.7% in 97 cases. All these 97 subjects were females. Two to three percent of Davidson's bodies were found in 46.4% (45/97) of the cases, in advanced state of putrefaction or heavily mutilated bodies. In conclusion, identification of Davidson body in the neutrophil is very simple, cost effective and rapid method to determine the genetic sex of the individual.

Key words

Davidson body, Barr body, Neutrophil, Sex chromatin, Lyonisation.

Introduction

A medico-legal expert may have to determine and identify the sex of the individual, which may help to sort out the legal matters related to inheritance, disposal of property, marriage, impotence, matrimonial suits, legitimacy, and affiliation cases etc. In ordinary cases, mere examination for the presence of sex organs and secondary sexual characteristics would suffice to identify the sex of the individual. But in special situations like in cases of hermaphrodites, pseudohermaphrodites, concealed sex and body in advanced state of putrefaction or heavily mutilated body parts, identification of sex of the individual might be difficult. These cases would be solved by determining the genetic sex by forensic pathologist or by geneticist, and later correlating with presence of type of external and internal genitalia.1

Genetic sex is determined by identifying the presence of sex chromosome X or Y. The males have XY whereas, female have XX sex chromosomes. In females, one of the X chromosomes differed from all other chromosomes in the extent to which it is condensed or inactivated. Only one X chromosome is essential for normal activity of cell in females. The process of inactivation and condensation is called as lyonisation.2 Because of this, sex chromatin or barr body is seen as planoncave condensed chromatin adjacent to nuclear membrane in 80-90% of somatic cells of the normal females. The barr bodies are very well made out in cells of buccal mucosa, cervico-vaginal epithelium, skin, nerve cells, cells of cartilage, adrenals and amniotic cells.1,2 The granulocytes of blood also show barr body which has special appearance of drumstick, a chromatin appendage known as Davidson body. The sex of the individual could be identified very easily, by simple method of identifying the Davidson body in granulocytes, when blood is the only tissue sample available.1,2

Aims and Objectives

Our study aimed to determine the sex of the individual by identifying the presence of Davidson body (drumstick chromatin appendage) in the neutrophils and to check interobserver variability in identifying the Davidson's body in the neutrophils.

Material and Methods

This study was conducted in department of Pathology, SS institute of medical sciences and research centre Davangere, Karnataka in the month of August 2010. Peripheral blood smears of two hundred subjects were studied. Sex chromosomal abnormalities like Turner's syndrome, Klinefelter's syndrome were excluded clinically. Two experienced pathologists examined the peripheral blood smears and were unaware about the sex of the patients. The smears were well made and stained with leishman stain. Smears were screened horizontally from head to tail and tail to head, in search of Davidson body in 100 mature neutrophils. Both the pathologists examined all the smears separately and determined the percentage of Davidson bodies in the neutrophils. Later, percentage of neutrophils showing Davidson body was correlated with phenotypic sex of the individual. Interobserver concordance was calculated by Kendall’s tau test. One way ANOVA test was used to find out relation between age and number of barr bodies.

Results

A total number of 200 subjects were studied. Mean age was 38.4 years. Male and female subjects were 103 and 97 respectively.

Observation made by pathologist I (Table 1 & 2)

Davidson bodies were not found in 103 subjects and all these were males. A wide range of 1 to 9% sex chromatin was found with the mean of 3.7% in 97 cases. All these 97 subjects were females. Two to three percent of Davidson’s bodies were found in 46.4% (45/97) of the cases,
Table 1: Observation of pathologists in females

<table>
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<th>% Davidson body in females</th>
<th>Pathologist I</th>
<th>Pathologist II</th>
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<tr>
<td>No. of cases</td>
<td>%</td>
<td>No. of cases</td>
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Table 2: Observation in females by pathologist I

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Observations made by pathologist II (Table 1 & 3)

One hundred and three subjects were negative for Davidson body and all these were males. A range of 1 to 8% Davidson bodies was found in 97 subjects and all of them were females. The average percentage of Davidson bodies in females was 3.6. Majority (45.3%) of the female had 2 to 3% of Davidson bodies.

None of the neutrophils showed double or triple Davidson’s bodies. The variation in number of sex chromatin was insignificant (p value >0.05) in correlation with the age of the patient. Observations by both the pathologists were concordant. But minimal variation in the observation regarding the percentage of Davidson bodies in females was noted between the two pathologists and it was insignificant. This could be because of minute differences in the way of moving the stage of microscope while screening the slide. That is both the pathologists would not get to see the same neutrophils while screening manually. There was no significant relation between number of barb bodies and age.

The number of barb bodies seen in a cell is one less than the number of X chromosomes present. Thus normal females have one barb body whereas normal males don’t have any. The sex chromatin body of the neutrophil of females is a small drumstick chromatin mass, usually adjacent to the nuclear membrane. It stains deeply with hematoxylin, Feulgen reagent, and thionine and is approximately 0.7 to 1.2 µm in diameter. The drumstick chromatin mass (Figure. 1) may project from one of the nuclear lobes of the segmented neutrophils in the blood. They are well-defined, solid, round projections of chromatin connected to a lobe by a single, fine chromatin strand. They must be distinguished from small-clubbed or racket-structured, nonspecific nodules that may be smaller or larger as well as irregular in shape or lacking in chromatin, as well as from small (minor) lobes attached to the rest of the nucleus by two strands. Eosinophils and basophils may also have drumsticks. Confirmation of the X chromosome in the drumstick has been provided by in situ hybridization. Sessile nodules are equally gender-specific but are more difficult to recognize.

The study by Davidson and Smith in 1954, showed approximately 2 to 3% (extreme range, 1 to 17%) of neutrophils with drumstick chromatin appendage in females. No drum stick chromatin appendages were found in 500 neutrophils of the male. Age had no influence on this cellular finding. Similarly in the study by Maclean N et al ⁵ none of the normal males had sex chromatin.

In our present study, the males were negative for Davidson body. Whereas, in females, on an average 3.7% (wide range of 1 to 9%) and, 3.6% (a range of 1 to 8%) of Davidson bodies were found by pathologist I & II respectively. The findings of both the pathologists were concordant. But minimal variation in the observation regarding the percentage of Davidson bodies in females was noted between the two pathologists and it was insignificant. This could be because of minute differences in the way of moving the stage of microscope while screening the slide. That is both the pathologists would not get to see the same neutrophils while screening manually. There was no significant relation between number of barb bodies and age.

The number of barb bodies and number of drumstick chromatin appendages increase with increase in X chromosomes in case of super females. Even larger drumstick chromatin appendage might be seen in case of isochromosome formed by duplication of long arm of X chromosome. Drumsticks or sessile nodules are seen in chromatin-positive males with Klinefelter syndrome and are absent in chromatin-negative females with Turner syndrome. Drumsticks are mainly seen in mature females and are more difficult to recognize.
neutrophils and may be difficult to find in the presence of a marked shift to the left. Drumstick counts are reportedly low in the leukocytes of patients with chronic myelocytic leukemia, paralleling the low leukocyte alkaline phosphatase and catalase concentrations. In our study, single Davidson body was found in all screened neutrophils of female patients.

**Conclusion**

Identification of Davidson body in the neutrophil is very simple, cost effective and rapid method to determine the genetic sex of the individual i.e. sex chromatin positive or negative individuals. The interobserver variability is very minimal when methods and procedures are standardized and, with experienced pathologist. This method could be used to solve the special legal issues where sex determination of the individual is needed and when blood is only the tissue sample available for investigation.

**References**

Suicidal Hanging in Franco da Rocha, Brazil - a Six-Year Prospective and Retrospective Study

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Abstract

Introduction

Brazil is among the ten countries with the largest absolute numbers of suicide (7,987 in 2004) in the world. This prospective and retrospective research is done with an aim to develop the victimological profile of suicidal hanging in this region of Brazil, and to describe the gender differences among males and females that may prove important in identification of people at risk. In the same series of cases, we analyze the internal injuries at the neck region of the victims, as well as the characteristics of the node and its location in the neck and the results of drug tests performed in the blood of victims.

Methods

This research was carried out in the Coroners Office of Franco da Rocha. All deaths due to hanging autopsied at the aforementioned centre between January 2000 and December 2006 were included in the study. Thirty-four of them were done prospectively by the author in the same period. Blood of the victims was collected for toxicological analysis. In addition to demographic data, internal lesions found in the neck were recorded.

Results

2120 autopsies were conducted at the aforementioned centre during the study period. Deaths due to suicidal hanging constituted 5% (n = 106) of the total cases. Majority of the victims were males. The age of the victims ranged from 11 to 86 years (peak incidence in the 3rd decade of life). We found a simple fracture of the hyoid bone in 22.6% of cases (n = 24). Fracture of superior horn of thyroid cartilage was found in 11.32% (n = 12). About 47.16% (n = 50) of the victims had high levels of blood alcohol. The research also showed positive for benzodiazepines in 37.73% of cases (n = 40). Antidepressants were present in the blood of 41.5% of the victims (n = 44).

CONCLUSION

In our series, the internal injuries to neck structures were less frequent than those reported by other studies. Male-female ratio was 2.02:1, mainly in the 3rd decade of life. Also, abuse of drugs and alcohol seems to play a role in inducing suicide.

Introduction

Brazil is in the group of countries with low relative rates of suicide. These rates, according to the Ministry of Health of Brazil varied from 3.9 to 4.5 for every 100 thousand inhabitants each year between 1994 and 2004. However, as it is a populous country, Brazil is among the ten countries with the largest absolute numbers of suicide (7,987 in 2004). Suicide is also a major social problem with tragic implications for all sections of society. Thus, it is important to identify the contributing factors and to establish strategies for the promotion of positive mental health throughout communities at all levels.

Although Brazil has a rate generally considered low by World Health Organization (WHO), there is a tendency to rise (1994-2004 period) mainly among women: the proportionate increase rates in the period was 16.4% for men and 24.7% in women.

The suicide rates, by age, for the Brazilian states in 2004 are also rising. The same data show that for certain age groups (e.g. adolescents) and regions of the country (e.g. richest states in the country) rates can be considered moderate and high according WHO criteria.

Preference of method of suicide in men and women is complexly determined but hanging and poisoning were very common forms of suicide in Brazil as in other countries.

Hanging is a form of ligature strangulation in which the force applied to the neck is derived from the gravitational drag of the weight of the body. The most common hangings are suicidal as opposed to accidental and rarely homicidal. The ligature material commonly used is either the easily available clothing or a rope. In most cases, a ligature mark is present on the neck. There are a number of mechanisms by which hanging may cause death: stretching of the carotid complex causing reflex cardiac arrest; venous and arterial occlusion; airway obstruction; disruption of the spinal cord, etc.

Franco da Rocha is an urban and poor township situated in the Great Sao Paulo, Brazil. This region is considered one of the most violent of the state of Sao Paulo, with a high rate of mortality from external causes.

The city’s population, according to official census data of 2008, is 129,304 inhabitants. In this city is located one of the major Mental Institutions of Brazil, named “Juqueri” (about 1100 patients hospitalized in 2004). In this institution, most patients are treated on an outpatient basis or become part of free time, walking in the vicinity of the hospital.

This prospective and retrospective research is done with an aim to develop the victimologic profile of suicidal hanging in this region of Brazil. In the same series of cases, we analyze the internal injuries at the neck region of the victims, as well as the characteristics of the node and its location in the neck and the results of drug tests performed in the blood of victims.

Methods

This 6-year prospective and retrospective descriptive research was carried out in the Coroners Office of Franco da Rocha. All deaths due to hanging autopsied at the aforementioned centre between January 2000 and December 2006, where manner of death was deemed to be suicidal by hanging as per police investigations and autopsy findings were included in the present study. Thirty-four of the autopsies were done by the author of the study, prospectively, using the method proposed by Prinsloo and Gordon. Toxicological tests were performed at the Laboratory of Toxicology of the Forensic
Medicine Institute of São Paulo, by means of gas chromatography. A victimologic profile was made based on autopsy records and information furnished by the police in inquest papers.

**Results**

Tables 1, 2, 3 and 4 show the results we found. A total of 2120 autopsies were conducted during the study period.

The poison favorite among victims of suicide by poisoning is a rat poison called “pellet” (poison of a group of organophosphates), present in the blood of 85 victims (60.7% of 140 victims of suicide by poisoning). Firearms favorite among suicide was the revolver, .38 caliber, used by 62 victims (62%).

The region of the body preferred by these victims was the right temporal region (43%), followed by oral cavity (26%). The chest in the precordial region, was chosen by 21% of the victims.

Deaths due to suicidal hanging constituted 5% (n = 106) of the total autopsied cases. Table 2 shows the demographic data. Male-female ratio was 2.02:1. The age of the victims ranged from 11 to 86 years, with peak incidence in the 3rd decade of life. Decades of 3rd–5th were the most affected age groups, together accounting for 68.5% (n = 48) of the total hanging deaths. Mean age (±S.D) of the victims was 35.20 (±15.16) years. On comparative gender analysis, the age of the male victims ranged from 11 to 86 years, while their female counterparts were aged between 14 and 75 years. Mean age in males was 41.3 ± 15.3 and in females 24 ± 12.2 years. Females were particularly vulnerable during 2nd and 3rd decades and males in 3rd–5th decades.

We found a simple fracture of the hyoid bone in 22.6% of cases (n=24). Fracture of superior horn of thyroid cartilage was found in 11.3% of the victims (n=12). We did not found any fracture of the cricoid cartilage.

**Discussion**

Individuals of different races in different countries tend to use different methods of committing suicide. Cultural, religious and social values appear to play a vital role. Factors that place individuals at increased risk for suicide are complex and many interact with one another. Such factors
include psychiatric illnesses, alcohol abuse, interpersonal conflicts or broken or disturbed relationships, legal – or work – related problems and economic hardships.

The incidence of suicide by hanging in our sample does not differ from that of other authors, and it was about 5\% of cases\textsuperscript{4}. It should be noted also that most of the population in Franco da Rocha, and in Brazil as a whole, is Catholic. The Catholic religion forbids suicide, what could be a limiting factor to this type of violent death in the country. The same happens in other religions: Suicide being considered ‘haram’ is strictly forbidden in Islam. This may be the reason for lower number of suicides among Muslims as such.\textsuperscript{11} and in our series.

Otherwise, it is estimated that 6.6\% of the population of the State of Sao Paulo (one of the most populous regions of the country), is dependent on alcohol\textsuperscript{12}. In our study, a large number of victims, nearly 50\% of the total, showed high levels of alcohol in the blood. Never hurts to remember that the use of other drugs may also contribute to suicidal action. In our series, four victims have shown positive results for cocaine use.

A lower incidence of depression, a well recognized risk factor for suicide worldwide has been reported in suicidal poisoning mortalities in India.\textsuperscript{2} The reason for the lower incidence of depression in India is attributed to the reluctance of the people to attend a psychiatric clinic as well as shortage of trained psychiatrists.\textsuperscript{3,19} In contrast, in Brazil depression seems to be an important factor in the rise of suicides, since in our study, about 40\% of the victims showed evidence of use of antidepressant drugs.

Suicide in males is more common in most countries with the exception of China.\textsuperscript{14} Higher suicide rate in men is attributed to the fact that males are subjected more rigorously to the stresses and strains in life than females.\textsuperscript{15,16} The same happened in our study, with a ratio of two men to one woman among the victims. Noteworthy is the fact we found in our study that more than half of women who committed suicide by hanging have used bed sheets to hang themselves and no strings or wires. Interestingly, the choice of this type of material (not found among men) seems to indicate a preference basically feminine, and must have some psychopathology meaning which deserves further study.

Males outnumbered females in our study (similar to findings of other researchers,\textsuperscript{17,19} and that can be attributed to the fact that males are more exposed to increased stress, strain and financial burden. We also note that the population of Franco da Rocha, as well as the rest of the country is extremely poor, subject to all sorts of financial difficulties. Moreover, the high rate of unemployment in the country (about 8\% of the economically active population) can be an important factor for suicide.

Although suicidal hanging has been reported in all age groups after the first decade the peak incidence during 3rd and 4th decades is often attributed to the tremendous stress a person is put to during this period of life, and is similar to other studies worldwide.\textsuperscript{19,22} Suicidal hanging was relatively more common in young females, where 2nd and 3rd decades together accounting for nearly two-third of the female mortalities. A female is likely to face added stress and financial burden. We also note that the population of Franco da Rocha, as well as the rest of the country is extremely poor, subject to all sorts of financial difficulties. Moreover, the high rate of unemployment in the country (about 8\% of the economically active population) can be an important factor for suicide.

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Analyzing the internal signals in 175 cases of hanging, Nikolic et al. found simple fracture of the hyoid bone in 68\% of cases and fracture of the superior horn of thyroid cartilage in 53.1\% of cases\textsuperscript{21}. These figures are well above those found in our study.

There are some possible explanations for this discrepancy. Firstly, the autopsies reported in our study were performed by different professionals (thirty-four by the author and seventy-two by other professionals) – which can be a source of bias – mainly in the retrospective part of the study.

Another possible explanation for this difference can be the legal cause of death. In suicide we can imagine that the victim does not put much force on the structures of the neck to achieve the outcome. Thus, the internal injuries were less evident than those encountered in other forms of hanging (murder, for example).\textsuperscript{22} Our study is consistent with the one presented by Maxeiner & Bockholdt\textsuperscript{22}. The authors analyzed 66 cases of strangulation. Of these, in 19 due to suicide they found only 3 cases with fractures of the horns of the thyroid cartilage. Already in 47 cases due to homicide, 21 had fractures of the horns of thyroid cartilage.\textsuperscript{23} It is important to note that we did not found any fracture of cricoids cartilage – a suspicious sign of homicide\textsuperscript{24}. Thus, it seems fair to assume that in cases due to suicide by hanging the internal injuries in the neck are less aggressive than those injuries due to the cases of homicide or execution by hanging.

pesquisar.

## Conclusion

1. Suicidal hanging amounted for 5\% of the total autopsied cases in Franco da Rocha Coroners Office.
2. Abuse of drugs and alcohol seems to play a role in inducing suicide in our cohort.
3. A high number of victims in our study group committed suicide despite being in use of antidepressant drugs.
4. Male to female ratio was 2.02:1
5. It seems fair to assume that in cases due to suicide by hanging the internal injuries in the neck are less aggressive than those injuries due to the cases of homicide or execution by hanging, including cricoids cartilage fracture.

Conflict of Interest Statement
None to declare.

## References

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Abstract

Choking to death means asphyxiation by blockage of the internal air passages. If it occurs while eating, it is also called café coronary syndrome because it presents like an acute heart attack due to coronary obstruction. Café coronary syndrome, which was first reported as a sudden collapse at restaurants while dining, was found to be due to fatal occlusion of the upper airway by large pieces of food. Many individuals affected had consumed large amounts of alcohol prior to the incident. However, the same condition has been noticed among the institutionalized elderly with neurologic and psychiatric conditions. The diagnosis of café coronary syndrome can only be made with confidence after the clinical history and circumstances of death have been clearly established, impacted material has been demonstrated in the airway at autopsy, risk factors have been identified and other possible causes of death have been excluded. There is no specific autopsy finding that is indicative of café coronary syndrome. Therefore, autopsy examination should not only attempt to demonstrate airway occlusion by a bolus of food or foreign body, but also identify underlying risk factors such as an acute intoxication, use of dentures or poor dentition, and neurologic or psychiatric conditions. This case report is an un-witnessed death caused by café coronary syndrome, where a 65 year-old woman was found dead in her bed, last seen having dinner the previous night. At autopsy, a piece of banana weighing 18 grams was found in the larynx in between the epiglottis and the vocal cords. This piece of banana led to the complete obstruction of the larynx (Figure 1). Due to its deep position in the larynx, this food bolus was not visible at external examination of the body.

Case report

A 65 year-old woman had dinner with her family previous night and retired to her room with a banana. Next afternoon she was found dead in her bed with some secretions from her nose and mouth. The deceased had a chronic history of a psychiatric condition and lacked teeth. A medicolegal autopsy was performed one day after the incident. During the autopsy of the throat, a non-masticated single piece of banana (4.5 cm x 3.0 cm) weighing 17 g was found in the larynx in between the epiglottis and the vocal cords. This piece of banana led to the complete obstruction of the larynx (Figure 1). Due to its deep position in the larynx, this food bolus was not visible at external examination of the body.

Fig. 1:

The trachea and the bronchi contained mucoid secretions mixed with food, which did not extend to the bronchioles (Figure 2). The stomach contained 200 ml of partially digested food with two smaller pieces of banana and a banana peel (Figure 3). Lungs were mildly congested and edematous. Mild atherosclerosis was present within the major vessels but coronary ostia was patent.

Additionally, toxicological screening for substances that included alcohol was performed. The toxicological screening did not show any signs of drug intoxication, and the blood alcohol concentration was 0.00 g/L.

Fig. 2:

Many of these witnessed cases could have been saved with proper, prompt emergency care. Increased awareness of the condition can minimize the deaths that are not witnessed. The case on discussion highlights the need of being aware of the condition, especially in the elderly with psychiatric conditions who lack teeth or those who tend to gulp food without mastication.

Introduction

Obstruction of the upper airway by food is a recognized cause of sudden unexpected death. The phenomenon is often referred to as “café coronary syndrome”, a term coined by Haugen in 1963. However, those who observe sudden attacks—especially in the elderly—often do not suspect choking, and erroneously attribute death to coronary artery disease. Common misdiagnoses were cardiovascular failure; epileptic seizures; and intoxication from medication, drugs, or alcohol. The typical victim of café coronary syndrome was initially thought to be a healthy middle-aged male with predisposing factors such as a large food bolus, poor condition or absence of the teeth, alcohol intoxication, and neurological or psychiatric conditions.

Many of these witnessed cases could have been saved with proper, prompt emergency care. Increased awareness of the condition can minimize the deaths that are not witnessed. The case on discussion highlights the need of being aware of the condition, especially in the elderly with psychiatric conditions who lack teeth or those who tend to gulp food without mastication.
Discussion

Café coronary syndrome, otherwise known as death due to acute obstruction of upper airway by impacted food while eating was first described in deaths at restaurants in which the victim collapsed in front of others, usually while trying to swallow a piece of meat. The mechanism of death in café coronary syndrome has been debated. In certain cases, death results from simple obstruction of the airway by food. However, the rapidity with which fatal episodes may occur without obvious evidence of choking raises the possibility of reflex vagal inhibition due to stimulation of the superior laryngeal nerve, in turn causing cardiac arrest. It may be that a combination of mechanisms contribute to the lethal outcome.

The incidence of café coronary syndrome varies among populations and at different ages from 0.1 to 2 cases per 100,000. As was demonstrated in the current study, the most at-risk individuals are elderly, had poor dentition, and neurologic or psychiatric conditions. More than 60% of the victims in the current study had clinical histories of cerebral disease or psychiatric disorders. The type of food being consumed is a significant factor in these deaths. Poorly masticated meat or meat products has been found in 40% of hospitalised victims. Alternatively, semisolid, adherent foods such as banana and peanut butter may also be a problem, and not only in the elderly or infirm. Although old age and inadequate mastication due to poor dentition are well known predisposing factors, alcohol consumption, sedatives drugs and anti-parkinsonism drugs were also found to show an increased predisposition. Mentally impaired or brain damaged patients are therefore at higher risk for café coronary syndrome due to a higher incidence of dysphagia, abnormal eating behaviour and impulsivity. Impaired coordination of swallowing or reduced reflexes as may occur with cerebral palsy, motor neurone disease and bulbar palsy, are all conditions that may contribute to fatal airway obstruction from food.

The autopsy findings in cases of café coronary syndrome are often unremarkable and the diagnosis often has to be made on circumstantial evidence and by excluding other possibilities. For this reason a detailed clinical history of the victim is required, as well as a clear description of the circumstances of death. Sudden collapse during or shortly after a meal should always raise the possibility of café coronary syndrome and the autopsy examination should not only attempt to demonstrate airway occlusion by a bolus of food, but also identify or exclude underlying neurological disease. Poor dentition is another risk factor therefore careful examination of the mouth for the number and quality of teeth is also required at autopsy. One of the important issues a forensic pathologist should be aware of in the diagnosis of café coronary syndrome is the exclusion of an aspiration. A simple litmus test to determine the acidity will solve the issue of whether or not the secretions found in the lower respiratory tract were coming from the stomach. Finally, toxicological evaluation should be performed in all cases, as alcohol or drugs may contribute to diminished awareness of the appropriate amount of food to ingest, reduce the time spent masticating, and interfere with swallowing reflexes. Possible drug interactions in institutionalised individuals must also be considered in order to raise the question as to whether or not there has been appropriate use of sedative and/or psychoactive medications.

Conclusion

The greatest risks of café coronary syndrome are in factors that interfere with mastication and/or swallowing. These include intoxication or drug effect, absent teeth, and neurologic or psychiatric conditions. The preponderance of cases in the elderly is most likely due to the cumulative effect of a number of these factors with age. The quality of supervision of those who are of old age and have psychiatric conditions during meal times is another issue that will need to be addressed.

References

Identification of a Deceased in Disaster by Fixed Prosthesis

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Introduction

Identification is an essential requirement of any medicolegal investigations, because a mistaken identity may pose a problem in delivering justice. The importance of placing identification marks on dentures has long been acknowledged by the dental profession. A procedure for marking accurate identification markings on crowns and fixed partial dentures and denture micro-labelling with minimal cost.

Many authors have described methods for identification of dentures, which are used primarily in hospitals and nursing homes to match the dentures to the particular patient. It is more common to find people with at least one crown than people with a denture, and these can be used to identify patients for forensic purposes. It may be possible to complete identification through dentists’ records, but this procedure requires time and luck, and it is not predictable.

To facilitate dental identification standard techniques for marking acrylic complete denture have been advocated. Nevertheless, a removable prosthesis can be easily dislodged and lost. A dental identification that is rigidly fixed in the oral cavity is more desirable. A fixed partial denture marked with patient’s name, zip code, or other codes, it should be unique for each person. A complete code, such as the social security number, is too long to be marked on a single crown, the first five numbers can be marked on the lingual surface of the restoration. Even this reduced code will considerably shorten the research time needed for complete identification of the person.

Materials and Method

- An electric engraver powered by AC motor.
- Mahagani (ceramic stain)

Electric engraver is the instrument used to mark the fixed partial denture (FPD) or crown chairside before final cementation. The engraver point is made of carbide steel and can easily be used to mark crowns and FPDs made of gold or base metal alloys.

The instrument is used to write the surname, year of birth, and sex of the patient. Initials and abbreviations may be used when space is insufficient. We use a plus (+) sign as the symbol for female and an arrow (*) for male instead of the scientific biologic sex symbols ( female and male) for easier engraving.

Method

Complete all steps of the procedure for baking a porcelain crown up to the last bake. (Fig.1). Before the last bake, engraving of the details is done.

Hold the FPD or cast restoration firmly while resting the arm comfortably on a table. Do not use heavy pressure while engraving. Hold the engraver at a slight angle with a pen grasp. The knob on the side of the engraver controls the stroke length and the depth of engraving. Select the lowest setting that will produce a deep enough engraving. A medium setting is satisfactory for an FPD made of gold, and a higher setting is required for an FPD made of a base metal alloy.

Engraving is done on the lingual side. (Fig.2). After engraving is complete, engraved porcelain is stained with mahagani stain (Fig.3) and porcelain is glazed (Fig.4).

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Fig.1: FPD after dentine firing

Fig.2: Engraving of identification code

Fig.3: Ceramic staining in engraved area
Discussion

As considered from many studies, the ability of the oral cavity to resist high temperatures, thus preserving many key features that facilitate identification. With any major disaster, the reliance on dental identification becomes essential because teeth and restorations are the most lasting parts of the human bodies. The victims' identification is easier as the antemortem and postmortem record correlation is easier. This procedure for marking crowns and fixed partial dentures provides for rapid identification of deceased victims since metal restorations have a high resistance to all insults and they are cemented to the teeth and cannot be readily removed.

This marking system is simple, practical, and durable because the identifying codes are engraved on metal restorations that are cemented in place. The engraver can be used by the dentist to write the name and mark the cast prosthesis accurately without additional cost to the patient.

Conclusion

To facilitate the forensic odontologist's task of identification, the identifying codes on a fixed prosthesis would not only facilitate the procedure but greatly reduce the possibility of an inaccurate identification. This simple, reliable method of marking intraoral fixed restorations with an electric engraver is cost effective.

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Awareness of Common Medico Legal Issues – A study among practicing doctors

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Abstract
A survey was undertaken to assess the awareness of practicing doctors regarding the common medicolegal issues faced during clinical practice. Fifty doctors were included in the study which was conducted by using a pretest questionnaire method, combined with a short interview. The questionnaire contained 10 questions related to consent, wound certification, poisoning cases, dead cases, dying declaration & Professional Secrecy.

Objectives
1. To analyse the awareness & knowledge of doctors about common medicolegal issues. 2. To find out whether there is any correlation between the level of awareness with their age, qualification and clinical experience.

Results
Questions on “consent in Emergencies” obtained 98% correct responses, questions regarding “recording of dying declaration” had 96% correct response and for question in “ideal time for taking consent for surgical procedures” 90% correctly responded. The score was low for question on “minimum age for consent for physical examination” (24%) and question as “divulging details of the patient” (36%). Statistically significant difference was noted in answering questions on “minimum age for consent for physical examination” between age groups more than 45 years and less than 45 years (P = 0.019) and between graduates and postgraduates (P = 0.003). Those in less than 45 years group and graduates were more successful. Doctors with more than 10 years of clinical experience were more successful in answering questions on “issuing death certificates” (70%) and “how to deal with dead cases” (85%). It was only 40% and 56% respectively for those with less than 10 years clinical experience (P = 0.0375, P = 0.0353 respectively).

Introduction
Medicine is full of value conflicts. Medical practitioners must be aware of legal and ethical implications of clinical practice. They should be familiar with the various statutes, rules and regulations that are in force. In earlier days, people had unbounded trust in doctors, nurses and co-workers as also in the hospital. The situation is changing. Patients are questioning the action of doctors and hospitals. They have begun to assert their rights. Complaints lodged in courts, including consumer courts are constantly on the rise in India, and are a cause for concern. It is interesting to see that while for the entire decade of 1986 – 1996, only 145 complaints were filed in consumer courts, but in 1997 – 1998 as many as 201 complaints were filed¹.

Material and Methods
The awareness and knowledge regarding some common medicolegal issues were analysed by questionnaire method among fifty doctors practicing in Trivandrum and Kollam Districts of Kerala. The study period was from July 2009 to November 2009. The questionnaire contained 10 medicolegal questions. Each question was given different options; both correct and incorrect statements. The participants were free to choose more than one option and given provision for expressing fresh opinions if needed. Statistical analysis was done with the package SPSS.

Results and Discussion
Of the 50 participants, 56% were from Government sector and 44% from private sector. Distribution of participants according to their age showed that 46% belonged to 36-45 years followed by 24% in 26-35 years. Number of years of clinical experience was analysed and showed in (Table 2). Among the participants, 26% were having only graduate degree and the rest 76% had postgraduate degree. Frequency of correct responses given by 50 participants is shown in (Figure 1).

Table 1: Distribution of participants according to age.

<table>
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</tr>
<tr>
<td>Total</td>
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Fig. 1:
The opinions given by the participants to each question were as follows: For the question “on the cases which need wound certificates”, only 46% correctly responded by stating that other responses were (a) “all injury cases” other responses were (b) should be prepared “only when the police requests” (26%), (c) should be prepared “only when the patient/relative requests” (16%) and (d) in “assault cases only” (30%).

Any case of injury treated in casualty or inpatient ward or operation theatre is a medicolegal issue. Sometimes sufficient care is not given for details during medicolegal management of injury cases in hospitals. Major stress is given for therapeutic management. Medical officers invite adverse remarks from different quarters for the omission of medicolegal requirements.

For the question on “the type of poisoning case which needs police intimation”, the responses were; (a) “in all cases (84%)”, (b) only if critically ill (2%) (c) only in homicide cases (12%) and (d) Suicidal and accident cases (4%). One person opined that those poisoning cases that needs admission should be intimated to police.

If a case of poisoning is definitely accidental or suicidal in nature, the attending doctor is under no legal obligation to notify the police. All homicidal poisoning (definite or suspected) must be reported to police. Doctors working in government run hospitals are required to report every case of poisoning.

The responses to the question “when to take consent for a surgical procedure”? were (a) “blanket consent is sufficient (12%)”, and (b) “should be separately taken for each procedure (90%)”, which is the correct response. Written consent is obtained for all major diagnostic procedures and for surgical operations. Consent should refer to only one specific procedure.

Opinion on “minimum age for consent for physical examination”, were (a) 12 years (24%), (b) 14 years (4%), (c) 16 years (36%) (d) 21 years (26%) and (e) “don’t know” (10%). The minimum age for giving valid consent for physical/ medical examination is 12 years and only 24% got it correct.

For the question on “minimum age for giving consent for surgical procedures” the responses were (a) 14 years (8%), (b) 16 years (4%), (c) 18 years (72%) and (d) 21 years (16%). A person who is above 18 years can give valid consent to suffer any harm which may result from an act in good faith and which is not intended or known to cause grievous hurt or death. Only 72% opined correctly.

The participants responded to question on ‘professional secrecy’ by answering that details should be divulged to (a) “patient only” (36%) which is the correct response, (b) “next of kin also” (28%) (c) “to spouse also”(20%) (d) “to one more person other than the patient” (44%). During the course of treatment, a patient may reveal matters of a personal nature to his doctor. The doctor is obliged to maintain the secrecy of all such information, except when he is required by law to divulge it, or when the patient has consented for the disclosure.

The responses to question on “the type of cases in which death certificate can be issued”, were (a) in all hospital death (58%), (b) only in natural disease with confirmed cause of death (52%), (c) all brought dead cases (2%) and (d) accidental deaths (2%). A doctor should not certify the cause of death in the following instances like person brought dead to casualty, person dying in casualty, persons dying after admission but before making diagnosis, all cases of unnatural deaths, deaths due to animals, snake bite etc.and anaesthetic deaths. Only 52% opined correctly.

Only 68% of the participants responded correctly to the question of “how to deal with brought dead cases”, by stating that, “the body should be kept for autopsy and police intimation sent”. Other responses were as follows: “death certificate issued and police intimated” (26%), “death certificate issued and body released (14%)” and “arrival of the body should not be documented to avoid medicolegal issues” (20%). Similarly, for question on “how to deal with sudden unexpected deaths”, 80% correctly said that the body should be kept for autopsy and police intimated, 4% said that death certificate should be issued if patient is known to the doctor, 8% responded by stating that body should be released if relatives raise no suspicion. Medicolegal importance of sudden unexpected death is that it usually raises a suspicion of foul play and death certificate must not be issued in such cases till an enquiry is conducted and cause of death in confirmed.

Regarding the opinion about the person “who is authorized to record dying declaration”, 72% responded that it should ideally be done by a Magistrate and 60% also responded that it can be done by a doctor also in the presence of witnesses. But another 4% stated that it should be done by nurse or hospital administrator. If there is time, a magistrate should be called to record the declaration, or the doctor should take it is the presence of two witnesses. It can be done by the village headman or police or any other person, but the evidential value will be less.

The correct responses made by the participants in the age group less than 45 years were compared with that of more than 45 years. There was a statistical significance in the responses of either group to the question about “minimum age for valid consent for physical examination”. 32.4% of participants below 45 years expressed it correctly where as none in the age group above 45 years made it correct. (P value 0.019). (Table 3).

When the correct responses made by those of clinical experience more than 10 years were compared with that of less than 10 years, there were significant difference in responses to two questions. One regarding the “issuing of death certificates”, where 70% of those with more than 10 years and only 40% of those with less than 10 years responded correctly. (P value = 0.037514).

Similarly the responses to the question regarding “how to deal with brought dead cases”, only 56% of the doctors with experience less than 10 years responded correctly where as 85% of those in the other groups were correct. (P value = 0.0325373). (Table 3).

The correlation between the correct responses made by the graduates and post graduates showed significant difference in response to question regarding the “minimum age for valid consent for physical examination”. 53.8% of those with MBBS

<table>
<thead>
<tr>
<th>Clinical Experience (Years)</th>
<th>No</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>6 – 10</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>11 – 15</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>16 – 20</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>21 – 25</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>26 – 30</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>&gt; 30</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Distribution of participants according to Number of years of clinical experience.
degree gave correct response as twelve years whereas only 13.5% of postgraduates could make it correct. (P value 0.003) (Table : 3).

In a study conducted in Karaachi to assess the knowledge, attitude and practice of medical ethics among surgical residents and interns in karachi, 42 of 101 respondents provided correct answer to question concerning confidentiality and the law pertaining to trauma victim. Respondents with more years of clinical experience were more likely to give correct answers in this section (9). This is in agreement with the findings in the present study.

Conclusion

Analysing the awareness and knowledge of doctors about medicolegal matters might benefit organizational and educational efforts to help the doctors in a constructive way. The supporting systems for doctors are being developed in many European countries and in emerging state in our country. The information from this survey may provide input into the raise the question whether there a need for changes in the teaching of the subject and continuing development of supporting services by establishing an evidence base regarding the awareness of doctors about common medico legal issues.

References


Table 3: Correlation of percentage of correct responses with Age, Clinical Experience & Qualification

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Question</th>
<th>Correlation of correct responses in two Age groups</th>
<th>Correlation of correct responses between those with clinical experience of &lt;10Yrs &amp; &gt;10Yrs</th>
<th>Correlation of correct responses of graduates and postgraduates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt; 45Yrs</td>
<td>&gt; 45 Yrs</td>
<td>‘P’ value</td>
</tr>
<tr>
<td>1.</td>
<td>Cases in which wound certificate is written.</td>
<td>51.4</td>
<td>30.8</td>
<td>0.2</td>
</tr>
<tr>
<td>2.</td>
<td>Poisoning cases requiring police intimation</td>
<td>83.8</td>
<td>84.6</td>
<td>0.944</td>
</tr>
<tr>
<td>3.</td>
<td>When should the consent for surgical procedure be taken ?</td>
<td>86.5</td>
<td>100</td>
<td>0.162</td>
</tr>
<tr>
<td>4.</td>
<td>Minimum age for valid consent for physical examination</td>
<td>32.4</td>
<td>0</td>
<td>0.019</td>
</tr>
<tr>
<td>5.</td>
<td>Minimum age for valid consent for surgical procedures.</td>
<td>73</td>
<td>69.2</td>
<td>0.796</td>
</tr>
<tr>
<td>6.</td>
<td>To whom should the details of patient be divulged ?</td>
<td>37.8</td>
<td>30.8</td>
<td>0.648</td>
</tr>
<tr>
<td>7.</td>
<td>Cases in which death certificate can be issued.</td>
<td>45.9</td>
<td>69.2</td>
<td>0.148</td>
</tr>
<tr>
<td>8.</td>
<td>How to deal with brought dead cases ?</td>
<td>62.2</td>
<td>84.6</td>
<td>0.135</td>
</tr>
<tr>
<td>9.</td>
<td>How to deal with sudden Natural death ?</td>
<td>73.0</td>
<td>100</td>
<td>0.036</td>
</tr>
<tr>
<td>10.</td>
<td>Person authorized to record Dying declaration</td>
<td>100</td>
<td>100</td>
<td>-</td>
</tr>
</tbody>
</table>
Citrullus Colocynthis (bitter apple) Poisoning; A case report
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Abstract

Introduction

Citrullus colocynthis Schrad (Cucurbitaceae), commonly known as bitter apple, is a tropical plant that grows abundantly in the south of Iran, and widely in other parts of the world. It has a folklore origin and in traditional system of medicine is used as purgative, analgesic, anti-diabetic, vermifuge, abortifacient, etc.

Case Report

There are few case reports about toxicity of this plant, and in this paper, we presented a 48-year old man with acute Citrullus colocynthis toxicity who was admitted to the emergency department ten hours after ingestion of decoction of plant fruit for self-treating of his constipation. He developed watery diarrhea, hypotension and hypoglycemia. Hepatic injury was also developed indicated as rising in Alanine aminotransferase (ALT) and Aspartate aminotransferase (AST) enzymes. He was treated with supportive management in the intensive care unit (ICU). All parameters reached to the point of normalcy after four days and he discharged from the hospital with full recovery.

Key words

Citrullus colocynthis, bitter apple, toxicity, poisoning.

Discussion

In folk medicine, dried fruits of Citrullus colocynthis as infusion or decoction are used for the treatment of constipation. In spite of having many other useful effects, such as analgesic and anti-inflammatory activities2, antifungal3, antibacterial and anticandidal4, anti-diabetic5, anticancer6, antioxidant and free radical scavenging activity7 and hypolipidemic effects8, it has acute toxic effects like colitis and

of his three days constipation. The ingestion of about 60 mL of decoction of the plant fruit was confirmed by the patient. Two hours after ingestion, he had tenesmus, followed by watery diarrhea (defined by 15 times defecation during 6 hours, about 200 cc each time). In ED, his complains included dizziness, mild abdominal pain and watery diarrhea. Prior to admission he had no personal or familial history of chronic disease. He has not been taking any medications such as, antihypertensive or illicit drugs.

At the time of admission, he was lethargic (GCS = 12). His systolic/diastolic blood pressures were 60/40 mm Hg, pulse rate 120 bpm (beat per minute) and respiratory rate 18 bpm. Electrocardiogram (ECG) showed sinus tachycardia with no ST-T changes. Other parameters and signs, such as temperature, White Blood Cell (WBC), Complete Blood Count (CBC), Alkaline Phosphatase (ALP), Sodium (Na), Potassium (K), Pupil size and corneal reflex were normal but platelet count was low (91000 /mm3). Routine laboratory tests at the time of admission included: Na 133 mmol/L, K 4.3 mmol/L, Urea 42 mg/dL, Creatinine 1.1 mg/dL, Lactate dehydrogenase (LDH) 730 IU/L, Creatine phosphokinase (CPK) 308 IU/L and Blood glucose level 62 mg/dL.

Arterial blood gas (ABG) showed pH = 7.31, HCO3 = 14, PCO2 = 30 and O2 saturation = 80%. Central venous pressure was 4 cm H2O. TPI was normal. Echocardiography showed normal pericardium, LVEF = 62%, Systolic pulmonary arterial pressure (PAP) = 20. Cardiac valves were normal. Urinary tract sonography was normal (kidney size: right = 113 mm, left = 120 mm, cortical thickness: right = 12, left = 13 mm, no hydronephrosis, normal paranchymal echo).

Urinary analysis (U/A) was normal and urinary specific gravity was 1029 at ED. In the ED, he was treated with I.V. fluids (at first with Ringer and followed by normal saline 0.9% / Dextrose 5% solutions). Because of refractory hypotension, dopamine 900 µg/min was administered. Due to severe hypotension, the patient was transferred to ICU.

Stool exam on the first day of admission showed mucus whereas on the second day mucus and blood. On day of admission, liver tests including Aspartate Aminotransferase (AST) and Alanine Aminotransferase (ALT) were 640 and 753 U/L respectively. Repeated blood cultures, parasitic stool examination for the search of shigelae and bacteriological stool examination for the search of shigelae and salmonellae were negative. Hepatic functions improved in three days. He discharged four days after admission, with normal liver function. Serial clinical and laboratory parameters of our patient during hospitalization are shown in table 1.

Case report

A 48-year old man was admitted to the emergency department (ED) of Vali Asr Hospital, Birjand, Iran ten hours after ingestion of Citrullus colocynthis extract for self-treating in three days. He discharged four days after admission, with normal liver function. Serial clinical and laboratory parameters of our patient during hospitalization are shown in table 1.

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severe diarrhea. These effects are related to the presence of phytochemicals in the herb, including polyphenolics, alkaloid, resin, saponins and glycosides. Purgative action of the plant is due to colocynthidin and elaterin.

The preliminary toxicity studies of the plant which was carried out by Al-yahya et al. indicated that the plant fruits are toxic but not fatal to rats when fed at 10% of the diet for six weeks. Adam et al also showed that oral administration of 0.25 g/kg/day of fruits for 42 days is not fatal to the sheep. Studies have shown the development of enterohepatonephropathy suggesting the presence of toxic constituents in the plant that impaired rat growth and injured kidneys and liver. Diarrhea induced by fruits may be due to cucurbitacins and other irritant substances.

In the present case the plant seems to have toxic effects on gastrointestinal tract, cardiovascular system, blood glucose level and liver.

The toxic effects of the plant on the gastrointestinal tract were only correlated with the pharmacology of constituents on the bowel of patient, because repeated cultures for searching of bacteria and parasites were negative. Similar results were obtained by Goldfain et al who reported three case of colitis by the plant except for one case which accompanied with bacterial infection. Other causes of colitis and diarrhea like pseudomembranous and chronic ischemic colitis were ruled out due to the history of patient and rapid onset of symptoms after ingestion of plant fruit decoction. In this case liver damage was occurred by increasing ischemic colitis were ruled out due to the history of patient and rapid onset of symptoms after ingestion of plant fruit decoction. In this case liver damage was occurred by increasing

One of the surprising findings of our case was moderate hypoglycemia after ingestion of plant fruit decoction. Hypoglycemic effect of Citrullus colocynthis has been proved in animal studies, however very few reports are available about hypoglycemia in human being. Antidiabetic effect was reflected to inducing insulin secretion by this plant. The clinical recovery of the patient in this case was four days, nearly similar to Goldfain et al. cases which were 3,4 and 6 days.

Table 1: Serial clinical and laboratory parameters of our patient during hospitalization

<table>
<thead>
<tr>
<th></th>
<th>1 hr</th>
<th>2 hrs</th>
<th>3 hrs</th>
<th>4 hrs</th>
<th>6 hrs</th>
<th>12 hrs</th>
<th>24 hrs</th>
<th>48 hrs</th>
<th>72 hrs</th>
<th>96 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure (mmHg)</td>
<td>80/54</td>
<td>86/50</td>
<td>88/52</td>
<td>90/56</td>
<td>94/60</td>
<td>128/83</td>
<td>126/84</td>
<td>127/82</td>
<td>128/84</td>
<td>126/82</td>
</tr>
<tr>
<td>Pulse rate (bpm)</td>
<td>114</td>
<td>108</td>
<td>109</td>
<td>106</td>
<td>98</td>
<td>90</td>
<td>87</td>
<td>84</td>
<td>70</td>
<td>75</td>
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<tr>
<td>Urine output(cc)</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>280</td>
<td>-</td>
<td>1100</td>
<td>1350</td>
<td>1200</td>
<td>1300</td>
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<tr>
<td>Cumulative Fluid intake (liter)</td>
<td>2.5</td>
<td>8</td>
<td>12</td>
<td>4</td>
<td>2.8</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Urea (mg/dl)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>42</td>
<td>33</td>
<td>29</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Creatinine(mg/dL)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.1</td>
<td>1.1</td>
<td>0.8</td>
<td>0.7</td>
<td></td>
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<tr>
<td>Alanine aminotransferase (ALT)U/L</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>640</td>
<td>493</td>
<td>340</td>
<td>105</td>
<td></td>
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<tr>
<td>Aspartate Aminotransferase (AST)U/L</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>753</td>
<td>597</td>
<td>394</td>
<td>117</td>
<td></td>
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<tr>
<td>Prothrombin time (sec)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td>17</td>
<td>14</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Partial thromboplastin time(sec)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>41</td>
<td>39</td>
<td>36</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

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Abstract

In the forensic medicine studies one of the most significant factors to recognize individual identities; is determining the age of the person, because this factor can help to detect more facts about identity.

Using of fingerprints, studies about hematology, special elements on face and body, special hair color and skin, nails and teeth and genetic studies and DNA are the most significant devices to recognize individual identities in the hands of forensic medicine and offence specialties. among them teeth because of its strength and stability, lack of rapid dental decay and endure even under bad ecological condition and environment significantly can help to specialties in this field. Lack of recognition identity from body burn, breaking up of body, to be torn by animals and to be mutilated bodies is one of the concerns of forensic medicine physicians. Children and particularly infants due to lack of body evolution, and common skeleton features between bisexual infants, removing the end of limbs that are findable rapidly and due to delicacy and smallness and also lack of delivering real information from relatives and friends is considered as a major problems to recognize identity in forensic medicine. this paper intends to diagnosis real age of children with considering the number of grown teeth in their oral and judges with the least error for determining age and children’s identity.

Key word

Forensic medicine, milk teeth, children’s identity.

Introduction

Each human in childhood has twenty milk teeth and thirty two permanent teeth that will be substituted by milk teeth. In each jaw will grow ten milk teeth that begins from 6 months and up to second and half /years all the milk teeth will grow gradually and will be completed the roots will be completed. The best way to measure children,s age is manner of appearance and the number of milk teeth in time period that milk teeth appear actively ie, is between 6 months up to 3 years old because it is possible to measure the children,s age by counting teeth in the mouth . Credibility of this measurement depends on two subjects:

1- Comparing the gained data with existing data and references for admitting the studies.
2- Studied community:

In different communities this standard is various depend on geographic conditions and naturally to above factors. Usually the first milk teeth appear when the baby has 6 months. Growing the rest teeth continue up to end of 2 or 3 years old. The number of milk teeth in each jaw is 10 and in all oral 20. Milk teeth are responsible for Chewing the foodstuffs up to 6 years old, in this age permanent teeth start to grow and gradually will be substituted for them as in 12 or 13 years we don’t see milk teeth and all teeth are permanent. Dividing milk teeth we divide milk teeth to 3 categories for better recognition: incisor teeth: these are in front of the baby,s mouth and they are 4 in each jaw (in each right and left half) milk incisor teeth are the first teeth that grow in baby,s oral. usually, this teeth are specified by letters A and B in order that in each half of up and down jaw, called the first milk incisor teeth A and the second B. milk canine teeth : these are after incisor teeth, and they are 2 in each jaw.

- Milk canine teeth usually are appeared as baby is 19 up to 20 and they are specified by letter C.

Milk moral teeth : these teeth are putting at oral rear and after incisor teeth and They are 4 in each jaw . the first milk moral teeth D and the second are called E.

Growing time for D (tooth) is about 16 months and E about 28 months so it will be cleared that in childhood in upper half jaw and down there are 2 incisor teeth , one canine tooth and 2 moral teeth.

With regard to some statistics about the number of grown milk teeth in babies and its relation with their age growth, in Iran, researchers tried to achieve a formula for determining this relation precisely by implementing this plan.

One of factors for recognition identity is determining the considered individual,s age . determining the age of anonymous children and specially bodies of deceased children and sometimes with advanced atrophy of the tissues that their identity is not clear that of the considerations of forensic medicine is very important.

This can help to consideration of forensic medicine and on the other hand for determining the age and identity of anonymous children.

Human has two dental period :Primary or milk teeth and secondary or permanent. there is no tooth when he or she is born. But they will be completed in 3 years old. The first permanent tooth grows in 6 while milk teeth drop one after one, and permanent teeth will be substituted. Finally , permanent teeth will complete in 18 years and almost last up to 70 years. But the life time of milk tooth is about 6 years.

Complete number of milk teeth in each jaw is 10 and totally 20. While full number of permanent teeth in each jaw is 16 and totally 32.

When it is said that the first milk teeth grow in 6 months, its reason that all children should have such a tooth at this age as their height and weight are not the same. Growing time of teeth shows some differences. 

1- In growing time of 2 middle down incisor in 6 months before coming out is appeared antinode on the gum.
2- In growing time 2 middle incisor upper that coming out, the gums are affected by inflaming, insomnia and impatience(1).*
3- Four incisor teeth in both sides , two upper and two down are appeared at the end of 1 year.*
4- The first moral teeth , come out from several points that last for 2 or 3 weeks, because of this the gums are inflade and painful. They grow in 18 months.*
5- Four Canine teeth are appeared in 18 months up to
particulars of researched persons has hidden.

To observe moral points and preserving the patients' secrets:
1. Planning consist of determining information sources ,
2. Designing a test comprises focus on system model and variables ( age and the number of teeth) . as, this relation was bilateral effect of dependent and independent variables (linear regression).
3. Summarizing of all observations for giving perfection to the final formula.
4. Recording and giving the final formula.

Summary of considering steps was including:
1. Planning consist of determining information sources , selecting the considering subject and looking ethics and suggesting method.
2. Designing a test comprises focus on system model and bilateral effect of dependent and independent variables (linear regression).
3. Summarizing of all observations for giving perfection to them or omitting the details (descriptive statistics).
4. Achieve to adding about observations that telling us about the world we observe (statistic understanding).
5. Recording and giving the final formula.

To observe moral points and preserving the patients, secrets: All the information was collected honestly and carefully and without any alteration. Furthermore, name and the particulars of researched persons has hidden.

Findings: in this study, statistical pattern included 372 children referred to Rasoul Akram that had been chosen by accidental modeling . the method of this study is descriptive, analytic and cross sectional. To measure studied variables was used from a questionnaire, that its fluency was admitted by some forensic medicine professors of Tehran Medical Science, and coordination of them with Kronbaq Alfa Coefficient 0/86,93%, 84%, and was used of SPSS software and Spearman test to analyze. In this research was discussed 2 theories that considers the relation between children,s age and the number of milk teeth and the findings from statistical analysis including:

From 372 cases , 198 were boys (53.2%) and 174 girls (46/8%). the mean age among selected children had been 17/2±3-7 with minimum age 6 months and maximum 36 months.

The average of grown teeth in children,s mouth was ten ( min 0 and Max 20 teeth) and deviation criterion 6/23.

Finally the researchers succeeded to provide a formula according that can estimate the age of children by month with the number of grown teeth about 6 to 30 months. the formula is:

The number of expected teeth =7
Y=a + (b1×x1)
-2/89= constant coefficient = a
0/748= the age coefficient =b1
Monthly age = x1
For example all the teeth in a child by 8 months
Y= -2/89+(0/847×8) = 3/09

Discussion and Conclusion

In different medical and dentistry sources , there is various data about the growing time of teeth according to children,s age for example some references say that each months after 6 months grows a milk tooth and or at 10 months the number of the grown teeth is close to 4 or in 12 months has grown 6 teeth in the mouth.

Using this formula can predict the age of deceased anonymous children under 3 years that aren’t recognized trough ordinary methods carefully because of advanced atrophy of tissues and this is a significant issue to determine their age and identity.

With regard to the growing time of milk teeth in children is influenced according to race, nutrition and some factors, this study should be done more among different regions and nations.

Acknowledgment

The authors would like to acknowledge the support of Tehran Hospital of University for their support.

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11. Dr. Khadija Moluk thesis as compared with the time of primary tooth eruption in children and non-Iranian Persian (1367)
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Cardiotoxicity Due to Paracetamol Overdose - A case study and Review of the literature

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Abstract

Paracetamol is considered a safe analgesic and antipyretic drug. Cardiotoxicity has also been speculated to be a serious complication in paracetamol poisoning. Most of the claims made for paracetamol cardiotoxicity have been based on postmortem findings in patients who developed fulminating hepatic failure. A 24-year-old man reportedly ingested 50 tablets of 325 mg paracetamol. He presented to hospital 24 hours later. Intravenous N-Acetyl cysteine (NAC) was started immediately after admission. His hospital course included hepatic injury, coagulopathy, acute renal failure and cardiac injury. Cardiac function began to decline on the second hospital day with severe LV systolic dysfunction (EF = 10-15%), and pulmonary edema, but began to improve on the 3rd day. Hepatic injury was mild. Renal injury, consistent with acute tubular necrosis, didn’t recover and permanent hemodialysis resulted. A decline in cardiac function may occur following paracetamol overdose.

Key words

Paracetamol, Cardiotoxicity, poisoning.

Introduction

Paracetamol overdose is a major health problem worldwide. Hepatic injury and less commonly renal failure have been reported in this overdose. Delayed administration of acetylcysteine in paracetamol overdose is frequently reported. It has been shown that delayed presentation to hospital is the main predictor of liver damage in paracetamol overdose. In large case series, the most frequent cause of death in patients of paracetamol overdose with concurrent hepatic, renal and heart failure.

Case Report

A 60 kg, 24 year old man was admitted to the Vali-ASR Hospital (Birjand, Iran), 24 hours after the ingestion of 50 tablets of 325 mg paracetamol (16250 mg). The ingestion was confirmed by the patient’s history and corroborated by and his relatives and the medication container brought to the Emergency Department. His complaints included dizziness, mild abdominal pain and nausea. Prior to admission, he had been healthy, his blood pressure was normal before admission. He had not excessive activity before admission. He had no personal or familial history of chronic diseases; he had no familial history of cardiac disease. He was not taking any medications or illicit drugs.

On admission, he was alert. His systolic and diastolic blood pressures were 110 and 70 mm Hg, pulse rate was 80 bpm and respiratory rate was 14 bpm. The rest of the examination was normal, specifically he had no evidence of asterixis, Kussmaul’s respiration or icterus. Due to late admission the Plasma Paracetamol level was negative.

Intravenous N-acetylcysteine infusion was started immediately upon admission. (Standard regimen: 150 mg/kg over 20 minutes, followed by 70 mg/kg every 4 hours. Routine laboratory tests at admission included: Sodium 143mmol/L; Potassium 5.6 mmol/L, Urea 74 mg/dL, Creatinine 1.8mg/dL, Prothrombin time 24seconds, Partial Thromboplastin Time 120 seconds, blood gas assessment (pH = 7.43, HCO3- = 21.5 and PCO2=33), platelet count 82,000 IL. Serum magnesium and calcium were normal. Table 1 showed the serial laboratory investigation of our patient. Blood ethanol and opium and tricyclic antidepressant level, was negative.

Twelve hours after admission (36 hours after ingestion), he developed respiratory distress and hypotension (systolic blood pressure of 70 mmHg). Chest X ray revealed significant pulmonary vascular cephalization. Electrocardiogram (ECG) showed sinus tachycardia with no ST-T changes. Troponin I (TPI) was negative. His bedside echocardiogram showed severe LV systolic dysfunction (EF = 10-15%), global hypokinesia, mitral valve regurgitation (MR) and increased mean pulmonary artery pressure (PAP=25). End-diastolic size of L.V was 54 mm and End-systolic size of L.V was 44 mm. Left atrial size was 38 mm. He was admitted to the intensive care unit (ICU). Due to acute left heart failure dopamine (10ìg/kg/min), dobutamine (10ìg/kg/min) and lasix (10mg q 6h) were started. In addition, he received a nitroglycerin infusion (5mg/min). The serum Aspartate aminotransferase(AST) and serum Alanine aminotransferase(ALT) peaked at 505 U/l and 470 U/l respectively on day two. His HBs Antigen, Anti HIV, Anti HTLV1, Anti HCV, Anti toxoplasma (Ig M AND Ig G), VDRL, Wright, Widal, CANCA, PANCA, ANA were negative. Serum albumin and TSH level were normal.

Seventy-two hours after treatment, a second echocardiogram showed improvement of Ejection Fraction (EF) up to 40%, and improvement of global hypokinesia.

However, the patient’s BUN and creatinine continued to rise and he remained anuric. An ultrasound of the kidneys on day 2 revealed increased echogenicity of the cortical region and increased corticomedullary differentiation which was suggestive of acute tubular necrosis, but was otherwise normal. The renal failure did not improve and he required permanent haemodialysis.

Cardiac and hepatic functions improved from day 3, whereas renal function didn’t recover and permanent hemodialysis was required. He discharged 25 days after admission, with normal liver and cardiac function.

Discussion

Ingestion of more than 10 gr or blood concentrations greater than 150 mg/dL of paracetamol at 4 hours post ingestion may cause hepatic damage and necrosis. Renal injury has been reported less frequently and can occur without
significant hepatic injury. Cardiotoxicity due to paracetamol overdose has been primarily described from Cardiogenic shock, rhabdomyolysis, mild hepatic injury and acute tubular necrosis possibility secondary to rhabdomylysis and shock were predominant manifestation in our case. A possible mechanism induced cardiogenic shock is drug myocarditis due to acetaminophen overdose, because other possible causes of CHF were excluded. Furthermore a significant history of paracetamol overdose confirm this hypothesis. Pimston described a 26 year old woman who ingested 60-80 tablets of paracetamol and died 8 days after admission. Her autopsy revealed a sub endocardial hemorrhage in the left ventricular wall. In addition, her myocardium showed interstitial edema, foci of necrosis and a significant amount of leukocytosis. Similarly Sanrkin described a 15 year old girl who ingested about 16 grams of paracetamol and died 40 hours after ingestion. The wall of her left ventricle was focally purple and the discolored areas showed focal necrosis and intra myocardial fat at autopsy. In the report of Will, cardiac dysrhythmia was ascribed to paracetamol toxicity. Wakeel described a 15 year old girl who was admitted 55 hours after ingestion of unspecified amount of paracetamol with evidence of hepatic failure metabolic acidosis and hypotension who experienced atrial and ventricular arrhythmias. This patient died 25 hours after admission. Mild dilation of left ventricle and a pale myocardium were observed at autopsy. Myocardial histology showed focal infiltration of neutrophils and mast cells among necrotic myocardial fibres. Her kidneys were slightly swollen with pale cortices, and her lungs were congested. The author concluded that the combination of hypotension, mild cardiac dilation and pulmonary congestion had led to acute cardiac failure -presumed to be the immediate cause of death in this case.

### Table 1: Laboratory Investigation of our Patient with Paracetamol Poisoning

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should be aware of it. paracetamol poisoning, physicians managing such patients may be at work. If myocardial mitochondria metabolize paracetamol, depletion of myocyte glutathione may lead to NAPQI formation, and NAPQI as a free radical may exert an adverse effect on the myocardial energy supply or impair the breakdown of EDRF. Since NAC is indicated for the prevention and treatment of hepatic injury, it will be difficult to assess the independent benefit of NAC for prevention or treatment of myocardial injury in humans.

Conclusion

Though cardiotoxicity is rare finding following paracetamol poisoning, physicians managing such patients should be aware of it.

Limitation

Plasma paracetamol level was negative in this study. As this patient admitted to the hospital 24 hours after the ingestion of tablets, even a negative value would not have precluded a significant overdose.

Acknowledgment

The authors wish to convey their full appreciation to Professor G. Randall Bond, for his critical review and sophisticated editing of this paper.

Declaration of interest

The authors report no declarations of interest. The Authors alone are responsible for the content and writing of this paper.

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19. Ohtani N, Matsuzaki M, Anno Y, Ogawa H, Matsuda Y,
3-dimensional Facial Reconstruction utilising Clay

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Abstract

The paper describes a simple procedure of facial reconstruction for forensic and other purposes utilizing tissue thickness determined from a cadaver of the same average age, body weight, race and ethnic origin. The technique reconstructs the face by making an impression of the skull which is later poured with high strength gypsum. The thickness of the facial tissues is determined by measurements that were taken on a cadaver of same sex, age, ethnicity, body weight and origin. The muscles of the face were built using clay and then the clay model was refined by using the same clay of different consistency. A digital photograph is taken of the model which later serves as a 2-dimensional sketch for identification.

Key Words

Forensic reconstruction, facial approximation, forensic science, clay.

Introduction

Forensic facial reconstruction is the process of recreating the face of an unidentified individual from their skeletal remains through an amalgamation of artistry, forensic science, anthropology, osteology, and anatomy. It is easily the most subjective - as well as one of the most controversial - techniques in the field of forensic anthropology. Despite this controversy, facial reconstruction has proved successful frequently enough that research and methodological developments continue to be advanced.

The science can be utilized for remains of those unrecognizable individuals where only bones are present, historical investigations and for remains of prehistoric hominids and humans. No two reconstructions are ever the same and the data from which approximations are created are largely incomplete. Because of this, forensic facial reconstruction, is not included as one of the legally recognized techniques for positive identification, and is not admissible as expert witness testimony. Currently, reconstructions are only produced to aid the process of positive identification in conjunction with other verified methods. The two types of identification process in forensic science are Circumstantial identification which is established when an individual fits the biological profile of a set of skeletal remains and the Positive identification which is established when a unique set of biological characteristics of an individual are matched with a set of skeletal remains. This type of identification requires the skeletal remains to correspond with medical or dental records, unique ante mortem wounds or pathologies, DNA analysis, and still other means.

Facial reconstruction presents investigators and family members involved in criminal cases concerning unidentified remains with a unique alternative when all other identification techniques have failed. Facial approximations often provide the stimuli that eventually lead to the positive identification of remains.

Types of reconstructions

There are two main methods used in forensic facial approximation: two dimensional and three dimensional. 4,5,6,7,8

2D Reconstructions

Two-dimensional facial reconstructions are hand-drawn portraits based on radiographs, ante mortem photographs, and the skull. This method usually requires the collaboration of an artist and a forensic anthropologist. Recently developed, the F.A.C.E. and C.A.R.E.S. computer software programs quickly produce two-dimensional facial approximations that can be edited and manipulated with relative ease. These programs help speed the reconstruction process and allow subtle variations to be applied to the drawing.

3D Reconstructions

Three-dimensional facial reconstructions are either: 1) sculptures (made from casts of cranial remains) created with modeling clay and other materials or 2) high-resolution, three-dimensional computer images. Computer programs create three-dimensional reconstructions by manipulating scanned photographs of the unidentified cranial remains, stock photographs of facial features, and other available reconstructions. These computer approximations are usually most effective in victim identification because they do not appear too picturesque or too artificial.

Facial reconstruction originated in two of the four major subfields of anthropology. In biological anthropology, they were used to approximate the appearance of early hominid forms, while in archaeology they were used to validate the remains of historic figures. In 1964, Gerasimov was probably the first to attempt paleo-anthropological facial reconstruction to estimate the appearance of ancient peoples.

Material and Methods

The following materials were used to reconstruct the face of a skull which was determined by anthropologist to be of a female, aged between 65 and 70, north Indian origin.

1. Model clay.
2. Digital vernier caliper.
3. Cadaver of approximately same age group, ethnicity and body weight.
4. Alginate impression material.
5. High strength gypsum.
6. Artificial eye shells.
7. Wooden markers.
8. Auto polymerizing acrylic resin.

Method

Facial reconstruction was planned in four stages:
1. Preparation of a model of the skull.
2. Determining tissue thickness of a cadaver.
3. Sculpturing muscles and skin on the working cast.
4. Computing the photo through various programs.
Technique for creating a 3-d clay reconstruction

The first phase of facial reconstruction was achieved by determining the sex, age, and race of the remains to undergo facial reconstruction through traditional forensic anthropological techniques. A thorough examination of the skull was completed. This examination includes, but is not limited to, the identification of any bony pathologies or unusual landmarks, ruggedness of muscle attachments, profile of the mandible, symmetry of the nasal bones, dentition, and wear of the occlusal surfaces. All of these features have an effect on the appearance of an individual’s face especially the presence or absence of the posterior dentition. The vertical height of the lower third of the face is determined largely by the dentition.

1. Preparation of a stone model

Once the examination is complete, the skull is cleaned and any damaged or fragmented areas were repaired with sticky wax. All the fossae, cavities and the undercuts were then blocked with clay. The mandible was then reattached, again with wax, according to the alignment of teeth and by averaging the vertical dimensions between the mandible and maxilla. Undercuts (like the nasal openings) were filled in with modeling clay (Fig 1). The undercuts were blocked to prevent the impression material from flowing inside the skull. An impression of the whole skull was then made in alginate and the resulting impression was then poured with high strength gypsum. Impression was made in a container which could be easily cut to enhance the removal of the skull after the impression material is set. The impression was then poured with high strength dental stone and allowed to set. The stone cast was then retrieved and prosthetic eyes were inserted into the orbits centered between the superior and inferior orbital margins.

2. Determining tissue thickness from a cadaver

Areas of varying tissue thickness were then marked by an anatomist on the working cast (Fig 2). The tissue thickness at different areas of the face determines the basic contours of the face which alternately gives the particular shape. There are different methods of determining tissue thickness. The data can be obtained from cadavers, previous research, CT scan of a person meeting same criteria. All the different methods are arbitrary and each has certain drawbacks. After thorough search, we obtained the required data from a cadaver of same ethnicity, of approximate age and body weight. The areas of different tissue thickness were identified and recorded using a modified digital vernier caliper. The movable sliding component of the vernier was sharpened so that it could penetrate the tissues easily. Care was taken to minimize the compression of the tissues as a result of vernier touching the tissues. The cadaver shrinks from its original size varyingly according to the type of tissues present in the face. The thickness of alive individual is more than the same when fixed in formalin as in cadaver.

3. Sculpturing muscles and skin on the working cast

Artifical eye shells were first selected for size and were then retained in the sockets of the orbit with the help of clay. The working cast was then put in water for some time to enhance retention of the clay. The facial muscles were then layered onto the cast using clay in the following order: temporalis, masseter, buccinator and occipito-frontals. Next, the nose and lips were reconstructed before any of the other muscles were formed. The muscles of facial expression and the soft tissue around the eyes were added next. Additional arbitrary measurements were made according to race (especially for those with eye folds characteristic of Asian descent) during this stage (Fig 3).

4. Computing the photograph of the model through various computer programs

After the clay construction was over, a digital photograph was taken of the model. The photograph was computed and adjusted by using computer software like ADOBE PHOTOSHOP.
and COREL PHOTOPAINT. These programs allow one to modify the color of the skin and eyes.

**Fig. 4:** Skin and associated landmark reconstruction

**Fig. 5:** Completed 3-dimensional facial reconstruction

At this time two different ways of making a sketch could be followed. One is to take a print out on paper and add the features of the face directly on the print out. Another way is to modify the photograph on the computer and then printing it out.

**Discussion**

The basic framework in the form of the skull produces the kind of face that one possesses. Tissue thickness over the bone varies considerably during young age and adulthood. During old age depletion of areolar tissue within the face occurs which results in discrepancy of surface area between the overlying skin and the underlying connective tissue, thus resulting in wrinkles of the face. The tissue thickness therefore varies less in old age. The different methods of measuring tissue thickness of the face are determination on a cadaver, CT scan, cephalometric radiographs. When a cadaver is used to determine the tissue thickness it is important to understand the changes in the soft tissues that take place as a result of fixing of tissues and should be kept in account. Also the elasticity of the tissue decreases on the cadaver.

Certain landmarks can be taken as guides to build facial landmarks like lips and nose. The lips are approximately as wide as the interpupillary distance. However, this distance varies significantly with age, sex, race, and occlusion. The nose is one of the most difficult facial features to reconstruct because the underlying bone is limited and the possibility of variation is expansive. The nasal profile is arbitrarily determined by projecting two lines from the midline of the skull unless any obvious bony asymmetry is present, in which case accommodating adjustments to the possible projection are made. The tissue thickness of face varies at different levels and the areas that have been used in this study are minimum areas that one should record. These areas determine the various contours of the face. Reconstructions only reveal the type of face a person may have exhibited because of artistic subjectivity. The position and general shape of the main facial features are mostly accurate because they are greatly determined by the skull, but subtle details like certain wrinkles, birthmarks, skin folds, the shape of the nose and ears, etc, are unavoidably speculative because skeletal remains leave no evidence of their appearance. The success of reconstruction depends as much upon the circumstances pertaining to the subject under investigation as it does upon the accuracy of the technique.

**Summary and conclusion**

The art of facial reconstruction largely depends on the interpretation of the data provided to the forensic anthropologist and the circumstantial evidence. Through thorough knowledge, the science can be developed and mastered to help identify the remains of those who cannot be identified or create the face of ancient hominids and humans. There are multiple outstanding problems associated with forensic facial reconstruction. Probably the most pressing issue relates to the data used to average facial tissue thickness. The data available to forensic artists in India is very limited in ranges of ages, sexes, and body builds. This disparity greatly affects the accuracy of reconstructions. Until this data is expanded through research and surveys, the likelihood of producing the most accurate reconstruction possible is largely limited. Facial depth measurements should be available for male and female, certain ages, racial groups, thin people and obese people.

No single, official method for reconstructing the face has yet to be recognized. This also presents major setback in facial approximation because facial features like the eyes and nose and individuating characteristics like hairstyle - the features most likely to be recalled by witnesses - lack a standard way of being reconstructed. Without consistency and a standard method for approximating these features, it will remain very difficult for forensic reconstruction to earn wide recognition as a legitimate form of forensic identification.

**References**

Proposed Amendment of Mental Health Act, 1987: Salient features and critiques

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Introduction

A Sustainable Mental Health Act is essential for protecting the rights and dignity of persons with mental illness for developing accessible and effective treatment program on a legal framework. Legislation can create enforceable protocol to effectively implement and protect rights of persons with mental illness, including a right of access to treatment, education, housing, employment and social security.4,5 It helps to integrate the judicial, social, political and professional will to treat the persons with mental illness with dignity and to make those responsible and accountable.7

The boom of private psychiatry and associated services even at small towns and challenges of regulation is yet another significant development of the last 30 years. The major obstacles are limited mental health professionals, limited mental health service infrastructure, limited budget, huge population and persisting stigma of illness.4,5 Indian Psychiatric Society has shown its commitment and taken a lead initiative and drafted a mental health bill to amend the Indian lunacy act 1912 and submitted it to Govt. of India in 1950 but it took another 28 years for Government to present it in the Lok Sabha which subsequently received approval only in May 1987 and implemented in April 1993.1,7 Though the act was a welcome relief for a long time to many, it was still plagued with criticisms and prompted the need to amend this act to keep in pace with the growing concerns to match international regulations like UNCRPD(United Nation Convention on Rights of Physically Disabled, which India ratified in May 2008).3,6,7

Positives of the Proposed Amendment of Mental Health Act, 1987

The proposed amendment appears to have addressed most of the criticisms of Mental Health Act 1987 by re-defining terminologies and replacing few words with precise non-stigmatizing, modern and scientific words.3 It gives top priority to protection of rights of persons with mental illness and promoting active involvement and participation in decision affecting their lives, measures to care and rehabilitation in harmony with UNCRPD which is a important move to keep in pace with international regulations.6 Every attempt has been made to clearly define right to treatment, admissions, discharges, quality of life, insurance, information, confidentiality, emergency treatment and planning of the future treatments.7 Through advanced directives, authorized special personnel representatives and nominated representatives of persons with mental illness will be able to direct how, where and when to be cared for in the event of severe mental illness compromising their decision making.3 Registration of mental health facility issues has been streamlined and state mental health authority has been empowered to issue licenses as against deputy commissioner, with clear guidelines and timeframe for application processing.5,7 A new concept of mental health review committee with a dedicated judge as president of commission to oversee and review functioning of licensed facility with judicial powers to make surprise inspection and pass orders.3 All institutions treating persons with mental illness and addiction including general hospitals, rehabilitations centers, de-addiction centers and government hospitals have been brought under the purview of licensing to help scrutinizing all admissions and discharges which could also involve treating of minors.3,5,7 To enable quick supported admission in registered mental health facility with lack of adequate psychiatrists, strict requirements of two psychiatrists certifying need for involuntary admission has given away to two mental health professionals’ i.e. psychiatrist plus psychologist or social worker.3,6,7 Clinical research on persons with mental illness with poor insight will need separate approval from Mental Health Review Commission. 3,6,7

Critiques

I totally agree that the persons with mental illness are different and need separate provisions for protection of their individual rights and support but the proposed amendments not only needs to patient friendly but also never to forget the comfort and needs of the caregivers and difficulties faced by the treating professionals. Issue of non-discrimination of persons with mental illness and making comparable to physical illness is itself a paradox as act itself deems necessary to have a separate mental health act when there are no such acts for other specialities. Implications of not treating a acutely ill person by making due provisions in law may lead to treatment resistance, lost days due to disability, stigma and loss of employment and making family vulnerable to patients’ behavior arising due to illness.5 Supported admissions may need to be reclassified on duration of up to 60 days and beyond and not 30 days as most of us will agree that time to respond is a minimum of 4-6 weeks, will need time to titrate, demonstrate improvement in resistant cases, cases with co-morbidity and will have to follow treatment guidelines and algorithm. There seems to be undue preoccupation involving a very small percentage of low prevalence disorder involving vulnerable inpatients in acute and emergency situations in private settings.3 Protection of rights of patients gets a priority when issues like competence, insight, safety of patients / others and getting maximum number of patients on treatment are an important concern.5,7 Can we call this a mental hospitals act and not a mental health act as it is largely confined to involuntary admissions on the background of tragedies which happened in non-professionals run residential care centers where no caregiver stays with patients to ensure quality care. Violation of rights of patients can occur at home with family members, public places and any other place that one can think of. To assume that violation of rights can happen only during involuntary admission procedure in an attempt to bring patient on treatment is a fallacy. This blanket Amendment covering all admissions would mean all psychiatrists should have access to registered facilities and hospitals willingness to take all the hassles involving the licensing.3 Enforcement of stringent regulations on institutions who admit patients with a bystander appears totally unnecessary. Act needs to be understood in an Indian context where support systems are progressively thinning and emotional and financial needs of the patients are care givers burden. Amendment appears to increase patient’s responsibilities and empowerment and not on a typical Indian system where a collective decision would involve patients, care giver and treating doctor. Act has no
understanding of an ethical psychiatrist governed by beneficence, non-malafficence and code of conduct already prescribed by medical council. Human right activation and laws could mean anti-treatment, increase in doctor-client litigations, care giver disownment of subsequent admission for fear of punishment when the top priority is to bring all persons with mental illness under treatment and making mental health care accessible, available, affordable, acceptable and reaching the un-reached. The responsibility of treatment is often a care giver who supervise medication and after care of the patient ensuring compliance. Our health care has no proper centralized medical record maintenance, social security / insurance system, adequate unemployment benefits, care giver pension, house rent allowance subsidized medicines or states sponsored house visits, ambulance service in crisis intervention or judicial apprehended violence order to protect the spouse and family from violation of rights by persons with mental illness. India and developing countries had always had an edge with better prognostic factors with a collective family psyche and therapeutic alliance and may no longer have the claim in view of removal of treatment decisions from system involving clinicians, care giver and patients to a system involving patient and judiciary. Registration under private medical establishment act, licensing under mental health act for already ethical treating psychiatrist in private may be too much to ask and may lead to increase in burden and stigmatization of psychiatry profession and alienation of psychiatrist from other professionals as they do not need a separate act governing admissions and treatments. Looking forward, psychiatry as a profession may have few takers for admissions at post-graduate level and practicing psychiatrists may have to be rehabilitated to other professions. It is relevant to explore the issues of protection of treating professionals and their rights and adequate provisions to be made to protect spouse, family and society at large from the persons with mental illness by taking away the rights of patients in crisis and rather than empowerment. Judicial chairperson of MHRC directing discharge in otherwise not clinically warranted decisions may have to bear the consequence resulting from premature discharges and subsequent behavior of persons with mental illness and may be a step to protect the medical professional from the relentless fights of human right activists. Making a written advanced directive available to all professional involved in treatment and directing future treatment decision may come in way of clinician judgment and discretion and may be more appropriate for medical emergencies and resuscitation measures only.

Suggestions

Greater problems of violation of rights are anticipated outside the mental health facility after treatment and may need indefinite guardianship. A visiting magistrate to all mental health facility to issue compulsory treatment order to facilitate supported admissions may be considered on application by the treating doctors/caregiver to prevent the bureaucratic delay, overburden of the limited mental health professionals and facilitate the quicker recovery of persons with mental illness. Amendments have to be planned keeping in mind, long term care of persons with mental illness outside mental health facility who will represent greater than 90% of the consumers and not stay focused on acute care and crisis intervention only. Non-psychotic insight less people, persons with personality disorders is a significant population who will need to be brought under mental health act. Anti-social personality disorder will need to be diagnosed based on non-confirmatory with moral, social, political and religious values and belief systems. Time frame for Emergency treatment may be considered up to 7 days, supported admissions up to 60 days and thereafter three monthly renewals. It will be harsh to include facilities which admit persons with mental illness with a family member under the licensing issues and may lead to refusal of major hospitals for admissions and refusal to undergo registration hassles.

Patients will have few options to choose for in-patient care. Mental Health Review Commission may consider not discharging patients, if it is against medical advice or take a second professional opinion and keep in mind the consequences of pre-mature discharge and its responsibility if discharges are against the decision of treating team.

Conclusion

I would like to congratulate the entire team involved in the drafting the proposed amendment of Mental Health Act, 1987 for their wonderful foresight in treatment care and protecting rights of persons with mental illness. Though an attempt has been made to address most of the lacunae of Mental Health Act, 1987, still the proposed amendment need further revision, active participation and feedback from Indian Psychiatric Society, as it is a major stakeholder representing service providers. Hope this critical review of the proposed amendment is considered to have a balanced view considering consumers and service providers.

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Correlative Study of Foramen Magnum With Cranial index in adult crania

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Abstract

In the Present study 541, non-pathological dried crania irrespective of the sex are studied from the Dept of Anatomy of various medical colleges of Karnataka and Maharashtra. The Mean value of Cranial Index is compared with Mean value of Foramen Magnum Index). There is a positive correlation between the two values (P value 0.00134). Regression equation is calculated for X (Mean value of CI) and y (Mean value of Foramen Magnum Index ). So that if one value is known other can be calculated. The present study shows the difference between mean value of CI and Mean value of FM is 03.7246 cm. This study will help the clinician by providing base line date and to a medico-legal expert to find out the Cranial Index from Foramen Magnum Index.

Key words

CI – Cranial Index, FM –Foramen Magnum, Max - Maximum

Introduction

The FM has different size and shape in early hominids. In Neanderthals, it is heart shaped but in modern man it is oval. Antero-posterior diameter is more than transverse diameter. Hence certainly there will be variation in the diameter of FM. The FM is pushed anteriorly to adapt bipedalism. FM is forced to align with erect vertebral column which has nodding occipito-atlas joint, rotating atlanto-axis joint, with curvatures at different levels. If there is non – alignment between FM and vertebral column, it could be due to due to age, profession which keeps head bending continuously, nutritional and gender factors. It leads to many complications at the level of FM by compressing related structures.

Moreover different crania has different CI like dolichocephalic, mesocephalic, and brachycephalic but exact index of FM is yet to be known because “contents induces the container”.7

Apart from this, human being has to rotate its neck to maintain erect posture and balance supported by semicircular canals of inner ear concerned with sense of balance. Erect posture demands non-voluntary coordinating movements of the neck along with eye movements which require adequate diameter of FM, otherwise there could be compression of spinal cord and allied blood vessels.

Hence attempt is made to correlate CI with FM which will be useful to clinician and medico-legal expert.

It is admitted by many anatomist and anthropologist that no study has ever investigated the secular trend of size of FM (secular trend means changes occurring from generation to generation), because still there is a lack of basic osteometric studies when brain and body size have been known to change, the size of FM is still ambiguous.

Material and Method

Total 541 non-pathological, dried crania are studied irrespective of sex from Department of Anatomy of various medical colleges of Karnataka and Maharashtra. The cranial index is measured by spreading caliper and diameter of FM is measured by vernier caliper.

\[
CI = \frac{\text{Maximum Breadth of crania}}{\text{Maximum length}} \times 100
\]

Foramen magnum index = \[
\frac{\text{Maximum Breadth of crania}}{\text{Maximum length}} \times 100
\]

And both mean values are studied by (1) coefficient correlation study (2) Regression equation of X and Y, to study the unknown value from known value.

Observation and Discussion

Total 541 crania are studied irrespective of sex. The coefficient study of correlation between Cranial Index and Foramen Magnum have shown positive P value is 0.00134. It means both values of CI and FM are positively correlated.

<table>
<thead>
<tr>
<th>Mean Value of CI</th>
<th>Mean Value of FM</th>
<th>Difference between known and unknown value</th>
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<tbody>
<tr>
<td>88.1406 cm</td>
<td>84.416 cm</td>
<td>03.7246 cm</td>
</tr>
</tbody>
</table>

1. Regression equation ‘y’ on ‘x’ is

\[ y - \bar{y} = b_{yx}(x - \bar{x}) \]

2. \[
\begin{align*}
&= \frac{\sum (x - \bar{x}) (y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2} \sqrt{\sum (y - \bar{y})^2}} \\
&= \frac{\sum (x - \bar{x}) (y - \bar{y})}{\sqrt{n} \sqrt{\sum (x - \bar{x})^2} \sqrt{\sum (y - \bar{y})^2}} \\
\end{align*}
\]

Table 2:

<table>
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<tr>
<th>Positive Coefficient (r)</th>
<th>Value of Y</th>
<th>Value of X</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.001332046</td>
<td>4.36 X -299.8744</td>
<td>0.2434 y + 67.589</td>
</tr>
</tbody>
</table>

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In the case to determine the value of “y” if the value of “X” is known we will get the value of “Y”.

“X” means value of CI and “Y” means value of FM.

In the present study mean value of “X” is 88.1406 cms and unknown “Y” mean value is 84.416 cms. Hence the difference between known value and unknown value will be 03.7246

r = correlative coefficient of two variables
m = number of cranial studied.

Although there is larger Index of FM in male than female but present study is compared irrespective of sex. The studied crania had normal Index of FM because narrower FM could be due to occipitalisation of atlas vertebra which compress the spinal cord and brain stem, blood vessels.8,12

Some workers studied the diameter of FM 35 mm for 30.5 mm antero-posterior and 30.5 mm transverse diameter and 33.3 mm antero-posterior and 27.9 mm transverse diameter,11,10 which also in agreement with present study.

The present study also indicates the normal or abnormal fetal life, because in embryonic life of human, the FM has the same sagittal plane of direction which is similar with most of the animals. Gradually during fetal life inclination of the FM plane to more perpendicular to establish relationship with the trunk preparing for future erect posture. Previously it was thought that change of inclination in FM is the very important factor, it is due to rapid growth of cerebral cortex.16

The present study is carried out irrespective of body mass index presuming that it variability could be due to geographical influence.12

The present study of correlation of Cranial Index and Foramen Magnum may help the clinician to rule out many symptoms, because narrow FM compression leads to (1) Pain in hand 57%, or arm 55%, especially along with burning along the ulnar border of contralateral arm in unilateral lesion (2) Pain in the leg (26%) and face (7%) is much less common (3) Gait disturbance (50%), (4) Weak arm (40%), (5) Hand clumsiness (27%), (6) Bladder dysfunction (22%), Dysphagia (13%), (7) Headache (11%), Dizziness (4%), (9) Dysarthria (3%), (10) Lhermide (3%).10

More over compression at the level of FM will also lead to (a) cruciate paraplegia (arms affected more than legs), (b) wasting of hand muscles (c) lesion of spinothalamic tract (40%) Dorsal column dysfunction (26%).13,14 The stenosis of FM could be due to over growth of Opisthion in child with achondroplasia, which is a rare autosomal dominant dwarfish syndrome. It is most often due to hypertrophied posterior occipital rim and undersized transverse diameter of FM.13

Stenosis of FM in infants and children cause cervico-medullary compression which leads to apnea and sudden unexpected death from encroachment of respiratory centre in the medulla.8

Narrowing of FM could be due to concomitant ligamentous hypertrophy that causes an accompanying dense fibrotic epidural band which leads to narrow the FM diameter.8 MRI study can evaluate the compression but exact degree and severity of compression is done by present study.

Summary

There is lot of literature available regarding variation of CI and its anomalies but osteometric study of any foramina and its variations complications due to size and shape of foramina is still to be studied. Changes in brain, body and the crania leads to changes in the size and shape of FM.

As FM develops from chondrocranium i.e., prochondral or basal plate extending from FM to pituitary fossa. The characteristic of human FM shows complete adaptation to erect position. The plane of FM being practically horizontal in human but obliquely placed in apes, and pushed backwards in quadriceps.

Moreover, occipital bone has four pieces at birth but 3rd or 4th year they fuse around FM. For the proper fusion of bones, and to maintain the horizontal plane of FM requires proper nutritional and environmental influences.

Conclusion

Although the study of FM can be done by techniques like x-ray, CT scan, MRI scan, but exact diameter cannot be determined. The present study will certainly help the clinician to know the relation between abnormal CI and subsequent symptoms shown by the patient. The complications due to compression of FM and clinical correlation to manage and treat the patient by studying correlative study between CI and FM. Moreover medicolegal expert can explore the CI by knowing the diameter of FM.

Acknowledgement

We are thankful to Dr. Satymurthy, Professor and Head, Department of Anatomy, SSIMS & RC, Davangere, Dr. Ramesh C.M., Professor and Head, Department of Anatomy, J.J.M.M.C., Davangere for their kind cooperation. Mr. Rafi Ahmed Shaikh, Professor and Head, Department of Statistics, Anjuman Arts Science and Commerce College, Bijapur for his kind guidance and valuable suggestion for statistical analysis.

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Abstract

Anatomically, club foot or talipes equinovarus can be defined as “a condition in which foot is plantar flexed at the ankle joint and inverted at the mid-tarsal joints. The condition may be bilateral or unilateral. It is a matter of debate whether the, clubfoot is due to autosomal trait (genetic defect) or idiopathic.

Hence an attempt is made to study the various angles of the tarsal and metatarsal bones, from x-ray plates with the help of protractor and divider. Total numbers of patients were 47 out of which 33 were Male and 14 were Females. In the present study, (i) the measured angles are quite less than normal anatomical angles except 1st metatarsal joint angle. (ii) the angle of internal tibial torsion is also less than +5° (normal angle) in 53% of patients, (iii) in present study incidence of bilateral club foot is more than unilateral, (iv) incidence is more in male than female. The present study of anatomy of clubfoot knowledge will certainly help the orthopedic surgeon to treat the concerned patients.

Key words

TCN = TALOCAL CANEO NAVICULAR JOINT.
AP = ANTERIO POSTERIOR, Lat = LATERAL VIEW

Introduction

Clubfoot is a condition which can make the best surgeon eat humble pie due to relapse.1

Clubfoot or talipes equinovarus is a condition in which foot is plantar flexed at the ankle joint and inverted at the mid-tarsal joints. The condition may be unilateral or bilateral. It is presumed that clubfoot inherited abnormality having incidence of 1 to 4:1000 live births as autosomal trait that affects mainly male than female.2

According to earlier anatomists, clubfoot is congenital Talocal Caneo Navicular joint dislocation, which is the currently accepted view. Some anatomists believed that, the primary abnormality is outward rotation of the talus in the ankle mortise.3 The true clubfoot is characterized by equinus, varus, adductus and cavus. The equinus deformity is at ankle joint, Talocal Caneo Navicular joint and the hind foot is rotated inwards and this occurs primarily at the Talocal Caneo Navicular joint. The whole of the tarsus except the talus, is rotated inward with respect to the lower leg. Since the forefoot follows the hind foot, the medial border of the fore foot faces upwards. The adductus deformity takes place at the talo-navicular and the anterior subtalar joints. The cavus component involves the fore foot plantar flexion which contributes to the composite equinus. The cuboid moves medially with the anterior end of the calcaneus and this causes lateral convexity of the foot.4

Since olden days, clubfoot is being treated without any surgical procedure, simply by tying the bandage or wet cloth. Some physicians of olden days used to tie the sticks or preparing boots to normalize the clubfoot.

It cannot be denied that, by forceful tying of sticks, bandage or artificial manipulation of clubfoot is likely to damage articular joints and bones, even there are chances of tearing ligaments also. Hence surgical procedure is much safer than old method, because joints, bones and ligaments will be kept patent and these will be no chance of recurrence also.

Material and Methods

The present study is conducted on patients with clubfoot deformity attending OPD and admitted in the wards of orthopedic department of S.S. Institute of Medical Sciences and Research Centre, Davangere. The period of study was about two years i.e., from June 2007 to December 2009. No funding source was taken and the study is performed on own expenses. Hence there is no conflict of interest.

A total number of 47 patients were studied out of which 33 were male 14 female clubfoot deformity was observed. The patients with cerebral palsy and poliomyelitis, were excluded. The age of the patients studied varied from 10 months to 9 years. The majority of the patients were economically backward and undernourished.

On local examination wasting of calf muscles was seen and following abnormalities were seen on palpation.

1. Internal tibial torsion
2. Calf deformity
3. Posterior displacement of fibula
4. Curved lateral border
5. Fixed equines and tightening of tendo-calcaneus
6. Cavus
7. Navicular bone fixed medial malleolus
8. OS calcis fixed to tibia
9. No midtarsal mobility
10. Fixed forefoot supination.

X-ray of anteroposterior view and lateral view of dorsiflexion was taken to study the relationship between talus and calcaneus. X-ray of both feet was taken to compare the normal angles. The angles on x-ray plate were measured with the help of protractor and divider (Scale)

The list of normal degrees of the angles belongs to present study is listed below –for comparison.

1. Talo-calcanal angle (AP view) 30°-55°. (Kite’s angle)
3. Talo-calcanal index > 40°.
5. Talo-first metatarsal angle (AP view) 0-20°.

Observation and Discussion

Incidence of clubfoot is more in male than female4 and bilateral club-foot is more common than unilateral14 (Table No. 1 & 2) indicates that clubfoot is under genetic factor.
The angles formed between talo-calcaneal joint in AP and lateral view (Table No. 4, 5 & 6) are quite less than normal angle. It is due to altered talus in distortion 5 or could be due to congenital atresia of the socket containing head of talus, which attributes the deformity of the medial displacement of the navicular and calcaneus around the talus. 6 The ossific nucleus of talus lies predominantly in the head and neck of the cartilaginous anlage of the talus, therefore ossific nucleus forms an angle with the cartilage of the body wider in the clubfoot than in normal feet owing to the marked angulation of the neck of the talus in the clubfoot. 7

The talus and calcaneus are partly ossified at birth but there is a over imposition of bones in the clubfoot, which arrest the further growth of these bones thereby causing reduction in talo-calcaneal index, reduction in the talo-calcaneal angle (AP & lat) which subsequently leads to reduction in internal tibial torsion. 4 Due to reduction of bony elements, the plantar aponeurosis, spring and deltoid ligament are unduly stretched to facilitate plantar flexion to resist dorsiflexion, in addition to this, tibiatis posterior showed loss of spatial orientation due to contraction of collagen fibres and soft tissue. 9 This involves muscles, tendons, tendon sheaths, ligaments and joint capsule. These contractures are classified into four groups 1) Posterior. 2) Medial Plantar. 3) Sub-talar. 4) Plantar.

1. Posterior contracture involves the tendo Achills, tibio-talar capsule, talo-calcaneal capsule, posterior tibio-fibular ligament and calcaneo- fibular ligament.
2. The medial plantar contracture involves the talo-navicular capsule, deltoid ligament, tibialis posterior tendon and spring ligament.
3. The sub-talar contractures involves the talo- calcaneal, interoseous ligament and bifurcated ‘ Y ’ ligament.
4. The plantar contractures involves the abductor hallucis, plantar fascia and intrinsic toe flexors. 1 These contracted soft tissues, when visualized under microscope showed the presence of fibroblasts and mast cells. Some fibroblasts contain a network of microfilaments but all lacked microtubules, basal lamina. Mast cells are rarely identified in capsular specimen. 10 It gives a dual statement that

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of foot studied</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Female</td>
<td>27</td>
<td>35.53</td>
</tr>
<tr>
<td>Male</td>
<td>45</td>
<td>64.47</td>
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</tbody>
</table>

Table shows incidence of clubfoot is 35.53% in female which is much less than male.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Bilateral</th>
<th>Unilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>15.7</td>
</tr>
<tr>
<td>Male</td>
<td>17</td>
<td>33.3</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>49</td>
</tr>
</tbody>
</table>

Tables showing 49% of bilateral deformity, and 31.37% on right side and 19.63% on left unilateral deformity.

<table>
<thead>
<tr>
<th>Age of the patient</th>
<th>Number of foot studied</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 months to one year</td>
<td>30</td>
</tr>
<tr>
<td>1 year to 2 year</td>
<td>12</td>
</tr>
<tr>
<td>2 year to 4 years</td>
<td>16</td>
</tr>
<tr>
<td>4 years to 9 years</td>
<td>05</td>
</tr>
<tr>
<td>9 years and above</td>
<td>09</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
</tr>
</tbody>
</table>

The table shows that the club-foot deformity is maximum in patients between 7 months – 1 year of age and least in 9 Years and above.

The angles formed between talo-calcaneal joint in AP and lateral view (table No. 4, 5 & 6) are quite less than normal angle. It is due to altered talus in distortion 4 or could be due to congenital atresia of the socket containing head of talus, which attributes the deformity of the medial displacement of the navicular and calcaneus around the talus. Talus is deviated medially and calcaneus is inverted under the talus. 6 The ossific nucleus of talus lies predominantly in the head and neck of the cartilaginous anlage of the talus, therefore ossific nucleus forms an angle with the cartilage of the body wider in the clubfoot than in normal feet owing to the marked angulation of the neck of the talus in the clubfoot. 7

The talus and calcaneus are partly ossified at birth but there is a over imposition of bones in the clubfoot, which arrest the further growth of these bones thereby causing reduction in talo-calcaneal index, reduction in the talo-calcaneal angle (AP & lat) which subsequently leads to reduction in internal tibial torsion.

It is also said that, due to the significant reduction of the talus, the navicular facing medially with subtalar surface into varus. 8 Under these circumstances the angles between talo-calcaneum are bound to reduce. Hence talo-calcanean index is also reduced considerably (72.36%) (Table no- 6).

Table 1: Percentage distribution of patient with clubfoot in both sexes

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of foot studied</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>27</td>
<td>35.53</td>
</tr>
<tr>
<td>Male</td>
<td>45</td>
<td>64.47</td>
</tr>
</tbody>
</table>

Table 2: Classification of clubfoot bilateral Vs Unilateral

<table>
<thead>
<tr>
<th>Sex</th>
<th>Bilateral</th>
<th>Unilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
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<td>6</td>
<td>15.7</td>
</tr>
<tr>
<td>Male</td>
<td>17</td>
<td>33.3</td>
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<tr>
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<tr>
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<td>12</td>
</tr>
<tr>
<td>2 year to 4 years</td>
<td>16</td>
</tr>
<tr>
<td>4 years to 9 years</td>
<td>05</td>
</tr>
<tr>
<td>9 years and above</td>
<td>09</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
</tr>
</tbody>
</table>

The table shows that the club-foot deformity is maximum in patients between 7 months – 1 year of age and least in 9 Years and above.

Due to reduction in the size of the calcaneus in the varus position so the ligaments and tendons will be confirmed to the mishappened bones and calcano-fibular ligament is also severely stretched. 4 Due to reduction of bony elements, the plantar aponeurosis, spring and deltoid ligament are unduly stretched to facilitate plantar flexion to resist dorsiflexion, in addition to this, tibiatis posterior showed loss of spatial orientation due to contraction of collagen fibres and soft tissue. 9 This involves muscles, tendons, tendon sheaths, ligaments and joint capsule. These contractures are classified into four groups 1) Posterior. 2) Medial Plantar. 3) Subtalar. 4) Plantar.

1. Posterior contracture involves the tendo- Achills, tibio-talar capsule, talo-calcaneal capsule, posterior tibio-fibular ligament and calcaneo- fibular ligament.
2. The medial plantar contracture involves the talo-navicular capsule, deltoid ligament, tibialis posterior tendon and spring ligament.
3. The sub-talar contractures involves the talo- calcaneal, interoseous ligament and bifurcated ‘ Y ’ ligament.
4. The plantar contractures involves the abductor hallucis, plantar fascia and intrinsic toe flexors. 1 These contracted soft tissues, when visualized under microscope showed the presence of fibroblasts and mast cells. Some fibroblasts contain a network of microfilaments but all lacked microtubules, basal lamina. Mast cells are rarely identified in capsular specimen. 10 It gives a dual statement that
presence of fibroblasts and mast cells in contracted soft tissues because in the untreated clubfoot, the fibrosis develops. Perhaps the fibrosis developed in the clubfoot could be "Pseudo-fibrosis".

The first talo meta tarsal angle is more than normal in 78% of the club foot deformity (table no 7). This is due to the supination of forefoot flatness increases the angle of first talo meta tarsal joint because in clubfoot deformity, there is late adaptive response to medial rotation of the foot 11. As first metatarsal carrying the big toe is very thick and strong for supporting the greater part of the weight of the body in stepping off from the ground, whereas the outer portion of the metatarsus is mainly used as a support in balancing the body not as a weight carrier. Hence it has assumed more supine position to maintain the balance of the club-footed leg.

Table 7: Radiological study of talo-1st metatarsal angle AP view (Normal 0-20°)

<table>
<thead>
<tr>
<th>Observed angles</th>
<th>Number of foot studied</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 20°</td>
<td>58</td>
<td>78.9</td>
</tr>
<tr>
<td>Less than 20°</td>
<td>14</td>
<td>21.1</td>
</tr>
</tbody>
</table>

Table shows 78.9% clubfoot have fore foot adduction while only 21.1% have normal talo-1st metatarsal joint.

In the club foot, atrophy of calf muscles is observed which is due to the fixed plantar flexion at ankle joint. In normal foot, every time foot comes to the ground in marking the step forward, there is tendency of long bones to slip forward, on the dorsum of foot which enhances the blood circulation but in the club-foot due to fixed plantar flexion of ankle joint, the distal muscles are pulled due to undue pulling constantly resulted in to atrophy of myo-filaments. This atrophy is associated with absence of anterior tibial artery in 85% of untreated club-foot deformities 12. It is also noted in the angiography, that absence of posterior tibial artery also, and in some cases hypo-plastic anterior tibial artery in 90% of the cases 13. There is also absence of dorsalis pedis artery in untreated old patients 14. It could be due to disarticulation and superimposition of tarsal bones, plantar flexion at ankle joint and inversion at mid tarsal joints. These blood vessels could have compressed resulting into ischemia, infarction, necrosis. The concerned area of non vascularity may develop in to fibrosis due to continuous pressure on these structures by ankle joint to maintain stability of lower limb and antigravity muscles.

In present study it is also observed that internal tibial torsion (table No.8) is less than normal in 52.63% cases. The range of tibial torsion varies from +5° to +40°. Consistency with normal appearance and function tibial torsion must not be distinguished from apparent torsion when there is a rotation of whole limb 15. More over there could be pseudo-tibial torsion is due to laxity in the ligaments of knee joint 16. It is also considered that, there is no significant difference between internal tibial torsion of normal foot and club-foot at various age groups 17. The main factor responsible for the torsion of tibia may be the tendons on the posterior aspect of medial malleolus which will take origin from the posterior surface of fibula 18.

Summary and conclusion

1. The present study shows that all the normal angles are reduced due to plantar flexion at ankle and inversion at mid-tarsal joint except the talo-first metatarsal joint which is more than 20° in 78.9% of the club-foot deformities.

| Table 8: Radiological study of internal tibial torsion in clubfoot (normal +5° to +40°) |
|-----------------------------------|------------------------|------------------------|
| Observed torsion                  | Number of foot studied | Percentage             |
| Less than +5°                     | 38                     | 52.63                  |
| More than +5°                     | 34                     | 47.37                  |

Table shows 52.63% internal tibial torsion in clubfoot while 47.37% shows normal torsion.

2. In addition to this, internal tibial torsion which is less than +5° in 52.63% of club-foot study.
3. Incidence of club foot is more in males than females.
4. This angular measurement study of club foot will certainly help the orthopedic surgeon to use advanced technique in club-foot treatment of children to increase the reduced angle to the normal angle to treat the club-foot deformity by keeping the bony elements intact.
5. The fibrosis present in club-foot is most probably Pseudofibrosis and it can be regenerated if treated.

It is a matter of a debate that club-foot or talipes equinovarus deformity is due to genetic abnormality or idiopathic. Hence it is hypothesized that the following conditions could be the reason for the clubfoot.

1. It could be due to improper flexion position of fetus.
2. There could be improper or variation in umbilical vascular supply towards lower limb buds.
3. Due to nutritional status of mother, certain genes remains silent if they do not get proper or required nutrition.
4. It could be due to any abnormal placenta which might have obstructed growth of lower limb.
5. Placental barrier might have permitted certain virus which attack the lower limbs mainly.
6. Moreover club foot deformity associated with dystrophy of calf muscles again confirms that there might be some obstruction on the distal part of the leg and ankle joint, unilaterally or bilaterally.
7. Apart from this, the congested uterine cavity might have arrested the growth of distal part of the lower limb and foot.
8. Due to over flexion or hypoflexion of fetus umbilical vessels might not have reached the distal part of leg and foot in idiopathic condition.
9. It could be due to disorientation of ossification centres and non coordination between oppositional growth and transitional growth which has resulted from unknown metabolic disorder of mesoderm in lower limb buds unilaterally or bilaterally.

These factor requires further embryological genetic, and histo pathological study to find out the exact cause of clubfoot so that its recurrence can be prevented positively.

The overriding of bones in club foot certainly cause undue stretching of ligaments, muscles, fascia resulting into narrowing of all the normal angles between tarsal and metatarsal considerably, associated with calf muscle deformity and fixed fore foot with supination. Most of the club foot are congenital than acquired. The severe reduction in TCN angle (AP & lat), reduction in talo-calcaneal index and internal tibial torsion causes compression of related blood vessels which may cause ischemia, infarction and even necrosis if club foot is untreated. Hence during the surgery the normal angles has to be born in the mind & re-arrange the related Structures in such a way that, there shall be no reduction in angles in future which leads to relapse of clubfoot after surgery.

The presence of fibroblast and mast cells in club foot proves that, the fibrosis developed in club-foot is "Pseudo fibrosis" and can be treated for regeneration. The regenerated tissue will certainly prevent the relapse of clubfoot.
References

Blood and Component Usage in Trauma Patients

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**Professor and Head, Dept. of Pathology, S.S Institute of Medical Sciences and Research Centre, Davangere, Karnataka - 577 005
***Associate professor, Dept. of Forensic Medicine and Toxicology, S.S Institute of Medical Sciences and Research Centre, Davangere, Karnataka - 577 005

Abstract

Background

Ten to fifteen percent of all transfusions are used in patients with traumatic injury. By understanding the patterns of blood usage in these patients, routine resource allocation, planning for mass casualty situations, designing research and optimizing triage can be usefully informed.

Aims and Objectives

To analyze the transfusion practices in trauma patients in a tertiary care hospital and to emphasize the rationale behind modern and future transfusion strategies.

Material and Methods

The study reports were compared with Blood Bank registry records. The data collected include patients’ age, sex, departments to which the injured patients were admitted. Hemoglobin levels during admission and number of blood and blood components used in various departments were analyzed.

Results

Fifty two patients with acute trauma were admitted to a tertiary care hospital and received 8.32% of total transfusion during the study period. The mean age of these patients was 38.2 years and 93.38% of them were males. The most common blood group among the patients was B positive (36.54%). Among the admitted patients 59.61% were from Orthopedics, 23.07% from Neurosurgery, 13.46% were from General Surgery and 1.94% each from the cardiovascular and thoracic surgery (CVTS) and maxillofacial surgery departments. Patients admitted to orthopedic department received the maximum number of transfusions (43.94%) and packed red cell was the most frequently used blood component (61.46%).

Conclusion

Hemorrhage and anemia is common in critically injured trauma patients and use of appropriate blood component can be life saving.

Key words

Trauma; blood components; transfusion.

Introduction

Traumatic injury is rapidly becoming the leading cause of death worldwide. Nearly 1.05 lakh people die in road accidents in India. It is the highest in the world. Uncontrolled hemorrhage due to trauma is the leading cause of potentially preventable death. In addition to crystalloid and/or colloid based resuscitation, severely injured trauma patients are routinely transfused with packed red blood cells (PRBCs), fresh frozen plasma (FFP), platelets and in some centers either cryoprecipitate or fibrinogen concentrates or whole blood. The immediate availability of these components is important, as most hemorrhagic deaths occur within the first 3-6 hours of patient arrival.

Blood transfusion is a life-saving strategy that is often utilised in a trauma care set-up. Improvements of tissue hypoxia as well as the restoration of haemoglobin status and blood volume are some of the advantages of transfusion. Hemorrhage is known to be a major cause of early death after injury and has been shown to be responsible for 30–40% of trauma mortalities. There is currently little debate about the need for restricting blood transfusions. In spite of screening for transmissible infectious diseases, the fear of transfusion associated infections, including the human immunodeficiency virus, hepatitis B and C has been partly responsible for increasingly restrictive approaches. Therefore, transfusion is a double edged sword that also has its own demerits. Hence, it is essential that the usage of blood and blood products be kept to a bare minimum and used only when absolutely necessary. The aim of this study was to review blood and blood component usage in trauma patients in our tertiary care hospital, with a view to streamline the resources for the proper therapeutic benefit for these patients.

Material and Methods

This proposed study was conducted from over a period of one month (January 2010) at casualty department in a tertiary care hospital (situated next to National Highway 4) that provides trauma care services to acutely injured patients and those requiring specialised services around the clock. The hospital has a wide range of specialists. The data was correlated andanalysed from the clinical records and blood bank registers. This included the patients’ age, sex, blood group, hemoglobin concentration and the details of patients admitted and transfused in the General Surgery, Orthopedics, Neurosurgery and other departments. The nature of the blood components transfused (whole blood, PRBCs, FFP or platelet concentrate) and the transfusion reaction, if any, were also noted. The data was recorded on a Microsoft Excel spreadsheet.

Results

During the study period there were a total of 1845 episodes of transfusion with blood and components to various departments and 8.32% (132/1845) was utilized for trauma patients. There were 52 admissions to various departments with history of trauma. Among these, the mean age of the patients was 38.2 years (Table 1) and 93.38% of them were male (Fig. 1). The most common blood group among the patients was B-positive (36.54%), followed by O-positive (28.86%) (Fig. 2). Twenty three (44.23%) patients had a low hemoglobin concentration ranging between 6.1 to 9 grams/dl.
Among the admitted patients 59.61% were from Orthopaedics, 23.07% from Neurosurgery, 13.46% from the General Surgery department and 1.94% each from the cardiovascular and thoracic surgery (CVTS) and maxillofacial surgery departments (Fig. 3).

Overall these 52 patients received 132 episodes of transfusions with whole blood, PRBCs, platelet concentrates and FFP. Table 3 provides a summary of the blood and blood component usage in each department. Overall, PRBCs were the most commonly utilized component, followed by whole blood, platelet concentrates and FFP in the ratio 8:2:1:1.

Patients admitted to orthopedic department received the maximum number of transfusion (43.94%) and packed red cell was the most frequently used blood component (61.46%).

The highest number of whole blood, PRBCs and FFP was utilized for patients admitted in orthopedic department. Patients in Neurosurgery department utilised maximum units of platelet concentrates.

Discussion

Blood transfusion is an essential aspect of trauma care. The primary goal of blood transfusion is to ensure that it is done safely and used appropriately for specific clinical conditions, thereby avoiding the unnecessary use of donor blood in clinical practice.

As patients rarely require all the components of whole blood, transfusion of the required component is a meaningful and useful alternative to whole blood transfusion. This allows several patients to benefit from one unit of donated whole blood. Blood is a precious and scarce commodity that is dependent on public donations, and should therefore be used effectively in order to avoid misuse and wastage.9,10

The study group has shown male predominance. This could be because of the socio-cultural factors in Indian set up, where males use to go outside for work. The patient with age group of 20-30 years was maximum which shows that the middle age group people are involved in travel, driving and other manual work which exposes them for traumatic accidents. Low hemoglobin concentration in patients with trauma is attributable to blood loss due to hemorrhage.

Incidence of B blood group is common among the trauma sustained patients which is comparable with the study done by Arulselvi S et al.9

The trauma patients admitted to our hospital were commonly from the road traffic accidents occurring near the National Highway, situated very much close to the hospital. Orthopedic cases were highest in number because, the force and manner of injury occurring in these patients invariably involves the bony and soft tissue damage.

The present study has helped in analyzing the usage of blood and its components to patients admitted to various departments with trauma. Trauma accounts for 13.4% of all blood products transfused in Ontario 11 as against 8.3% observed in the present study. Overall, packed cells were the most commonly utilized component and bleeding due to hemorrhage was the most common indication.

Conclusion

Trauma patients with massive bleeding and anemia are complex and difficult to manage, and clinicians often have little time to decide on their course of action. A rational approach in using blood products, in patients with bleeding requires an understanding of the principles of managing hemorrhagic shock. The main priorities are controlling hemorrhage and restoring adequate oxygen delivery to tissues. However, avoidance of over transfusion is key factor because transfusion is also associated with significant risks. Once patients are resuscitated and further bleeding is stopped, use of conservative transfusion triggers is recommended to avoid excessive transfusion. Fortunately, new technologies are being developed that have the potential of reducing blood loss and transfusion requirements in trauma patients with massive bleeding. Studies on the appropriateness of blood use and blood ordering schedules need to be conducted in the future.

**Table 1:** Age distribution of trauma patients.

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>n=52</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-20</td>
<td>7</td>
<td>13.46</td>
</tr>
<tr>
<td>21-30</td>
<td>17</td>
<td>32.69</td>
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<tr>
<td>31-40</td>
<td>11</td>
<td>21.15</td>
</tr>
<tr>
<td>41-50</td>
<td>6</td>
<td>11.53</td>
</tr>
<tr>
<td>51-60</td>
<td>3</td>
<td>5.76</td>
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<tr>
<td>61-70</td>
<td>4</td>
<td>7.69</td>
</tr>
<tr>
<td>&gt;71</td>
<td>4</td>
<td>7.69</td>
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</tbody>
</table>

**Table 2:** Hemoglobin concentration of trauma patients.

<table>
<thead>
<tr>
<th>Hemoglobin (grams/dl)</th>
<th>No.</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td>3 to 6</td>
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</tr>
<tr>
<td>6.1 to 9</td>
<td>23</td>
<td>44.23</td>
</tr>
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<td>9.1 to 12</td>
<td>22</td>
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<td>&gt;12</td>
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<td>3.84</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
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</table>

**Table 3:** Age distribution of trauma patients.

<table>
<thead>
<tr>
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<td>61-70</td>
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<td>7.69</td>
</tr>
<tr>
<td>&gt;71</td>
<td>4</td>
<td>7.69</td>
</tr>
</tbody>
</table>

Fig. 1: Sex distribution of trauma patients.

Fig. 2: Frequency of blood group distribution.

Fig. 3: Distribution of patients in various departments.
Table 3: Departments in which patients were admitted with blood and blood component usage.

<table>
<thead>
<tr>
<th>Department</th>
<th>No.</th>
<th>%</th>
<th>Whole blood</th>
<th>PRBCs</th>
<th>Platelet concentrate</th>
<th>FFP</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>General surgery</td>
<td>7</td>
<td>13.46</td>
<td>7</td>
<td>13</td>
<td>4</td>
<td>3</td>
<td>27</td>
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<td>Orthopedics</td>
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<td>59.61</td>
<td>9</td>
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<td>4</td>
<td>58</td>
<td>43.94</td>
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<td>3</td>
<td>37</td>
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<td>5.3</td>
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<td>26</td>
<td>81</td>
<td>13</td>
<td>12</td>
<td>132</td>
<td>100</td>
</tr>
</tbody>
</table>

References

Tetrodotoxin Versus Ciguatera Fish Poisoning in the Mediterranean Sea
Mohy K El Masry*, Marwa M Fawzi**
*Professor of Clinical Toxicology, **Lecturer, Forensic and Clinical Toxicology, Department and Poison Control Center, Ain Shams University Hospitals, Cairo, Egypt

Abstract
Tetrodotoxin and Ciguatera share common manifestations and pose special risks to people of the Mediterranean regions.

Aim of the Study
To report progressively increasing reports of ciguatera and tetrodotoxin fish poisoning and document the pattern of their invasion to the Mediterranean Sea.

Subjects and Results
All fish intoxicated cases from red or Mediterranean sea since 2006 were clinically described. Poisoning after fish consumption accounted for 294 patients, 19 of which had fatal outcome. Paresthesia, vertigo, sensory deficits early appearing and gastrointestinal signs were shared by both conditions. Tetrodotoxin was differentiated by the progression of the picture with muscle weakness, collapse, altered sensorium, respiratory muscle paralysis and failure.

Discussion
Higher risks are associated with larger fish or with consumption of liver or gonads. Diagnosis relies on the described clinical picture following the consumption of toxic fish. Documentation and rapid reporting of newly affected locations and manifestations of either condition may reduce the hazards of toxicity to other Mediterranean countries.

Key Words

Introduction
Cumulated clinical data point to progression of the toxic marine perils among unaware fish consumers along the coasts of Egypt. Ciguatera has been recorded in Egypt since the mid-eighties of the last century. Since then it became endemic. All affected cases have consumed fish from the Gulf of Suez, most of which is known as “rabbit fish”. The more serious cases were related to consumption of liver, testicles or ovaries.

More than 60 cases are recorded and treated annually in the Poison Control Center Ain Shams Universities (PCC-ASU). It often exceeded 120 cases per year with successive frequent outbreaks in the late 1980’s and the early 1990’s.

Symptoms usually develop immediately after fish consumption within the first fifteen minutes. Perioral, lips, tongue numbness in addition to numbness of the tips of fingers if fish eaten by hands, were the most consistent symptoms, usually followed by severe dizziness, inability to stand up, severe vertiginous malaise, loss of position feeling specially feet and knees, and vomiting.

Altered temperature sensation, burning of the hands and feet, headaches, impending fainting feeling were less common. All patients were conscious, had normal motor power, with altered sensations notably deep proprioception of knees and neck, disequilibrium, altered pain, and touch. Sensory cranial and peripheral nerves were equally affected. Severe position related autonomic disturbances were evident in less than 20% of cases and persisted for as long as 2 weeks in severe cases before spontaneously disappearing. No respiratory embarrassment or distress was evident, and arterial blood gas denoted almost always normal respiratory function. Mild gastrointestinal symptomatology was the rule. No mortality was ever recorded from ciguatera intoxicated patients in Egypt.

Over thirty years the rabbit fish was a common source of ciguatera poisoning in the Egyptian littoral annually reported and treated in the PCC-ASU. Rabbit fish has been as well reported by Israel poison information center as a cause of ciguatera in the Eastern Mediterranean region (Raikhlin-Eisenkraft and Bentur, 2002). Ciguatoxin like substances have been demonstrated by immunobead assay in the edible siganus species of fish on the Eastern Mediterranean on 2004 from the polluted sea water of Haifa bay (Bentur and Spanier, 2007).

Over the last 4 years several documented cases of fish-induced poisoning presented progressing paralytic manifestations with a definite change of the classical picture of ciguatera. The aim of this study is to document and report the newly appearing pattern of fish-induced poisoning in Egypt.

Methods
The medical files of fish intoxicated cases were retrospectively reviewed, clinical picture and laboratory investigations analyzed through the years 2006 - 2010 in PCC-ASU and in other hospitals.

Results
In 2006, a 55 years lady resident of the northern coast of Egypt was recorded to have consumed parts of liver and flesh of a large unidentified fish offered to her by some fishermen. Within half an hour she complained of severe dizziness, numbness of the face, shoulders and arms. She was unable to move and had severe sensory alteration of touch, temperature and position sense. She experienced breathing discomfort and severe muscle weakness. She was immediately transferred to Cairo where she was thoroughly investigated and examined by different imaging procedures including brain and spine MRI. All her findings were normal. Toxicological examination, next day, revealed a severe form of ciguatera as the significant muscle paresis had regressed. Simple movements triggered vomiting and severe vertigo. It was the first recorded case of ciguatera from the Mediterranean. The lady responded favorably to mannitol in addition to IV fluids and other supportive treatment and recovered in 5 days without sequelae. The fish was identified as Lagocephalus sceleratus from the family Tetraodontidae. It was not scaly, had smooth spotted brown dark skin with a relatively large head and blunt snout provided with a pair of big teeth on each jaw. It was around 4 kg and around 60 cm in length. Reviewed literature disclosed documentation of the pufferfish Lagocephalus sceleratus in the red sea (Sabrah et al, 2006) and in Gökova Bay (Southeastern Aegean Sea), Turkey on 2003 for the first time in the Mediterranean Sea (Akyol et al, 2005). Symptoms and signs were indicative of ciguatera; however, a mild tetrodotoxin
fish poisoning was put as well in consideration, since the reported muscle weakness in the first twelve hours and the identified Tetraodontidae fish indicate it.

In July 2008, an outbreak involving eleven persons in addition to two deaths resulted from consumption of large puffer fish (Alkarrad) in Alexandria. This outbreak was followed by four other cases. In November of the same year in Matrouh, twenty persons suffered severe tetrodotoxin intoxication, two of which died. The identified fish resembled puffer fish.

In 2009, Alexandria witnessed a similar outbreak involving nine cases one of whom died. The picture started by vomiting, abdominal pains, giddiness, vertigo and progressed to muscle weakness and eventually respiratory failure.

In March to May 2010, several outbreaks involving 16 patients transferred to PCC-ASU from most coastal cities on the Mediterranean and Red sea were documented. Most of the patients presented with a picture simulating early phases of ciguatera.

A family of 4 members from Port Said was affected after eating flesh and gonads of a puffer fish weighing more than four Kilograms; one of whom (the father) died immediately upon intake. Their initial symptoms included severe vomiting.

Fig. 1: Egypt Recorded Fish Poisoning

<table>
<thead>
<tr>
<th>Date</th>
<th>Origin of the Fish</th>
<th>Treating Center</th>
<th>Diagnosis</th>
<th>Nº of casualties</th>
<th>Nº of deaths</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>Alexandria</td>
<td>Private hospital in Cairo</td>
<td>Ciguatera &amp; V Tetrodotoxin</td>
<td>1</td>
<td>-</td>
<td>identified puffer fish as Lagocephalus sceleratus</td>
</tr>
<tr>
<td>2006</td>
<td>Gulf of Suez &amp; Mediterranean north coast</td>
<td>PCC-ASU</td>
<td>Ciguatera</td>
<td>21</td>
<td>-</td>
<td>Rabbit fish. Individual &amp; group reports</td>
</tr>
<tr>
<td>2007</td>
<td>&quot; &quot;</td>
<td>PCC-ASU</td>
<td>&quot;</td>
<td>34</td>
<td>-</td>
<td>Rabbit fish. Individual &amp; group reports</td>
</tr>
<tr>
<td>July 2008</td>
<td>Alexandria</td>
<td>Alexandria</td>
<td>Tetrodotoxin</td>
<td>13</td>
<td>2</td>
<td>identified puffer fish</td>
</tr>
<tr>
<td>July 2008</td>
<td>&quot; &quot;</td>
<td>Alexandria</td>
<td>&quot;</td>
<td>4</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>Gulf of Suez and Mediterranean north coast</td>
<td>PCC-ASU</td>
<td>Ciguatera</td>
<td>36</td>
<td>-</td>
<td>Individuals &amp; groups reports.</td>
</tr>
<tr>
<td>Novemb er 2008</td>
<td>Marsa Matrouh</td>
<td>Local Hospitals</td>
<td>Tetrodotoxin</td>
<td>20</td>
<td>2</td>
<td>identified puffer fish</td>
</tr>
<tr>
<td>2009</td>
<td>Alexandria</td>
<td>Alexandria</td>
<td>&quot;</td>
<td>9</td>
<td>1</td>
<td>identified puffer fish</td>
</tr>
<tr>
<td>2009</td>
<td>Gulf of Suez and Mediterranean north coast</td>
<td>PCC-ASU</td>
<td>Ciguatera</td>
<td>48</td>
<td>-</td>
<td>Individuals &amp; groups reports.</td>
</tr>
<tr>
<td>March to May 2010</td>
<td>&quot; &quot;</td>
<td>PCC-ASU</td>
<td>&quot;</td>
<td>16</td>
<td>-</td>
<td>Individuals &amp; groups reports.</td>
</tr>
<tr>
<td>March 2010</td>
<td>Port Said</td>
<td>PCC-ASU</td>
<td>Tetrodotoxin</td>
<td>3</td>
<td></td>
<td>4 patients from the same family. Father died before transfer. 3 transferred</td>
</tr>
<tr>
<td>March 2010</td>
<td>Suez</td>
<td>Port Said</td>
<td>&quot;</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 2010</td>
<td>&quot; &quot;</td>
<td>PCC-ASU</td>
<td>&quot;</td>
<td>6</td>
<td>-</td>
<td>6 patients from the same family</td>
</tr>
<tr>
<td>April 2010</td>
<td>Ras Ghareb</td>
<td>Local Hospital</td>
<td>&quot;</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>May 2010</td>
<td>Marsa Matrouh</td>
<td>Local Hospitals</td>
<td>Tetrodotoxin</td>
<td>75</td>
<td>12</td>
<td>identified Lagocephalus sceleratus</td>
</tr>
<tr>
<td>May 2010</td>
<td>Sidi Abdel Rahman</td>
<td>Alexandria</td>
<td>Ciguatera Vs Tetrodotoxin</td>
<td>4</td>
<td>-</td>
<td>Non identified fish</td>
</tr>
<tr>
<td>June 2010</td>
<td>North Coast</td>
<td>Local Hospitals</td>
<td>Ciguatera Vs Tetrodotoxin</td>
<td>2</td>
<td>-</td>
<td>Non identified fish</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>294</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

and numbness of face and extremities with disequilibrium. The other family members suffered hemodynamic instability with fluctuations of blood pressure and long episodes of bradycardia, severe vomiting and recurrent diarrhea on the first day. The two girls had ataxic gait, vertigo, incoordination, nystagmus and significant muscle weakness (grade 3/5) 24 hours after fish consumption. The wife, the least affected, did not eat the gonads or liver of the fish, although she consumed a large portion of the flesh. No respiratory affection was noted in either one. They responded favorably to IV fluids, hypotension was corrected and diarrhea stopped gradually at day 3. Mannitol was given intravenously, after which neurological improvement hastened and totally recovered at day 5.

Another family of 6 members originating from Suez city gave a similar history of ingestion of a large fish 3 to 4 kilograms. All members were suffering variable degrees of muscle weakness especially of hands grip. All patients gave the same symptomatology in addition to muscle weakness; vomiting and disequilibrium gradually improved over 5 days and were discharged.

On April 2010, two persons in Ras Ghareb (on the red sea) were affected following a fish meal, one of which died within 3 hours. The resuscitated case complained of severe dizziness, disequilibrium, severe numbness, prostration and marked muscle weakness.

On May 2010, a large outbreak was recorded in Matrouh where 75 persons were affected with a severe form of tetrodotoxin fish poisoning after ingestion of “Alkarrad”. Within few hours on their way to hospital, 12 patients died. Symptoms ranged from paresthesia, diarrhea and dizziness to severe weakness, ataxia, seizures, paralysis and arrest. The fish was not previously identified by the local fishermen. In Alexandria 4 cases were recorded with signs greatly resembling ciguatera, mild paresthesia of the lips, tongue and throat, vertigo and lightheadedness after consuming a large fish caught on the shore of Sidi Abdel Rahman on the west of Alexandria. They reported muscle weakness and difficulty breathing after few minutes and were admitted in Alexandria University hospital where they gradually recovered within 3 days.

On June 2010, 2 intoxication cases by puffer fish were recorded from red and Mediterranean Sea, though not fatal.

Discussion

The increasing reports of ciguatera and recent emergence of tetrodotoxin clinical picture of intoxication are warning signs of the invasion of the Mediterranean Sea by toxic tropical fish that will forcibly change the venomous marine map of the Middle East.

Differentiation between ciguatera and tetrodotoxin fish poisoning should be wise and always in favor of the latter if signs of respiratory distress or limbs weakness start to appear. Although unsteady posture and vertigo might result from ciguatera-induced affection of sensory inner ear and proprioception nerve endings yet this should be carefully interpreted as they might constitute the earliest manifestations of tetrodotoxin resembling to a large extent ciguatera and may possibly progress to weakness.nty. Ciguatera-producing fish identification is difficult. The larger and older the fish, the greater is the toxin concentration. Ciguatoxin cannot be destroyed by cooking, or any other method of food processing. It is recommended not to eat large fish, as well as avoiding liver, intestines, heads or gonads, where the toxin is concentrated (David Winter, 2009).

The appearance of serious often fatal neurotoxic fish poisoning following puffer fish consumption over the last four years in Egypt with the described characteristics is evidently a toxic phenomenon different from ciguatera and point to tetrodotoxin fish poisoning. The picture starts with sensory followed by progressive motor weakness, hemodynamic and respiratory muscle failure, necessitating mechanical ventilation in a significant number of patients. Actually a report of a similar picture was reported as well from Lebanon after fish consumption where deep non-reactive coma, reversible after one day was described (Awada et al, 2010). Interestingly the most serious cases, affirm to have consumed gonads and liver of the fish. The majority of reported deaths in Egypt (19 out of 294 patients) occurred within the first one to two hours from fish consumption before reaching medical facility. Other cases required intensive resuscitation for two to three days in the form of supportive treatment and mechanical ventilation. Since there is no typical laboratory parameters supporting the diagnosis of tetrodotoxin fish poisoning, the presence of muscle weakness, respiratory embarrassment following identified or suspected puffer fish consumption should point to tetrodotoxin rather than ciguatera fish poisoning.

The order Tetraodontiformes includes Lagocephalus sceleratus, a fish that has been identified since 2006 in Egypt northern coast and thereafter several times in the fatal outbreaks mentioned above. These species originally inhabit of the shallow waters of the temperate and tropical zones in China and Japan, recently migrated to the Mediterranean Sea and was recorded in 2003, Gökova Bay, Turkey (Filiz and Er, 2004). The liver, gonads, intestines, and skin of these fish contain tetrodotoxin, a powerful neurotoxin that can cause death in approximately 60% of persons who ingest it (Ellenhorn and Barceloux, 1988). Tetrodotoxin is heat-stable and blocks sodium conductance and neuronal transmission in skeletal muscles. Paresthesias begin 10–45 minutes after ingestion, usually as tingling of the tongue and inner surface of the mouth. Other common symptoms include vomiting, lightheadedness, dizziness, and weakness. An ascending paralysis develops, and death can occur within 6–24 hours, secondary to respiratory muscle paralysis. Other manifestations include salivation, muscle twitching, diaphoresis, dysphagia, aponia, and convulsions. Severe poisoning is indicated by hypotension, bradycardia, depressed corneal reflexes, and fixed dilated pupils (Morbidity and Mortality Weekly Report, CDC, 1996). In this series, ataxia, incoordination and nystagmus were recorded in some cases and death occurred as early as one hour after fish consumption following respiratory muscle paralysis and failure. Diagnosis is based on clinical symptoms associated with a history of puffer fish ingestion that can be easily identified by increasing awareness of fishermen and people. Treatment is supportive, and there is no specific antitoxin. In three treated cases, mannitol gave good results in rapidly reducing the severity and duration of symptoms.

It is in our opinion that global warming and climate change of the Mediterranean Sea, in addition to the progressive pollution of the international sea water are responsible for ciguatera and tetrodotoxin fish poisoning. Over the last two years, reports of individual poisoning emerged beyond regional water of Egypt, from Lebanon (Suheil et al, 2009) and from Israel (Bentur et al, 2008) where thirteen patients have been poisoned. The frequent reports from different Egyptian marine shores over the last four years make this situation highly endemic in the Mediterranean Sea. It is expected for these frequent accidents to affect shores of neighbor countries and to affect the people of the European and North African Western Mediterranean countries. The severity of the poisoning and high fatality rates (16% of Matrouh patients) and the rapidity with which death supervened make the poisoning by Tetrodotoxin extremely hazardous.

Over 3 decades ciguatera has been frequently reported following consumption of the red sea rabbit fish; on the other hand, tetrodotoxin, has never appeared neither in the red nor in the Mediterranean Sea until 4 years ago possibly suggesting that global warming and pollution are important factors in migration of the Tetraodontidae fish family from the Indo-
Pacific Ocean to the Mediterranean Sea through the Suez Canal. This phenomenon has been described as Lessepsian migration after “De Lesseps”. It is assumed that Lessepsian migration has enabled poisonous fish species to colonize the Mediterranean Sea (Bentur et al, 2008), a theory though partly correct, yet it ignored the progressive Mediterranean and global warming, which is a major factor of migration. It should be mentioned that Suez Canal of De Lesseps, has joined both sea since 1869, while these fish recently migrated to the Mediterranean Sea.

Conclusion

Tetrodotoxin fish poisoning is invading coastal Mediterranean cities, in an intense and frequent manner posing a high mortality hazard and is caused by puffer fish known locally in Egypt as “El Karrad”. It should be differentiated from ciguatera, a common red sea hazard, which preceded tetrodotoxin in the Mediterranean local water. Consuming liver, gonads or ovaries produce a worse clinical picture than the flesh. The greater the size of the fish, the more dangerous it is. Death occurs by a rapid affection of motor power and eventually respiratory paralysis. Mannitol significantly reduces the severity.

Acknowledgments

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Conflict of interest statement

None declared.

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Narco Analysis - A critical appraisal
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Abstract

The element of criminal instinct is present in the nature of human being since the start of civilization. When crimes are emerging on every part of the globe, further more attempts to stop crime ought to be made. The revolution in scientific technology has progressed tremendously in the modern world of advancement. The field of law is also under the scanner of scientific advancement. Judicial system, particularly the criminal justice system, is not untouched with the advancement of science. There has been a revolution in the age old established laws of crime detection and investigation with the introduction of view techniques of crime detections like 'Narco-Analysis', in laws of evidence and criminal jurisprudence. While treading the path of technology sometimes we tend to forget the procedure of usage of these methods which is likely to violate the basic human rights. On one hand it can be extremely helpful in speedy delivery of justice but on the other it can infringe upon the privacy of human mind, thus raising serious scientific, legal, and ethical issues.

Key Words

Narco-analysis; ethical considerations; human-rights; judiciary; crime.

Text

The term narco-analysis is derived from the Greek word ἀνακρήσις (meaning “anesthesia” or “torpor”) and is used to describe a diagnostic and psychotherapeutic technique that uses psychotropic drugs, particularly barbiturates, to induce a stupor in which mental elements with strong associated affects come to the surface, where they can be exploited by the therapist.(Green, 1961). Though Horsley is widely acclaimed to have coined the term narco-analysis, the term was popularised in 1922, when Robert House, a Texas obstetrician used the drug scopolamine on two prisoners. (Naples & Hackett, 1978). Ever since the first reported use of criminal narcoanalysis in 1922, the process has been under the scanner with a lot of criticism. Narco-analysis, as part of criminal investigative practice, is the administration of chemical drugs by the police to a suspect or witness in order to extract information from him/her by asking questions while in a drugged state. Three grams of sodium pentothal dissolved in 3 litres of distilled water are injected in one’s veins along with 10 per cent dextrose, slowly over 3 hours. This injected cocktail is believed to depress the body’s central nervous system, putting the subject in a state of trance, hence suppressing the rational faculties that would be present if questioned when fully awake. This is based on the fundamental assumption that the cortical portion of the brain is responsible for our ability to lie and Sodium Pentothal affects this portion thus successfully impairing the ability to lie; this assumption however, has no concrete scientific basis. The effects of the second stage are reversible; an overdose of the chemical form this stage could lead the victim to be unconscious and send him into the 3rd or 4th stage of anaesthesia, the latter being irreversible and leading to a coma or death (Peoples’ Union for Democratic Rights, 2008). The answers are believed to be spontaneous as a semi-conscious person is unable to manipulate the answers.

A review of scientific literature on the use of lie detection and narco-analysis for establishing crime shows there is not enough material to assure us that these are scientifically researched methods, (In biomedicine, for making a claim to science, one uses the golden standard of the randomised controlled trial.) Moreover, not much of the inconclusive literature available on the subject is from scientific journals. Most research on the subject is sponsored or conducted by people in the security, intelligence, police and military agencies, hence, there is a major conflict of interest. (Jesani, 2008). It is widely accepted that the correct dose of the so-called ‘truth serum’ depends on the physical condition, mental attitude and will power of the subject on whom the narco analysis is to be conducted. It is also known that if the subject has used/abused intoxicants and other narcotics, a degree of “cross-tolerance” could occur. In the absence of adequate research that indicates the exact dose for different subjects, the wrong dosage may put the subject in a coma or may even cause death. In such a situation, the doctor is violating the ethical principle of non-malfeasance (Jagadeesh, 2007). Narco analysis has become an increasingly, perhaps alarmingly, common term in India. In a spate of high profile cases, it is increasingly being used.

Narco Analysis is facing serious legal and ethical implications. The question of dispute is, whether Narco Analysis is permissible as an interrogative tool along with its admissibility in court, as well as a science-instigated weapon that violates the human rights and also the fundamental rights? McDonalds in his review on the subject entitled “Narcoanalysis and Criminal Law” published in 1954 in American Journal of Psychiatry concluded that Criminal suspects, while under the influence of barbiturate drugs, may deliberately withhold information, persist in giving untruthful answers, or falsely confess to crimes they have not committed. Narcoanalysis is of doubtful value when used for the purpose of obtaining confessions to crimes. For ethical reasons the psychiatrist is advised against performing narcoanalysis when the examination is requested as an aid to criminal investigation. No manuscript has been published since then which favours narcoanalysis as a method of detecting truth. It is for this reason that the scientific, legal, and evidentiary issues relevant to the narcoanalysis debate need to be critically discussed.

Narcoanalysis, Torture and Medical Ethics

Is narco-analysis a type of pharmacological torture? The United Nations’ definition of torture has four components. The first is that torture produces physical/mental suffering and is a degrading treatment. The second is that it is always intentionally inflicted. The third is that it is inflicted for certain purposes such as getting information, confession, etc. And
the fourth is that it is inflicted by an official actor or an actor acting on behalf of an official (The UN Convention against torture). Narco-analysis satisfies all four components. It is deemed because it deliberately uses a drug that attempts to alter the state of mind of a person against his/her wishes. It produces mental suffering in an individual, more so if he or she discovers that some of his or her fantasy revealed in the procedure is used to make accusation of a real crime.

In the present Indian condition it is misused on occasions as the police or forensic laboratory have on occasions released video clips of the actual narco-analysis of a person to the media, where it is played out on the TV repeatedly when it is not even admissions by evidence in a court of law. Thus, it inflicts a high level of mental suffering and stigmatisation of the individual by society. Indeed, it is deliberately inflicted so deliberately that it is systematically done in an operation theatre and not in a prison or police lock-up. It is also a method not only to extract information, but also to force confessions (Jesani, 2008).

Furthermore, it is always done by police through its forensic laboratory and personnel employed there, along with the doctors in a hospital who are specifically appointed by the police to do the procedure (Keller, 2004). A doctor participating in narco-analysis is participating in a psychological third degree torture, chapter 2, regulation 6.6 of the Code of Medical Ethics clearly mentions that the physician shall not aid or abet torture nor shall he/she be a party to either infliction of mental or physical trauma or concealment of torture inflicted by some other person or agency in clear violation of human rights (MCI regulations 2002). The physician shall not countenance, condone or participate in the practice of torture or other forms of cruel, inhuman or degrading procedures, whatever the offence of which the victim of such procedures is suspected, accused or guilty and whatever the victim's beliefs or motives and in all situations including armed conflict and civil strife. The physician shall not provide any premises, instruments, substance or knowledge to facilitate the practice of torture or other forms or cruel, inhuman or degrading treatment or to diminish the ability of the victim to resist such treatment (WMA Declaration of Tokyo 1975).

Another argument put forward in support of narco-analysis is that the procedure is video graphed and audio taped, which is a proof that no coercion is being used. At the same time, if such tapes are made public before the judgement, are we not psychologically harassing and punishing the accused before the court has actually convicted them? Is this also not torture? Are doctors getting the accused person's informed consent, before the narco analysis procedure, to the possibility of the videotapes being illegally shown in public? Clearly, doctors are directly involved in this procedure of pharmacological torture in the name of scientific medical procedure. As mentioned, these interrogation methods clearly and deeply involve health-care professionals in hospitals and in forensic laboratories. As per Justo, 2006 it is unethical to be a part of the so called 'war on terror' he is specifically critical of the 'biscuit' teams (behavioural science consultation teams), comprising psychologists, psychiatrists and other health workers, akin to teams in India for forensic laboratories. Medical associations in the US have strongly spoken out against these unethical actions (Justo, 2006). To conclude, the participation of doctors in narco-analysis and the death penalty, and the tolerance of medical associations for their unethical acts, are eroding the very core of the medical profession (Jesani 2008).

**Scope for Abuse**

There is no scientific evidence, but if sodium pentothal produces a trance-like hypnotic state at the second stage of anaesthesia, making a person talk with less inhibition in giving or recollecting information, then perhaps the reverse could also be true. Therefore, scientists who are confidently using sodium pentothal to make a person speak the truth have an obligation to provide evidence that their assumptions and hypotheses do not work at all in reverse. Unless that is done, there will always be a suspicion that the truth found in narco-analysis could also be manufactured truth, planted by the interrogators themselves (Jesani 2008). They must now prove their claim that narcoanalysis is backed by sound science. In the absence of proof, narcoanalysis must necessarily be suspended, especially given its ethical and human rights implications. Moreover, these techniques must be used only for the purpose of national security. The police in India have also started violating norms by airing videotaped statements made by the accused person under narco-analysis, this practice needs to be condemned strongly (Jesani 2006).

**Narcoanalysis in Context of Privacy**

Cases of search and seizure, and ones subjecting an individual to compulsory medical tests are most closely related to the subject of the interference by the State with an individual's privacy. The narco analysis test requires injection of a substance which has the effect of curturing one's imagination and autonomy of answering. It directly involves a violation of a person's bodily autonomy. Of course, the same is usually done only when there seems to be a reasoned accusation or allegation against a person, even though it is possible that the allegation may later turn out to be incorrect, as the right to privacy can be restricted by a reasonable procedure. However, in the absence of express and unambiguous procedural safeguards, which may be in the form of mandatory rules to be followed by both, the medical personnel and the investigating agency, the test is susceptible to abuse, for example, it may be used to extract information which may be irrelevant to the investigation of the case and be of a personal nature.

**Narco Analysis and the Right to Health**

Right to health has been held to be a part of the right to life. An argument that barbiturates administered during narco-analysis have detrimental side effects was advanced before the Kerala High Court in Rojo George v. Deputy Superintendent of Police. The High Court found it untenable merely because similar substances are also prescribed by way of medicines to patients despite their having side-effects; even X-Rays and CT scans are used for diagnosing diseases, though they might have adverse effects. The Court also relied on a report stating that the substances used in scientific tests are administered in lesser quantities than is done in medical treatment (KLT 1979). This reasoning suffers from the flaw that it compares medication which, although slightly harmful by it, has been taken to cause a net improvement to a sick person's health after his or her consent, whereas scientific tests lack both these features. Conditions under which the test may be conducted, precautions to be taken by the medical personnel while administering the drugs to the accused and the methods of interrogation by the police while the accused is under the influence of the drug may be prescribed to prevent abuse of power and excesses by the police and unwanted mishaps. Barbiturate used for conducting Narco-Analysis, Sodium Pentothal, needs to be administered with utmost delicacy and care failing which it could lead to the death of the accused. Instances have been cited such as the attacks in Pearl Harbour in the United States where the same drug was administered on the injured owing to its speedy anaesthetic abilities. Several of these injured died because it had not been done with the high degree of care that it required; it is also shown that the same drug is also used for euthanizing patients in countries such as Netherlands due to its ability to hasten death; Sodium Pentothal is also used to execute the 'death Penalty' in the...
Narcoanalysis and its Legal Aspects

There are two questions related to the legality of the use of Narco Analysis in procedures of interrogation: firstly, whether it is legally admissible and secondly, whether it results in violation of human rights and other legal rights. The admissibility of a science in a court of law demands that 3 rules and regulations governing the admissibility and plausibility of the same. Who decides the gravity of a crime and the modus operandi of the investigation process to be followed? This question remained largely unanswered; however the recent guidelines by the supreme court judgement has made the procedure more credible and it was urgently needed. The present situation is functioning in a clearer fashion and it is commendable in so far as, whether or not a person is subjected to such tests, due regard is given to his privacy if administered correctly, strict procedural safeguards as the judgement have contributed to prevent its abuse. Thus, after an overall assessment, the only reason that an unrestricted use of a narco-analysis test may be justified seems to be because of practical necessity.

Conclusion

The State police departments are responsible for generating demand for the process. Consequently, when there is enormous pressure on a police department to solve a case, sending suspects for narcoanalysis not only buys time but also gives the impression that something concrete has been done about the case. Some officials connected to law enforcement argue that narcoanalysis can be of great use in instances where witnesses turned hostile; rape cases where issues of consent are being debated; and cases where the investigating officer is hard pressed for time or working to disrupt offences planned for the near future, including terrorist acts. Narco analysis in India is a nascent form of investigation. There was a paucity of rules and regulations governing the admissibility and plausibility of the same. Who decides the gravity of a crime and the modus operandi of the investigation process to be followed? This question remained largely unanswered; however the recent guidelines by the supreme court judgement has made the procedure more credible and it was urgently needed. The present situation is functioning in a clearer fashion and it is commendable in so far as, whether or not a person is subjected to such tests, due regard is given to his privacy if administered correctly, strict procedural safeguards as the judgement have contributed to prevent its abuse. Thus, after an overall assessment, the only reason that an unrestricted use of a narco-analysis test may be justified seems to be because of practical necessity.

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Demographic and Clinical Parameters of Digitalis Intoxicated Pediatric Patients During Years 2009-2010

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Abstract

Hundred pediatric patients were presented with acute digitalis toxicity to pediatric cardiology unit and poison control center Ain Shams University (PCCA) hospitals during years 2009-2010. Their sociodemographic results showed that their age groups varies from early infancy up to adolescent. Early infancy (32%), late infancy (20%), early childhood (4%), late childhood (24%) and adolescents (20%). Most were males (68%). 80% of cases came from urban areas and near half of them belong to social class III (48%). Oral route of intake was the main route 64%. The clinical data showed that the indications of digitalis intake were 28% had DCM, 24% had RHD, 28% had CHD, 12% exposed accidently to digitalis toxicity while 8% due suicidal attempts. The main presenting clinical manifestations were nausea and vomiting 72%. Followed by bradycardia (50%). There was highly significant correlation between serum digitalis level measured and serum electrolytes. The outcome of cases showed that the mean hospital stay duration was 5.6 ± 3 days. Thirteen percent showed morbidities in the form of different types of arrhythmias as follows: PVCs (3%), Bigeminy (3%), sinus bradycardia (3%), Torsades de points (3%) and first degree heart block (1%). 100% of cases survived with mean serum digitalis level 2.8 ± 0.7 ng/ml. No mortalities occurred. All cases recovered completely and were discharged. This reflects the efficiency of therapy and successful management in both pediatric cardiology unit and PCCA.

Introduction

Digitalis is a medication prescribed to certain heart patients. Digitalis toxicity is a complication of digitalis therapy, or it may be occur when someone takes more than a large amount of the drug at one time. (This is called an acute toxicity). Digitalis toxicity can be caused by high levels of digitalis in the body, or a decreased tolerance to the drug. Patients with decreased tolerance may have “normal” digitalis levels in their blood. Digitalis toxicity can occur from a single exposure or chronic overmedication. Goldfank (2006)

The aim of the Work

The aim of the current work is to study the sociodemographic, drug intake profile, clinical and investigational data of all pediatric patients exposed to acute digitalis toxicity for prediction of the clinical outcome.

Patients and Methods

The present study was conducted at Pediatric Cardiology Department and Poison Control Center of Ain Shams University Hospitals (PCCA). The study was a prospective study in the period from January 2009 to December 2010. The following parameters were studied in all patients:

1. Sociodemographic findings: These include age, sex, residency & family social class
2. Drug intake profile: This includes the route, the indications of digitalis intake and delay time.
3. Clinical manifestations: These include the incidence of of clinical manifestations on admission
4. Investigational results: These include serum digitalis level, serum electrolytes Na, K, and Ca in addition to renal functions tests (Creatinine and BUN)
5. Outcome of cases: These include the duration of stay in hospital, the mortality, and the morbidities.
6. Statistical analysis was done using SPSS windows version 8. The mean and standard deviation were calculated and used for description of quantitative variables.

Ethical Consideration

Written informed consent was obtained from the volunteers as well as from the patients’ next kin. The written consent is the same one applied for all admitted patients to Pediatric Cardiology department and Poison Control Center Ain Shams University Hospitals.
Table 1: Sociodemographic variables among pediatric patients with acute digitalis poisoning

<table>
<thead>
<tr>
<th>Sociodemographic</th>
<th>Number</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early infancy</td>
<td>32</td>
<td>32%</td>
</tr>
<tr>
<td>Late infancy</td>
<td>20</td>
<td>20%</td>
</tr>
<tr>
<td>Early Childhood</td>
<td>4</td>
<td>4%</td>
</tr>
<tr>
<td>Late Childhood</td>
<td>24</td>
<td>24%</td>
</tr>
<tr>
<td>dolescents</td>
<td>20</td>
<td>20%</td>
</tr>
<tr>
<td>(2) Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>68</td>
<td>68%</td>
</tr>
<tr>
<td>Female</td>
<td>32</td>
<td>32%</td>
</tr>
<tr>
<td>(3) Residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>80</td>
<td>80%</td>
</tr>
<tr>
<td>Rural</td>
<td>20</td>
<td>20%</td>
</tr>
<tr>
<td>(4) Social Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td>II</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td>III</td>
<td>48</td>
<td>48%</td>
</tr>
<tr>
<td>IV</td>
<td>32</td>
<td>32%</td>
</tr>
</tbody>
</table>

Histogram 3: Residence distribution among patients with acute digitalis poisoning.

Histogram 4: Social Class distribution among patients with acute digitalis poisoning.

Table 2: Route of drug intake among pediatric patients with acute digitalis poisoning.

<table>
<thead>
<tr>
<th>Route of intake</th>
<th>Number</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>64</td>
<td>64%</td>
</tr>
<tr>
<td>Intravenous(IV)</td>
<td>36</td>
<td>36%</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100%</td>
</tr>
</tbody>
</table>

Histogram 5: Route of intake among patients with acute digitalis poisoning.
Table 3: Indications of Digitalis among patients with acute digitalis poisoning.

<table>
<thead>
<tr>
<th>Indication of Digitalis</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dilated Cardiomyopathy (DCM)</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Rheumatic heart disease (RHD)</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Congenital Heart disease (CHD)</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Accidental</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Suicidal</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>
| **Total**                       | **100**| **100%**

Table 4: Incidence of clinical manifestations among patients with acute digitalis poisoning.

<table>
<thead>
<tr>
<th>Clinical manifestations</th>
<th>Number</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea &amp; vomiting</td>
<td>72</td>
<td>72%</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>35</td>
<td>35%</td>
</tr>
<tr>
<td>Blurring of vision</td>
<td>20</td>
<td>20%</td>
</tr>
<tr>
<td>History of syncope</td>
<td>15</td>
<td>15%</td>
</tr>
<tr>
<td>Confusion</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td>Weakness</td>
<td>27</td>
<td>27%</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>50</td>
<td>50%</td>
</tr>
<tr>
<td>Convulsion</td>
<td>4</td>
<td>4%</td>
</tr>
</tbody>
</table>

Table 5: Correlation coefficient test comparing Digoxin level and serum electrolytes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Serum electrolytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digitalis level (ng/ml)</td>
<td>Serum Sodium</td>
</tr>
<tr>
<td></td>
<td>Serum Potassium</td>
</tr>
<tr>
<td></td>
<td>Serum calcium</td>
</tr>
<tr>
<td>Mean</td>
<td>138</td>
</tr>
<tr>
<td>±SD</td>
<td>6.4</td>
</tr>
<tr>
<td>r</td>
<td>0.43</td>
</tr>
<tr>
<td>P</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>.001</td>
</tr>
</tbody>
</table>

Table 6: Student (t) test comparing Digoxin level and renal function tests.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Renal function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digitalis level (ng/ml)</td>
<td>Creatinine</td>
</tr>
<tr>
<td></td>
<td>BUN</td>
</tr>
<tr>
<td>Mean</td>
<td>0.45</td>
</tr>
<tr>
<td>±SD</td>
<td>0.4</td>
</tr>
<tr>
<td>t</td>
<td>0.43</td>
</tr>
<tr>
<td>P</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>0.85</td>
</tr>
</tbody>
</table>

Table 7: Student (t) test of serum digitalis level for survived and died patients.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No</th>
<th>Digitalis level (ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survived</td>
<td>100</td>
<td>mean ±SD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.8 ±0.7</td>
</tr>
<tr>
<td>Died</td>
<td>None</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Table 6 showed there was non significant change in renal function tests mainly creatinine and blood urea nitrogen when compared with the mean digitalis level.

Table 8 showed that there was significant difference in digitalis level and serum digitalis level in all patients.

Discussion

Hundred pediatric patients were presented with acute digitalis toxicity to both pediatric hospital and poison control center Ain Shams University hospitals during years 2009-2010. Their sociodemographic results showed that their age groups varies from early infancy (6 months) up to adolescent (18 years old). Early infancy represented (32%), late infancy (20%), early childhood (4%), late childhood (24%) and adolescents (20%). This finding goes with the data from the annual report of the American Association of Poison Control Centers 2007 which report that among 2610 toxic digitalis exposures there were clinically well documented patients including 72% children and 20% young adults. (Bronstein 2007). This could be attributed to the fact that digoxin has a large volume of distribution: 6-10L/kg in adults, 10L/kg in neonates, and as much as 16L/kg in infants and toddlers. At therapeutic levels, the elimination half-life is 36 hours with...
adolescents are more susceptible to digoxin (Louis (2007) years. AAPCC. In most of these cases, the child was younger than 6 exposures and 20% of drug toxicity/poisonings reported to the patients. Children (<19y) account for almost 80% of plant supraventricular ectopic rhythms are most prevalent in younger intoxication among toddlers and children is 11 hours. In acute renal excretion. The average plasma half-life of acute digoxin intoxication among toddlers and children is 11 hours. In acute intoxication, plasma concentrations extrapolated to time zero is lower in toddlers than in infants and older children because of their increased volume of distribution and clearance. Moreover manifestations of digitalis toxicity varied depending on age (Aamoudse 2007). For instance, ventricular ectopy is most prevalent in older patients; conduction defects and supraventricular ectopic rhythms are most prevalent in younger patients. Children (<19y) account for almost 80% of plant exposures and 20% of drug toxicity/poisonings reported to the AAPCC. In most of these cases, the child was younger than 6 years. Louis (2007). However one study suggests that adolescents are more susceptible to digoxin (Hougon 2000). The results of this study showed highly significant correlation between serum digitalis level measured and serum electrolytes Na, K, and Ca. Regarding the Mean values of serum electrolytes in studied patients with heart diseases on digoxin (80% of studied patients) had serum K ranging from (3-5.3 mEq/L) while those with accidental and suicidal intake had values ranging from (5.6-6.2 mEq/L). The mean value for all pts was 5.5 ±0.3 mEq/L).This goes with values ranging from (5.6-6.2 mEq/L). The mean value for all pts was 5.5 ±0.3 mEq/L).The renal function tests (Creatinine and BUN) showed non significant difference with serum digitalis concentrations.

The incidence of arrhythmias among patients with acute digitalis poisoning was as follows. Sinus bradycardia, 3% of cases; premature ventricular contractions (PVCs), 3% of cases; Bigeminy, 3% of cases; sinus bradycardia, 3% of cases; first-degree heart block, 1% of cases; and torsades de pointes, 3% of cases. In the current study, most of cases were males 68%. This could be attributed to the fact that most pediatric poisonings from any substance are more common in males rather than females. (Pathore, Wang and Krumholtz 2002). However, for digoxin toxicity, a Netherlands study found no difference in incidence between pediatric males and females. The adult literature suggests women may be more susceptible to adverse effects than men. Benowitz (2004). However, for digoxin toxicity, a Netherlands study found no difference in incidence between pediatric males and females. The adult literature suggests women may be more susceptible to adverse effects than men. Benowitz (2004).

The clinical data in the current study showed that the indications of digitalis intake were as follows: 28% of cases had dilated cardiomyopathy (DCM), 24% had rheumatic heart diseases (RHD), 28% had congenital heart diseases (CHD), 12% exposed accidentally to digitalis toxicity who were due to suicidal attempts. This could be explained as the main causes of digitalis intake in pediatric population are mainly therapeutic in patients with cardiac conditions. The commonest presentations of these cardiac conditions were dilated cardiomyopathy (DCM), rheumatic heart diseases (RHD), congenital heart diseases (CHD) with left or right shunt. Therefore therapeutic indication for digoxin in treatment of pediatric cardiac patients continue to be reassessed. Pharmacologic interventions that improve cardiac output by afterload reduction have been proven useful and potentially have low risk for serious toxicity (Hougen, 2000). The use of digoxin in heart problems during sinus rhythm was once standard, but it is now controversial. In theory, the increased force of contraction should lead to engraved pumping function of the heart. But its effect on prognosis is disputable and other effective treatments are now available. Digoxin is in no longer the first choice for congestive heart failure but still can be useful in patients who remain symptomatic, despite proper diuretic and ACE inhibitor treatment (Haynes, Heitjan and Kanetks, 2008). Accidental digoxin toxicity was mainly due to erroneous dosing in infants which is, usually parenteral and frequently fatal. Beside, many suicide attempts in younger children have been reported (Hauptman and Kelly, 1999).

Initial clinical manifestations of digitalis toxicity could be attributed to the fact that digitalis toxicity may be subtle or obvious, depending on the severity of toxicity. Acute toxicity is rarely subtle, and chronic toxicity may be difficult to diagnose. GIT changes, most notably nausea, vomiting, and abdominal pain are the most common extra cardiac manifestations. However CNS manifestations such as drowsiness, visual changes usually affect, patients with chronic toxicity (Benowitz, 2006). Patients can have an asymptomatic period of several minutes to several hours after oral administration of a single toxic dose. Symptoms of cardiac glycoside toxicity are mostly nonspecific including fatigue, anorexia, nausea, vomiting, abdominal pains dizziness, confusion, delirium and occasionally hallucinations (Robets, 2006). Bradycardia is the most frequently encountered ECG abnormality in cardiac glycoside toxicity (Schmiedl et al., 2007).
level. This could be explained that none of studied patients had renal impairment or renal failure also none were on drugs that affect digoxin metabolism which include Quinidine, Cyclosporine, Ibuprofen, Captopril, Verapamil, Diltiazem, Tetracycline, Erythromycin, Capoten, Paroxetine and some other selective serotonin reuptake inhibitors (SSRIs). All of the drugs mentioned, decrease the excretion of digoxis through the kidney (Haumptman and Kelly 1999).

The outcome of digitalis intoxicated patients showed that the mean hospital stay duration was 5.6±3 days. Thirteen percent showed CVS morbidities in the form of different types of arrhythmias. This could be explained by the fact that digitalis toxicity produces myriad ECG changes. The earliest sign of toxicity is ventricular ectopy, usually manifesting by premature ventricular contractures due to increased automaticity. AV nodal depression frequently produces a high degree heart block, ventricular tachycardia and VF may be seen in digoxin toxicity. Digitalis affects different myocardial tissue in different ways; while atria and ventricular may exhibit increased automaticity with causative tachyarrhythmia, nodal tissue may be showed leading to prolonged PR interval and AV block (The Digitalis Investigation Group 2003). Alterations in cardiac rate and rhythm occurring in digoxin toxicity may simulate almost every known type of dysrhythmias. Toxicity should be suspected when evidence of increased automaticity and depressed conduction is noted. Underlying these dysrhythmias is a complex influence of digitalis on the electrophysiological properties of the heart, as well as via the cumulative results of the direct, vagotonic and antiadrenergic actions of digitalis (Ahmed et al., 2009a). Premature ventricular contractions (PVCS) are the most common dysrhythmias, sinus bradycardia and other bradyarrhythmias are very common, also first, second and third degree heart block are also common and ventricular fibrillation is a serious complication. (Ahmed et al., 2009b)

Conclusion

All cases recovered completely and were discharged without any reported morbidities. This reflects the efficiency of therapy and successful management in both pediatric cardiology unit and poison control center Ain Shams University Hospitals (PCCA).

References

What can an Accident Explain: A forensic case study

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Abstract

It is estimated that about a million of people are killed every year throughout the world as a results of road traffic accidents. In developing countries, occupants of private automobiles comprise the majority of traffic injury victims. In accident cases arise from the violation of statutes that typically require the driver of an automobile involved in an accident to stop, identify himself and his vehicle and render aid to persons injured in the accident.

Using this example of crime scene study, through this present case, the authors have tried to explain the importance of the spot examination and preservation of the scene of crime. Through this paper, the author tried to explain the circumstances can change the view of the public, by using the forensic expert view, proper examination of vehicles, victim’s injury and scene of crime, the doubt might be resolved.

Keywords

Forensic Engineering, Accident, Crime Scene, injury.

Introduction

In India, police accident reports are often the main source of data for accident investigations. These reports usually contain information on traffic conditions, vehicle performance, road environment, driver characteristics, casualty demographics, and injury severity level. When comparing police reports with hospital records, the degree of the under-reporting of road casualties has been found to be quite significant. Casualty demographics, time of injury, hospital admission, and mode of transport, vehicle class, and car occupancy are all contributory factors to the reporting rate in police accident records. Fatal accidents are normally assumed to be reported in full. However, the degree of under-reporting is greater for less seriously injured casualties. The quality of police accident reports has also been examined in relation to the accuracy of accident attributes, vehicle performance, driver characteristics, and accident causes. Police data on the number of casualties involved and the time and location of accidents have been found to be unreliable in Rajasthan, India¹-². The number of road accidents in Rajasthan, total number of people died and injured, due to road accident are shown in Fig. 1. From Fig. 1, it is clearly seen that in year 2009 an increase of 7.83% compared to the year 2008, deaths due to road accident. In Rajasthan, India, police accident reports are often the main source of data for accident investigations. These reports usually contain information on traffic conditions, vehicle performance, road environment, driver characteristics, casualty demographics, and injury severity level. When comparing police reports with hospital records, the degree of the under-reporting of road casualties has been found to be quite significant. Casualty demographics, time of injury, hospital admission, and mode of transport, vehicle class, and car occupancy are all contributory factors to the reporting rate in police accident records. Fatal accidents are normally assumed to be reported in full. However, the degree of under-reporting is greater for less seriously injured casualties. The quality of police accident reports has also been examined in relation to the accuracy of accident attributes, vehicle performance, driver characteristics, and accident causes. Police data on the number of casualties involved and the time and location of accidents have been found to be unreliable in Rajasthan, India¹-². The number of road accidents in Rajasthan, total number of people died and injured, due to road accident are shown in Fig. 1. From Fig. 1, it is clearly seen that in year 2009 an increase of 7.83% compared to the year 2008, deaths due to road accident.

Through this paper, one very interesting case study is being communicated for the awareness of the forensic scientific community that vehicles, victim’s injury, scene of occurrence and concept of forensic engineering (direction and probability of vehicle path) can hold the clues to solve cases related to accident analysis.

Investigation of cause of death is very important and need special attention and training. Protection of crime scene is very important for the investigation of crime scene. Observe persons, vehicles events, potential evidence and environmental conditions. Safety and well being of officers and other individuals should be first priority³-⁴.

Fig. 1: Last five year statistics of Accident cases in Rajasthan¹

Case History

It was reported that on 15-01-2010 night accident was occurred near Gariawas 10 Km far from Teh. Choti Sadari, Distt. Pratagparh. The case was registered FIR No. 16/10 U/S 302, 201 IPC. One person was injured and his dead body was found on “kachhi sadak” road (Made of Stone and sand). Mobile Forensic team visited the spot of accident and to inspect a motorcycle involved in death after two days of the occurrence.

Forensic Finding

At Spot: At the spot one dead body was lying on the road. The road “Kacchi-sadak” road was made of stones and sand. Both sides of the road, there were cultivated farms. No light on the road. The motorcycle was not there, which was as per local persons, near the body at night.

Victim’s Body: The dead person was wearing a thick white coloured blanket, full selves sweater and scarf on the head. One shoe of the persons was lying near the body. No splash of blood was observed. The dead body had an injury right side near the forehead having length about 5–8 cms. No any other serious injury was on the body. Very little scratches were on the hand of the dead body. (Photo 1 - 2)

Impressions: Some impressions of the tyres of bike and foot impressions were also observed about 25-30 feet away from the dead body.

Bystanders: As per the bystanders the person (victim) was very nice person. He was never fight with any person of the village. He was very honest, liable and good in nature.

The Motorcycle: The motorcycle was recovered after two days of the occurrence. One metallic blue coloured Bajaj Platina motorcycle bearing the registration No. RJ 09 SC 806... was examined. Front side and rear side portion of the motorcycle

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Accident Occurred in a year</th>
<th>Number of people died in a year</th>
<th>Number of people injured in a year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1.8</td>
<td>0.6</td>
<td>1.2</td>
</tr>
<tr>
<td>2006</td>
<td>1.2</td>
<td>0.6</td>
<td>1.2</td>
</tr>
<tr>
<td>2007</td>
<td>1.8</td>
<td>0.6</td>
<td>1.2</td>
</tr>
<tr>
<td>2008</td>
<td>2.4</td>
<td>0.6</td>
<td>1.2</td>
</tr>
<tr>
<td>2009</td>
<td>3.0</td>
<td>0.6</td>
<td>1.2</td>
</tr>
</tbody>
</table>

At the spot one dead body was lying on the road. The road “Kacchi-sadak” road was made of stones and sand. Both sides of the road, there were cultivated farms. No light on the road. The motorcycle was not there, which was as per local persons, near the body at night.

Victim’s Body: The dead person was wearing a thick white coloured blanket, full selves sweater and scarf on the head. One shoe of the persons was lying near the body. No splash of blood was observed. The dead body had an injury right side near the forehead having length about 5–8 cms. No any other serious injury was on the body. Very little scratches were on the hand of the dead body. (Photo 1 - 2)

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**Other/Foreign Smears:** Foreign Smears was detected on the motorcycle rear right side guard made of metallic composition having height approx. 94 – 97 cm from the ground. The metallic guard was also found broken. A small dent was detected on body of the bike from the rear side. (Photo – 4)

**Skid marks:** No such skid marks have been observed at the spot because of the road was made of stone and sand.

**Results**

1. Thoroughly examination of the dents and scratches on the motorcycle revealed that the possibility of collision of the motorcycle is not ruled out.
2. Body of the victim having no serious injury or any other struggling marks was observed besides the head injury which might have been caused due to the road which made of stones and sand.
3. Forensic engineering reveals that dent, broken pieces, scratches direction and scratches on the motorcycle provide proper evidence of accident of the motorcycle.

At spot in this case IO was advised to call the dog squad for searching the motorcycle at & near the scene of crime and advice to work in both direction (murder or accident). After examination of the motorcycle after two days doubt was clear, on the basis of the tensile strength of the metallic back guard which is made of composition of Cu, Ni and Fe based alloys. The normal force applied generally by a person is not capable to break the alloy based guard and foreign material was also found at the location. These points lead us to conclude that the possibility of accident can not be ruled out.

After report of FSL mobile team the case was reviewed and investigations were reformed by changing the U/S as 279, 304A IPC in place of U/S 302, 201 IPC. Finally the case was submitted to the Hon’ble Sub Divisional Magistrate at Divisional Level for FR.

**Discussions**

The main use of forensic science is for purposes of law enforcement to investigate crimes such as murder, theft, accident and fraud. Forensic scientists are also involved in investigating accidents such car-truck, car-motorcycle crashes to establish if they were accidental or results of misfortune or foul play. At the core of most of these accidents is the failure of something—a person, a product or an area to work or react properly. Categories of accidents include: product liability; vehicular accidents; third-party liability; construction site accidents; animal-involved accidents; maritime accidents; and many more. These categories can also have sub-categories. For example, vehicular accidents include motorcycle accidents. Basic investigative procedures include: defining events that led to the accident; interviewing victims and/or witnesses; preparing photographs and sketches; and preparing reports. Investigators also apply different procedures depending on the...
type of accident. For example, an investigator will research an animal’s history of violence in an animal-attack case. Physical impairment might cause accident like poor eyesight and/or physical impairment, with many jurisdictions setting simple sight tests and/or requiring appropriate vehicle modifications before being allowed to drive. Some time old age might have become a cause of accident so some jurisdictions requiring driver retesting for reaction speed and eyesight after a certain age.

Conclusions

In collision (motor vehicle collision, motor vehicle accident, car accident, or car crash) is when a road vehicle collides with another vehicle, pedestrian, animal, road debris, or other geographical or architectural obstacle. Traffic collisions can result in injury, property damage, and death. A number of factors contribute to the risk of collision including; vehicle design, speed of operation, road design, and driver impairment. Worldwide motor vehicle collisions lead to significant death and disability as well as significant financial costs to both society and the individual.

It is essential that these crimes be solved in order to serve the victims and their families with justice. Moreover, there should be zeal to solve the crime.

Acknowledgement

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A study to evaluate factors associated with seizure in Tramadol poisoning in Iran
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Abstract

Seizures have been reported in patients receiving tramadol at the recommended dose or in poisoning. The aim of this study was to evaluate factors associated with seizure in tramadol poisoning.

Methods

All patients admitted in poisoning ward of Shoshtari Hospital Poison Center, Shiraz, Iran from March 2008 to March 2009 with a history of tramadol poisoning accompanied by seizures were included. Different variables including demographic information, ingested dose, time elapsed ingestion and seizure, time elapsed ingestion and admission to Hospital, history of chronic tramadol abuse cigarette use, illegal abuse, number of seizure, personal history of seizure (under treatment with anti convulsion drugs), need to naloxonone, need to intensive care unit (ICU), coma grading, and mortality rate were recorded in a check list.

Result

54 cases of tramadol intoxication with seizure admitted to our hospital during the study period. Mean age (SD) was 26.48 (7.74) (range, 17-45). The majority of cases were in the age group of 15–30 years (N=42, 77.8%). Time from ingestion to admission varied between 0.5-12 hours. Onset of seizure was between 0.5 - 20 hours after tramadol ingestion. Most of seizure occurred 0.5 - 2 hours after ingestion (%). Half of cases had one episode of seizure, followed by two seizure in 35% of cases (n=19). The route of poisoning in all of patients was oral. The range of ingested dose was from 200 to 11000 mg with an average (SD) of 3248 (2515) mg. most of seizure were occurred at dose of 200-2000 mg (n=25, 46.3%). Seizure was treated with diazepam alone in 85% of cases. Eleven patients (20.4%) required intensive care unit (ICU) during treatment. Mortality rate was 7.4%. There was a significant difference between male and female according to coma grading (p=0.05). The significant differences between number of seizure and ingested dose (p=0.005), ICU admission (p=0.01), and mortality (p=0.03) was observed. There was also a significant difference between mortality and ingested dose (p=0.02), and ICU admission (p=0.02).

Conclusion

Seizures and ingested tramadol dose are important factors associated with ICU admission and mortality.

Key Words

Tramadol, Seizure, poisoning.

Introduction

Tramadol is a novel centrally acting analgesic used for the treatment of mild to severe pain1-2. Its clinical effects are due to both opioid and non opioid mechanisms. It has been approved in some countries since 1980 and become the most prescribed opioid worldwide3-4. It was approved by Iran Drug Selecting Committee as an analgesic since 2002 and during this period it has been abused especially by young population5. Tramadol weakly attaches to the i-opioid receptors and also inhibit reuptake of monoamines such as serotonin and noradrenalin2-5. Most of the analgesic effect of the tramadol may be secondary to non opioid properties, via the central monoaminergic pathways. The most common route of administration of tramadol is orally, due to well absorption of it, and its volume of distribution which is about 3 L/kg. Its bioavailability is 75% after a single oral dose but nearly 100% with regularly scheduled doses5. In the recent years, tramadol poisoning was one of the most common causes of admission due to poisoning in Tehran and other parts of Iran5,7, and we have an increase in the rate of seizure due to tramadol poisoning. In a study by Shadnia et al, they found 35% of admitted cases due to tramadol poisoning had seizure5. Seizures have been reported in patients receiving tramadol at the recommended dose level or in poisoning6. The aim of this study was to evaluate factors associated with seizure in tramadol poisoning. Since, data obtained from this center can be extrapolated to other parts of the country7.

Materials and Method

Shoshtari hospital in Shiraz is one of the referral hospitals for treatment of poisoned patients (9). The ethical committee of Shiraz University of Medical Sciences approved the study. In a prospective descriptive study from 21st March 2009 to 21st March 2010, all patients admitted with Tramadol poisoning and seizure admitted to the Shoshtari Hospital poison ward during one year were evaluated. Data were collected by use of a check list completed by the general physician training in emergency department. The information obtained from conscious patients or their relatives was the basis of diagnosis of intoxication with tramadol or co-ingested Compounds. Data included demographic information, cause of poisoning, ingested dose, time elapsed ingestion and seizure, time elapsed ingestion and admission to Hospital; history of chronic tramadol abuse, cigarette use, illegal abuse; number of seizure; personal history of seizure (under treatment with anti convulsion drugs); naloxonone administration; intensive care unit (ICU) admission; coma grading; and mortality rate were recorded.

Level of coma was assessed according to the REED coma scale (10): Grade I, decreased consciousness with normal
reflexes, respiration and circulation; Grade II, decreased consciousness with no response to painful stimuli but intact deep tendon reflexes and vital signs; Grade III, no response to painful stimuli, absence of deep tendon reflexes but intact respiration and circulation; and grade IV no respiration and circulation. All patients received general supportive and conservative Treatments. Data were analyzed by SPSS software (Version 16; Chicago, Illinois, USA) using Fisher exact test and Student t-test. P values d”0.05 were considered as the statistically significant levels.

Results

During 1 year study period, 54 cases of tramadol intoxication with seizure admitted to our hospital. Mean (SD) age was 26.48 (7.74) (range: 17-45).The majority of cases were in the age group of 15–30 years (N=42, 77.8%)(Table 1). Half of cases were men and half was female.

History of seizure, chronic abuse of tramadol, and illegal addiction was reported in 7%, 44%, and 24% of patients respectively. Time between ingestion to admission varied between 0.5-12 hours (Table 2). The route of poisoning in all patients was oral.

The range of ingested dose was varied from 200 to 11000 mg with an average of 3248±2515 mg. Most of seizure were occurred at dose of 200-2000 mg (n=25, 46.3%) (Table 3). 20.6% patients admitted in the intensive care unit (ICU) and79.4% hospitalized in the ward.

Most of patients presented with coma (Grade 1) on admission time (n=31, 57.4%).

Onset of seizure varied between 0.5 -20 hours after tramadol ingestion. Most of seizure occurred 0.5 -2 hours after ingestion (Table 4). Number of seizures was varied between 1-8 seizures after ingestion. 50% of the cases had one seizure, followed by two or more seizures in other cases (Table 5). Seizure was treated with diazepam in 85% of cases however, 15% of patients received Phenobarbital or thiopental for seizure control. Sixteen patients (29.6%) received naloxone during their treatment. Mortality rate was 7.4%.

There was no significant correlation between gender according to age, ingested dose, time from ingestion to admission, number of seizure history of chronic tramadol abuse, time between ingestion and seizure. However there was a significant correlation between gender and coma (p=0.05), number of seizure and ingested tramadol dose (p=0.005), requirement of ICU (p=0.01) and mortality (p=0.03). There was also significant correlation between mortality and ingested tramadol dose (p=0.02), requirement of ICU (p=0.02) and number of seizure (p=0.03).

Discussion

The results show the equal ratio of female to male in tramadol intoxication. Which is not comparable with other studies.

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**Table 1:** Distribution of patients according to age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
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<tbody>
<tr>
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<td>21-25</td>
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**Table 2:** Distribution of cases according to elapsed time between tramadol ingestion and arrival to emergency department (ED)

<table>
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<th>Elapsed time between tramadol ingestion and arrival to ED</th>
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<th>Percent</th>
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<td>.5-2</td>
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**Table 3:** Distribution of cases according to tramadol ingested dose

<table>
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<th>Tramadol ingested dose(mg)</th>
<th>Frequency</th>
<th>Percent</th>
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<tr>
<td>Total</td>
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**Table 4:** Distribution of cases according to elapsed time between tramadol ingestion and seizure

<table>
<thead>
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<th>Time between tramadol ingestion and seizure (hours)</th>
<th>Frequency</th>
<th>Percent</th>
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<td>1.9</td>
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<tr>
<td>Total</td>
<td>54</td>
<td>100.0</td>
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</tbody>
</table>
Ingestion of tramadol was the most common route of intoxication because of more available form of tramadol in the pharmacies 16. High chronic abuser of tramadol was reported in our case (43.6%). Tramadol in our society is increasingly abused by opioid addicted subjects 3, 13. It has also shown that tramadol is an interesting subject for abuse similar to other illegal agents such as heroin or opiates 13, 14.

It seems tramadol abuse probability in addicted population is much higher, as 24% of our cases had addiction to illegal agents at same time.

Coma (grade 1) was the most common symptom of CNS depression in our study which can be due to weak binding capacity of tramadol to mu receptors of Opioid. Shadnia et al found that seizure, anxiety, and unconsciousness were the most common adverse CNS symptoms for tramadol-intoxicated subjects 5.

While tramadol-related seizures can be controlled by diazepam, some tramadol induced refractory seizures was observed in our cases. Tramadol induced seizures can be precipitated by administration of naloxone, at high tramadol doses 15, but if there was progressive respiratory depression or CNS depression, we may need to administration of naloxone with more caution. In this study (29.6%) of cases received naloxone during treatment.

Much toxicity in tramadol overdose can be attributable to the monoamine uptake inhibition rather than its opioid effects 5,17.

Seizure is a serious neurological disturbance in tramadol overdose. In this study, the smallest dose which could induce seizure was 200 mg. The small dose of tramadol induced seizure has been reported in Mehrpour et al 16, Marquardt et al 17, and Shadnia et al 5 studies.

Seizure in tramadol poisoning is an important challenge; some researchers believed that tramadol at clinically relevant doses, slightly suppress the severity of seizures 18 also some other researchers believe that prevalence of seizure due to tramadol poisoning is not high 19. Jovanovic-Cupiae et al, observed 54% seizure in their cases 20. Tonic-clonic seizure was reported in a study by Shadnia et al at 35% of cases 5. In addition Talaei et al found that the prevalence of seizure in tramadol poisoning is 46.25 % 7.

In the present study, Time of seizure was varying from 0.5 to 20hours after ingestion; however about 95% of seizures occurred at first 12 hours after ingestion, it was in agreement with Mehrpour M et al study 16 and Marquardt et al 17.

In present study it was revealed that all of seizure occurred at first 24 hours after ingestion. It was in agreement with Jovanovic-Cupiae et al study that 84% of seizures occurred in first 24 hours and remain (16%) was occurred after 24 hours after ingestion 20. It was in agreement with Talaei et al that found all of seizures due to tramadol poisoning occurred in first 24 hours after ingestion 7.

Seizures caused by tramadol are most often tonic-clonic seizures 5, 7, 20. Single seizure was most frequent, that was seen in 50% of cases, and it was in agreement with other studies 20.

Previous history of seizure was seen in 7% of our patients; however it seems that it can be a risk factor for seizure in recent poisoning.

However it must be awareness to prescribe tramadol in patients with previous history of seizure.

Four patients finally dead due to tramadol poisoning; of them three cases had co-ingested with benzodiazepines and one patient died due to tramadol alone poisoning. There is evidence that most mortality due to tramadol poisoning is when co-ingested with benzodiazepine 1, 2. Death due to tramadol poisoning is a rare finding 22, but our study showed that it is possible even without co-ingestion with other drugs. Our study revealed significant different between mortality and ingested tramadol dose, requirement of ICU and number of seizure.

It seems that increased dose of tramadol significantly increased number of seizure and refractory seizure; consequently these patients had more need to intensive care. These finding not considered in the literature.

In this study we found most of seizures and deaths were occurred at dose of 200-2000 mg that was not so high dose, which was statistically significant. Some authors believed that the seizure with tramadol poisoning is not dose dependent and some authors think that it is dose dependent 19. In this present study we found significant difference between tramadol dose and number of seizure, a finding which was not considered in another studies. Tramadol is a racemic mixture of enantiomers of tramadol: (+) and (-) tramadol. Each of these enantiomers has different affinity for the mu and delta receptors and also their effects on the serotonin and norepinephrine reuptake 15. So, depending upon their ratio, they make affect seizure threshold differently, it can explain different seizure threshold in different studies.

In previous study, it was revealed study Seizures were more common in younger patients with a longer duration of exposure to tramadol 18. It was in agreement to Jovanovic-Cupiae et al study 20.

Furthermore because of high frequency of seizure at first 12 hours after ingestion, most of care should be done at this time.

Conclusion

Seizures and ingested tramadol dose are important factors associated with ICU admission and mortality.

References

Insects as Crime Investigators: Medicolegal entomology

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Abstract

Insects are increasingly being used to trace absconding murderers. When an animal or an individual dies and the body is left exposed, flies and other insects are attracted to the remains. Forensic entomology is a subject that deals with the study of those forensically important insects and the testimony dealing with such insects in criminal proceedings. This study is associated with death investigations. In the last 15 years, forensic entomology has become more and more common in police investigations. Though other forensic methods are equally or more accurate than the insect evidence, but after 72 hours, insect evidence is most accurate and sometimes the only method of determining elapsed time since death. Many times, the body is moved after death from the crime scene to a hiding place but some of the insects from the knowledge of their actual habitat indicate and prove the movement of body and gives clue of the area of murder. So insects are no less than criminal investigators but their accuracy depends on their suitable conditions.

Key Words

Entomology, crime scene, insects, investigators.

Introduction

Forensic entomology is now considered as a major component of forensic science. It deals primarily with determining the place, time and mode of death in homicide cases by analyzing the insects collected from and around corpses. Insects, along with bacteria and fungi, play a major role in the decomposition of dead animals. Insects use the decomposing material as a food source as well as a place to rear their young ones (egg, larva and pupa). Insects are attracted to body fluids like urine, saliva and faecal material, blood from wounds, the flesh, tissues and bones. As a body decays, it can be a habitat for a particular group of insects. The flies and beetles are of major importance from a forensic angle. Flies, whose larvae are capable of living in a semi liquid medium, are the first insects to colonize decomposing remains and the most important in crime investigations. Beetles are attracted at a later stage when the corpse has largely dried out. Insect evidence may also show that the body has been moved to a second site after death, or that the body has been disturbed at some time, either by animals, or by the killer returning to the scene of the crime. The primary purpose of forensic entomology today is to determine elapsed time since death.

Discussion

Forensic entomology was first reported to have been used in 13th Century China and was used sporadically in the 19th Century and the early part of the 20th Century, playing a part in some very major cases. However, in the last 15 years, forensic entomology has become more and more common in police investigations. Most cases that involve a forensic entomologist are old, as up until that time, other forensic methods are equally or more accurate than the insect evidence. However, after three days, insect evidence is often the most accurate and sometimes the only method of determining elapsed time since death.

Role of Insects

- The body may have been disturbed after death, by the killer returning to the scene of the crime. Some of the insects on the body may be native to the first habitat and not the second. This will show that not only was the body moved, but it will also give an indication of the type of area where the murder actually took place. This may disturb the insects cycle, and the entomologist may be able to determine not only the date of death, but also the date of the return of the killer.
- The presence and position of wounds, decomposition may obscure wounds. Insects colonize in a specific pattern, usually laying eggs first in the facial orifices, unless there are wounds. If the maggot activity is centred away from the natural orifices, then it is likely that this is the site of a wound. The presence of drugs can be determined using insect evidence because maggots bioaccumulate so it can determine type of drug present. Insects can be used to place a suspect at the scene of a crime. For instance, an insect inside a cocklebur was used to connect a rapist to the rape site.
- Civil cases also sometimes use insect evidence. Child or senior abuse/neglect. Some insects will colonize wounds or unclean areas on a living person. This is called cutaneous myiasis. In these cases, the victim is still alive, but maggot infested. A forensic entomologist will be able to tell when the wound or abuse occurred. In some cases, the onset of maggot infestation will give a minimum time interval since the child last had a diaper change. Such cases occur particularly in young children and seniors.

Procedure

The first and most important stage of the procedure involved in forensic entomology involves careful and accurate collection of insect evidence at the scene. This involves knowledge of the insect behaviour; therefore it is best performed by an entomologist. Unfortunately, the entomologist is often not called until after the body has been removed from the death site. He usually sees the remains at the morgue, and in some cases, does not actually see the remains at all, so his evidence is dependent on accurate collection by the investigating officers.
Collection

Samples of insects of all stages should be collected from different areas of the body, from the clothing and from the soil/carpet etc. Insects will often congregate in wounds and in and around natural orifices. The two main insect groups on bodies are flies (Diptera) and beetles (Coleoptera). The insects of greatest value to forensic entomology are blowflies (family Calliphoridae), because they are usually the first insects to colonise a body after death, often within hours. Because of this, the age of the oldest blowflies gives the most accurate evidence. Both types of insect look very different at different stages of their lives.

Flies can be found as eggs (in egg masses usually), larvae or maggots (in a range of sizes from 1-2 mm to 17 mm), pupae and/or empty pupal cases and adults.

- **Eggs** - are very tiny, but are usually laid in clumps or masses, and are usually found in a wound or natural orifice, but may be found on clothing etc. They can be collected. Half should be preserved in 75% alcohol or 50% isopropyl alcohol. The rest should be placed in a vial with a little damp tissue paper to prevent dehydration. If it exceeds a few hours before the entomologist receives them, they should also be given a small piece of beef liver. They need some air. Newly emerged maggots can escape through holes, so a paper towel held over the top of the vial with a rubber band is excellent.

- **Maggots** - collect a range of sizes. Maggots will be found on or near the remains and may be in maggot masses. The masses generate a lot of heat, which speeds up development. Therefore, the site, temperature and site of maggot masses must be noted. Then labelling of maggots which come from a particular mass must be done. The samples of maggots from different areas of the body and the surrounding area are to be kept separate.

When collected, a proportion of the larvae should be preserved immediately for two reasons. Firstly, to show the entomologist, if he is not present at the scene, what stage the larvae were when collected, as if they are then placed on meat, they will continue to develop, giving a misleading impression to the entomologist when they are examined. Secondly, to produce as evidence in court.

The specimens must be preserved by immersing them in hot water for a few minutes, then putting them in 70% alcohol or 50% isopropyl alcohol. A sample should contain about 100 maggots (of each size if possible).

- **Pupae and Empty Pupal Cases** - these are extremely important and are easy to miss. They are often found in clothing, hair or soil near the body. Pupae like dry, secure areas away from the wet food source in which to pupate so pockets and cuffs are likely hiding places. They range from 2-20 mm, and are oval. They are dark brown when completely tanned. An empty pupal case is very similar but is open at one end, where the adult fly has emerged. They need some air, so secure a paper towel over vial as for eggs.

- **Adult Flies** - are less important. They are only of use in indicating which species of insect are likely to develop from the corpse, as we cannot determine whether an adult has developed on the corpse, or has just arrived from somewhere else, unless it emerged only an hour or so earlier.

- **Beetles** - can be found as adults, larvae or grubs, pupae and also as cast skins. All stages are equally important. They move fast and are often found under the body, and in and under clothing. They can be placed in vials with some air.

- **Other Samples** - Soil from under of very near the body is useful.

- **Labelling** - Insects collected from one part of the body should be kept separate from those from another area. Different species should be kept separate as beetle larvae feed on fly larvae. Each vial should be labelled with area of body/soil, date and time of collection, name of collector and stage.

- **Handling** - most specimens are best picked up with gloves.

- **Packing** - They should be packaged in a cardboard box as this has lots of air.

Modern Techniques

Mitochondrial DNA Study

The use of DNA in forensic entomology is an important new technique discovered and used in order to more accurately gather evidence, or possibly introduce an entire new way to look at old information. In 2001, a method was devised by Jeffrey Wells and Felix Sperling to use mitochondrial DNA to differentiate between different species of the subfamily Chrysomyinae. This is particularly useful when working on determining the identity of specimens that do not have distinctive morphological characteristics at certain life stages.

Scanning Electron Microscopy

Usually fly larvae are used to aid in the determination of post mortem interval (PMI). However, sometimes the body may not contain maggots and only the eggs are present. In order for the data to be useful the eggs must be identified down to a species level to get an accurate estimate for the PMI. A study in 2007 demonstrates a technique that can use scanning electron microscopy (SEM) to identify key morphological features of eggs and maggots.

The SEM method identifies fly eggs but, this method does have some disadvantages. It requires expensive equipment time to identify the species from which the egg originated, so it may not be useful in a field study or to quickly identify a particular egg.

Potassium Permanganate Staining

The lower cost technique can be found in potassium permanganate staining. These slides can be used with any light microscope with a calibrated eyepiece to compare various morphological features.

Mock Crime Scenes

The use of mock crime scenes using pig carcasses is becoming popular. The pig carcass represents a human body and can be used to illustrate various environmental effects on both arthropod succession and the estimate of the PMI.

Gene Expression Studies

Recently a study has been conducted to determine the age of an egg based on the expression of particular genes. This is particularly useful in developmental stages that do not change in size, such as the egg or pupa, where only a general time interval can be estimated based on the duration of the particular developmental stage. This is done by breaking the stages down into smaller units separated by predictable changed in gene expression. Three genes measured in an experiment with Drosophila melanogaster were bicoid (bcd), slalom (sll), and chitin synthase (cs). These three genes were
used because they are likely to be in varied levels during different times of the egg development process. These genes share a linear relationship in regards to age of the egg, that is, the older the egg is the more of the particular gene is expressed. However, all the genes are expressed in varying amounts. Different genes on different loci would need to be selected for another fly species. The genes expressions are mapped in a control sample to formulate a developmental chart of the gene expression at certain time intervals. This chart can then be compared to the measured values of gene expression to accurately predict the age of an egg to within two hours with a high confidence level. Even though this technique can be used to estimate the age of an egg, the feasibility and legal acceptance of this must be considered for it to be a widely utilized forensic technique. One benefit of this would be that it is like other DNA-based techniques so most labs would be equipped to conduct similar experiments without requiring new capital investment. This style of age determination is in the process of being used to more accurately find the age of the instars and pupa, however, it is much more complicated as there are more genes being expressed during these stages.

Although forensic entomology can be very effective in determining elapsed time since death, it has its limitations. The accuracy of these methods, of course, largely depends on the expertise of the forensic entomologist and also the availability of all required data on the insects concerned. A wrong interpretation of the insect data may even mislead the investigators.

Summary and Conclusions

In its broadest sense, forensic entomology is the study of insects involved in any legal action. Insects are evidence.

Forensic entomology is a very useful method of determining elapsed time since death after 72 hrs. It is accurate to a day or less, or a range of days, and may be the only method available to determine elapsed time since death. It is vital that the insects are collected properly and its accuracy depends on this and on suitable conditions for insects.

References
Mortality and Morbidity Pattern among the Poisoning Cases Attending a Tertiary Care Centre in Nagpur, Maharashtra

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Abstract

Background
Poisoning results in a heavy death toll and is associated with underreporting and misclassification. Further lack of research and details about morbidity and mortality pattern related to different poisonous compounds create difficulty in management of poisoning cases in emergency care centres.

Objective
To know the morbidity and mortality pattern among ingested poisoning cases of different poisonous compounds.

Material and Methods
Hospital based descriptive study; Pre-designed pre-tested questionnaire was used to collect data from 100 ingested poisoning cases.

Settings
Indira Gandhi Government Medical College and Mayo Hospital, Nagpur.

Study Variables
Type of poison consumed, outcome, and hospitalization delay.

Statistical Analysis
Chi square test, mean, standard deviation and percentage.

Results
Majority (37%) of poisoning cases consumed organophosphorus compounds. Highest fatality (23.33%) was seen with organophosphorus compounds. Longest average duration of hospital stay (H=6 days) was seen with insecticide compound (organophosphorus/ organochlorine) poisoning. Definite statistical association was found between outcome and time duration in between poisoning and hospitalization, fatality reduces on early hospitalization (X² = 10.45, df= 3, P< 0.015).

Conclusion
Organophosphorus was the commonest poison used and may be attributed to its easy availability. Early management of poisoning cases, training of paramedical personnel and education programmes together with an effective telecommunication system will reduce fatality associated with poisoning.

Keywords
Poisoning, Organophosphorus, Hospitalization delay.

Introduction
Acute poisoning, accidental or due to deliberate ingestion or inhalation of chemicals or drugs, is an important medical emergency which carries a high mortality and a major public health problem in developing countries. In India in the year 2007, 25,447 deaths and 4987 serious injuries due to poisoning were reported across the country. Underreporting and misclassification are extremely common and actual numbers could be much higher. In India 217 persons commit suicide per day¹. Easy availability of poisons plays a major role in suicidal poisoning cases.

The complexity of poisoning in terms of the possible causes and the rapid increase in newer drugs and chemicals with potentially harmful effects is a matter of concern for those responsible for the treatment, and makes it increasingly difficult for them to retain their confidence and command of the situation, which is very essential in dealing with the cases of acute poisoning. Due to lack of research and systematic reporting, details with regard to nature of products, situation and outcome are not clearly known in India².

A thorough knowledge about the morbidity and mortality pattern of the poisoning is essential for the doctors in hospital practice. Present study was taken up to identify these patterns which in turn can provide a practical guide for the general practitioners and resident hospital staff towards the management of poisoning cases.

Material and Method
The study was conducted in Indira Gandhi Government Medical College and Mayo Hospital, Nagpur in between August 2006 to April 2008.

Type of study: Hospital based descriptive study.
The present study was carried out on 100 cases of poisoning who were admitted under medicine department in between August 2006 to April 2008. Cases of poisoning due to alcohol intoxication, food poisoning, snake bite, and poisoning by all other routes except ingestion were excluded from the study.

Data were collected in a pre-tested Schedule preferably from the patient and where not possible, from relative or attendant. The nature and purpose of the study was explained to the patient and/or to the respondent and a written consent was obtained in presence of a non interested person.

First Ryle’s tube aspirate (20 ml) as a gastric sample and
20 ml blood from peripheral vein as a blood sample was collected from each patient, while in casualty/Out Patient Department. Follow up was done for each case to obtain duration of hospital stay and to notice the outcome. Aspirate and blood were first extracted and then Subjected to Gas Chromatography. In case Gas Chromatography results were inconclusive the same sample was subjected to High Performance Liquid Chromatography.

Results

On analysis of the data it was revealed that organophosphorus (37%) was the commonest poison used followed by organochlorine (23%), pyrethrum and pyrethroids (6%), anticoagulant and carbamates (5% each) and corrosive (phenol) 3%. In 17% of the cases the poison could not be determined.

As shown in table I, fatality associated with organophosphorus and organochlorine poisoning was 23.33% and 21.05% respectively, with anticoagulant and carbamate it was 25% each. There was no fatality associated with pyrethrum and pyrethroids and with corrosive (phenol).

As shown in table II, the overall mean duration of hospital stay per poisoning case (non fatal) is 4 days (rounded). Longest average hospital stay was seen with organophosphorus and organochlorine poisoning (6 days each). While shortest average duration of hospital stay was noted in case of corrosive phenol poisoning (1½ day).

On further analysis of the time period between poisoning and hospitalization (first treatment), it was revealed that there was no fatality among cases who were hospitalized within 1 hr, 27.74% fatality among cases hospitalized in between 1 and 3 hrs, 58.33% fatality among cases hospitalized in between 3 and 5 hrs and 26.67% fatality among cases hospitalized beyond 5 hrs. The difference was statistically significant ($X^2 = 10.45; df = 3, P < 0.15$). Mean duration of hospitalization was 2.9 ($\pm 1.26$) hours.

Discussion

Type of poison ingested:

Senewiratne B et al found in their study that insecticides (42.2%) were the commonest ingested poison. Shankar A found that organophosphorus (63.04%) was the commonest ingested poison followed by aluminum phosphide (33.48%). Jain R. et al also found in his study that 40.5% of their study subjects ingested organophosphorus and was the commonest. Das SN et al also got a similar finding, 42.9% of their study subjects ingested organophosphorus and was the commonest ingested poison. The findings of the above mentioned studies reveals that insecticides- organophosphorus was the most commonly ingested poison and present study reveals the same, it may be attributed to easy availability of the poison in an agricultural country like India.

Table 1: Fatality and Type of Poison

<table>
<thead>
<tr>
<th>Type of Poison</th>
<th>Fatality</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fatal</td>
<td>Non fatal</td>
</tr>
<tr>
<td>Organophosphorus</td>
<td>7 (23.33)</td>
<td>30 (76.67)</td>
</tr>
<tr>
<td>Organochlorine</td>
<td>4 (21.05)</td>
<td>19 (78.95)</td>
</tr>
<tr>
<td>Pyrethrum and Pyrethroids</td>
<td>0</td>
<td>6 (100)</td>
</tr>
<tr>
<td>Anticoagulant</td>
<td>1 (25)</td>
<td>4 (75)</td>
</tr>
<tr>
<td>Carbamates</td>
<td>1 (25)</td>
<td>4 (75)</td>
</tr>
<tr>
<td>Corrosive (Phenol)</td>
<td>0</td>
<td>3 (100)</td>
</tr>
<tr>
<td>Others</td>
<td>3 (16.67)</td>
<td>18 (83.33)</td>
</tr>
</tbody>
</table>

NB: Figures in parenthesis represents row wise percentage.

Table 2 : Duration of Hospital Stay among the Non Fatal Poisoning Cases.

<table>
<thead>
<tr>
<th>Type of Poison</th>
<th>Duration of Hospital stay (In days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organophosphorus</td>
<td>5.83</td>
</tr>
<tr>
<td>Organochlorine</td>
<td>5.95</td>
</tr>
<tr>
<td>Pyrethrum and Pyrethroids</td>
<td>4.62</td>
</tr>
<tr>
<td>Anticoagulant</td>
<td>1.79</td>
</tr>
<tr>
<td>Carbamates</td>
<td>3.75</td>
</tr>
<tr>
<td>Corrosive (Phenol)</td>
<td>1.62</td>
</tr>
</tbody>
</table>
it was 7 days. Gannur DG 10 in his study of “organophosphorus average duration of 4 days, while for hydrocarbon poisoning consuming organophosphorus stayed in the hospital for an hospitalisation delay and fatality: which are similar to the findings of Senewiratne B et al 3 and study occurred among the organophosphorus ingested cases poisoning who stayed in the hospital for 16 days. Findings of (rounded) and there was only one case of hydrocarbon poisoning in Gulbarga region” found average duration of (66.1%) was due to ingestion of insecticides.  Palimar V et al 7 found in their study that 22.3% of the fatal cases had ingested organophosphorus. Adlakha A et al 8 in their study ‘organophosphorus and carbamate poisoning in Punjab’ found a fatality of 11%. Das SN et al 9 in their study ‘clinical profile of acute poisoning in hospitalized patients in orissa’, found that out of all ingested poisoning cases highest fatality was seen with organophosphorus poisoning (13.39%). Karalliedde L et al 9 in their study found 18% fatality among organophosphorus ingested poisoning cases. Fatality due to organophosphorus poisoning in present study was found to be 23.33% which is more or less similar to the findings of Palimar V et al 7 and Karalliedde L et al 9. Further the highest fatality in the present study occurred among the organophosphorus ingested cases which are similar to the findings of Senewiratne B et al 3 and Das SN et al 5. Type of Poison and Fatality:

Senewiratne B et al 3 found overall 23% fatality among the poisoning cases in their study among which majority (66.1%) was due to ingestion of insecticides. Palimar V et al 7 found in their study that 22.3% of the fatal cases had ingested organophosphorus. Adlakha A et al 8 in their study ‘organophosphorus and carbamate poisoning in Punjab’ found a fatality of 11%. Das SN et al 9 in their study ‘clinical profile of acute poisoning in hospitalized patients in orissa’, found that out of all ingested poisoning cases highest fatality was seen with organophosphorus poisoning (13.39%). Karalliedde L et al 9 in their study found 18% fatality among organophosphorus ingested poisoning cases. Fatality due to organophosphorus poisoning in present study was found to be 23.33% which is more or less similar to the findings of Palimar V et al 7 and Karalliedde L et al 9. Further the highest fatality in the present study occurred among the organophosphorus ingested cases which are similar to the findings of Senewiratne B et al 3 and Das SN et al 5.

Average duration of hospital stay:

Das SN et al 5 in their study found that the subjects consuming organophosphorus stayed in the hospital for an average duration of 4 days, while for hydrocarbon poisoning it was 7 days. Gannur DG 10 in his study of “organophosphorus poisoning in Gulbarga region” found average duration of hospital stay to be 5 days. In present study organophosphorus and organochlorine resulted in average hospital stay of 6 days (rounded) and there was only one case of hydrocarbon poisoning who stayed in the hospital for 16 days. Findings of the present study regarding organophosphorus poisoning were more or less similar to that of Das et al. 6 and Gannur DG 10 but regarding hydrocarbon interpretation was difficult as there was only one case in the present study.

Hospitalization delay and Fatality:

Karki P et al 11 in their study found that 90% of the poisoning cases presenting within 2 hours had non fatal out outcome. Yang Po-Yi, et al (12) found in their study that the mean duration of hospitalization was 5.3 (±3.3) hours. Adlakha A 8 found mean duration of hospitalization to be 9.73 (±13.76) hours in fatal cases and 13.39 (±18.14) in non fatal cases. Findings of the present study were more or less similar to Karki P et al 11 as 89.13% of poisoning cases attending within 1-3 hours of ingestion had a non fatal outcome. Mean duration of hospitalization found in the present study was 2.9 (±1.26) hours which was lesser than the findings of the above mentioned studies and it may be attributed to the fact that, the present study was conducted in an urban tertiary care centre.

Conclusion

Insecticide-organophosphorus seems to be the commonest ingested poison owing to its easy availability in an agricultural country like India. It is associated with high fatality and the fatality also seems to be associated with hospitalization delay as a statistically significant reduction in fatality was observed with early management in poisoning cases.

Recommendations

Organophosphorus compounds must be made available on restricted basis. The poisonous compounds should be sold only on prescription. Effort must be given to manufacture chemicals and compounds with less lethality. Management of poisoning cases needs to be instituted as early as possible. Paramedical personnel should be trained in emergency health care with priority to initiate the treatment during transportation to health care facility. Public education programmes should be conducted informing about the dangers of poisoning. Telecommunication system should be established in ambulance to communicate with an expert based in poison information centre which will lead to early institution of treatment.

References

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4. Shankar A; Epidemiological Study of Poisoning in Rural Population; IMG; Sep 1991; 285-287.
5. Jain R, Asawa S, Ruia S; Status of Poisoning in Rural Hospital of Maharashtra; JFMT; 2001; 18; 1; 12-16.
6. Das SN et al; Clinical Profile of Acute Poisoning in Hospitalised Patients in Orissa; IMG; 2004, Aug; 327-331.
8. Adlakha A, Philip PJ, Dhar KL; Organophosphorus and Carbamate Poisoning in Punjab; JAPI; 1988; 36; 3; 210-212.
10. Gannur DG, Maka P, Reddy KSN; Organophosphorus Compound Poisoning in Gulbarga Region- A Five Year Study; IJFMT; Jan- June; 2008; 2; 1; 3-11.
12. Yang Po-Yi et al; Acute Ingestion Poisoning with Insecticide Formulations Containing the Pyrethroid Permethrin, Xylene and Surfactant; A Review of 48 Cases; CT; 2002; 40; 2; 107-113.

Table 3: Hospitalization Delay and Fatality among Poisoning Cases

<table>
<thead>
<tr>
<th>Duration in between poisoning and Hospitalization (hours)</th>
<th>Fatality</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fatal</td>
<td>Non fatal</td>
</tr>
<tr>
<td>&lt;1</td>
<td>0</td>
<td>16 (100)</td>
</tr>
<tr>
<td>1-3</td>
<td>5 (10.87)</td>
<td>41 (89.13)</td>
</tr>
<tr>
<td>3-5</td>
<td>7 (36.84)</td>
<td>12 (63.16)</td>
</tr>
<tr>
<td>&gt;5</td>
<td>4 (21.05)</td>
<td>15 (78.95)</td>
</tr>
</tbody>
</table>

NB: Figures in parenthesis indicates row wise percentages (X² = 10.45, df = 3, P<0.015)

Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and Compound Poisoning in Gulbarga Region- A Five Year Formulations Containing the Pyrethroid Permethrin, Xylene and
Assessment of age by measuring variation in pulp tooth area ratio – An orthopantomographic study

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Abstract

Age estimation is an indicator employed to establish identity in forensic cases. The teeth are frequently used for age estimation as they are hardest structures and can be preserved long and also inspected directly in living individuals. The aim of this study was to estimate the age of an adult individual using maxillary canine in orthopantomograph. The study group comprised of 160 patients between 21 to 60 years. Orthopantomographs were taken, digitized and processed in AutoCAD. The pulp/tooth area, pulp/tooth length, pulp/root length, pulp/root width at 3 different levels were measured and the results were statistically analyzed. Step wise multiple regression analysis yielded the formulae to predict the chronological age. The full model explained 53% of total variance and the selected variables explained 51%. The mean predicted age was less than 5 years. The morphological parameters can estimate the chronological age using a single rooted tooth like canine.

Keywords

Forensic Science; Age estimation; Orthopantomograph; Pulp/tooth area; Canine; Step wise linear regression.

We are all biologically unique and become diverse as we age, enhancing the spice of life with increasing variety 1. Physiologic age is based on the growth and maturation of one or more tissue systems and is measured by the occurrence of one or a sequence of irreversible events. Developmental indicators most commonly used are bone maturation, secondary sex characteristics, height and weight. More recently, the dental maturation indicator system has been described as another useful index for comparison 2. Teeth, the hardest bodily structures and the most durable part of skeleton are useful in forensic science and anthropology and can act as biomarker of aging 3, 4. The gradual changes taking place in the dental tissues after the teeth are fully formed are referred to as age changes 5.

The estimation of age can play an important part in the forensic identification of skeletal remains 4. Anatomical and radiographic investigation of the state of development and fusion of the bones of the skeleton provide one means of age estimation. Similarly the examination of the stages of formation and progress of age changes in the teeth constitutes another source of information 4.

The estimation of age can play an important part in the forensic identification of skeletal remains 4. Anatomical and radiographic investigation of the state of development and fusion of the bones of the skeleton provide one means of age estimation. Similarly the examination of the stages of formation and progress of age changes in the teeth constitutes another source of information 4.

Age estimation of individuals older than 21 years of age still constitutes a great challenge for medicolegal research 7. Any tooth can be used to assess age; often present in old age are canines which are used for age estimation as they are less likely to suffer wear than other anterior teeth. Also, they are the single rooted teeth with the largest pulp area and thus the easiest to analyze 8.

Examination of dental radiographs of adult human dentition has rarely been advocated for use in age estimation and few methods exist for measuring morphological parameters on dental radiographs 5. Study of radiographs of teeth is nondestructive and a simple process which can be applied to living and deceased persons with contrast to other time consuming, expensive, less reliable and destructive methods which may not be acceptable for ethical, religious, cultural or scientific reasons 10. Further, procedures like digitalization of panoramic radiographs and computer assisted image analysis avoid the bias inherent in observers’ subjectivity and improve reliability, accuracy and precision 11.

The aim of the study was to estimate the age of an adult individual based on the relationship between age and measurement of the pulp / tooth area ratio obtained from orthopantomograph. The objective was to assess whether

1. This method could be applied in the estimation of age beyond 21 years for medicolegal purpose.
2. This technique can be used for estimating the age of adults, both living and dead in forensic studies.
3. This study could improve the precision and reliability of age estimation.

Material and Methods

The study was conducted in Department of Oral Medicine and Radiology. The study group comprised of 160 living patients with 80 males and 80 females divided into 8 groups in the age range of 21 to 60 years (Table 1). The inclusion criteria included the maxillary right canine free from caries, absence of abrasion, erosion, fracture, restoration, endodontic filling and impaction.

With the patient’s consent, the date of birth was noted and the orthopantomographs were taken and were scanned using 400 dpi resolution. The images were stored and then processed using a computer aided drafting program “AutoCAD2005”. Twenty points from each tooth outline and ten points for each pulp outline of maxillary right canine were identified (Figure 1). The tooth outline was marked using the points and the cemento-enamel junction was identified.

The measurements of the tooth area and pulp area from the radiographic images of the right canine were evaluated using AutoCAD. The tooth length, pulp length and root length were measured.

The width of the root and pulp at 3 different levels, one at the cemento-enamel junction (CEJ), second at the midroot level and third at the midpoint level between the cemento-enamel junction and midroot level were measured as shown in the figure 1. All the measurements were carried out by the same observer. To test intra-observer reproducibility, a random sample of twenty radiographic images of canine (RIC) were re-examined after an interval of one week.

Ratios between the length and width measurements of the same tooth were calculated. These ratios are the morphological variables and are as follows:
The morphological variables, age and the patient’s sex were entered in Microsoft EXCEL spreadsheet. The chronological age was calculated by subtracting date of birth from the date of radiograph.

### Statistical Analysis

The correlation coefficients were evaluated between age and predictive variables. A multiple regression model for age prediction was developed by selecting those variables which contributed significantly to age estimation using the stepwise selection method. Statistical analysis was performed with SPSS and Minitab software programs (version 13).

### Results

In relation to the maxillary right canine there was no statistically significant intra-observer differences between the paired sets of measurements carried out on the radiographs (p = 0.49). The morphological variables did not show any difference between the genders (Table 2).

Pearson’s correlation coefficients between age and the variables were significant and negative. The ratio between age and the pulp/tooth area and the pulp/root width at mid root level showed a high level of correlation (Table 3).

Stepwise multiple regression utilizing pulp/tooth area and the pulp/root width at midroot level yielded the following linear regression formula to predict the chronological age.

\[
\text{Age} = 70.5 - 178(\text{AR}) - 63.0(c)
\]

The full model explained 53% of total variance (Table 4), where as the model, with AR and c variables explained 51% (Table 5). The median of the absolute value of residual errors between actual and estimated age was less than 5 years and the predicted age was more precise between 36 to 45 years (Figure 2).

### Discussion

Age estimation is one among the indicators employed to establish identity in forensic cases which constitutes a greater challenge in medicolegal research in individuals older than 21 years of age.

Estimation of age by apposition of secondary dentin is a quantitative method; more controllable scientifically and is less dependent on technical ability. As a result the pulp/tooth ratio (PTR) of upper canine is a method applied in modern forensic cases.

The present study showed a very high degree of intraobserver agreement indicating a high reproducibility of the measurements of p = 0.49 which was in accordance with the previous studies carried out by Paewinsky E et al. and Cameriere et al. There was no significant influence of sex on age estimation which was similar to Cameriere et al. In the present study, Pearson’s correlation coefficient between age and all morphological variables were significant and negative which was in accordance with Cameriere et al.

### Table 1: Age and Sex distribution of the study sample

<table>
<thead>
<tr>
<th>Age (Yrs)</th>
<th>No of males</th>
<th>No of females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-25</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>26-30</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>31-35</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>36-40</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>41-45</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>46-50</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>51-55</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>56-60</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>80</strong></td>
<td><strong>80</strong></td>
<td><strong>160</strong></td>
</tr>
</tbody>
</table>

p = pulp/root length
r = pulp/tooth length
a = pulp/root width at CEJ level
c = pulp/root width at midroot level
b = pulp/root width at midpoint level between CEJ level and midroot level
AR = pulp/tooth area ratio
The ratios between the length measurements (p and r) in the present study were weakly significant or showed low level of relation with age which was similar to study done by Cameriere et al.8, 11, 12. The amount of secondary dentin deposition is well correlated with the chronological age and can be measured indirectly on radiographs16.

In the present study, the RIC method yields a median of absolute values of residuals (observed age minus predicted age) of 4.7 years and a standard error of estimate was 7.4 years which was similar to study done by Cameriere et al. whose absolute values of residuals was 3.7 years and a standard error of 5.3 years11.

In the present study, the predicted age was more accurate between 36 to 45 years which signifies the formula used. The full model explained 53% of total variance whereas the model with AR and c variables explained 51% which was in contrast

Table 3: Correlation between age and predictive morphological variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Males</th>
<th>Pearson's Correlation Coefficient</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>P</td>
<td>r</td>
<td>P</td>
</tr>
<tr>
<td>AR</td>
<td>-0.62</td>
<td>&lt;.001</td>
<td>-0.78</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>p</td>
<td>-0.40</td>
<td>&lt;.001</td>
<td>-0.03</td>
<td>0.81,(NS)</td>
</tr>
<tr>
<td>r</td>
<td>-0.21</td>
<td>0.06,(NS)</td>
<td>-0.21</td>
<td>0.07,(NS)</td>
</tr>
<tr>
<td>a</td>
<td>-0.50</td>
<td>&lt;0.001</td>
<td>-0.52</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>b</td>
<td>-0.49</td>
<td>&lt;.001</td>
<td>-0.63</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>c</td>
<td>-0.61</td>
<td>&lt;0.001</td>
<td>-0.69</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Pearson’s correlation coefficient (r value)
- p < 0.05,   p < 0.01 significant
- p > 0.05 not significant

Table 4: Regression Analysis Predicting Chronological Age from all the Predictors

<table>
<thead>
<tr>
<th>Group</th>
<th>Effects</th>
<th>Regression coefficient</th>
<th>Standard error</th>
<th>Significance T value</th>
<th>SE</th>
<th>Explained variance R²</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>68.819</td>
<td>7.356</td>
<td>9.36</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AR</td>
<td>-223.78</td>
<td>46.33</td>
<td>-4.83</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>p</td>
<td>-12.294</td>
<td>5.600</td>
<td>-2.20</td>
<td>0.030</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>r</td>
<td>20.01</td>
<td>13.37</td>
<td>1.50</td>
<td>0.137</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>a</td>
<td>-0.27</td>
<td>22.26</td>
<td>-0.01</td>
<td>0.990</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>26.57</td>
<td>20.32</td>
<td>1.31</td>
<td>0.193</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c</td>
<td>-63.35</td>
<td>25.65</td>
<td>-2.47</td>
<td>0.015</td>
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Table 5: Regression Analysis Predicting Chronological Age from Selected Predictors

<table>
<thead>
<tr>
<th>Group</th>
<th>Effects</th>
<th>Regression coefficient</th>
<th>Standard error</th>
<th>Significance T value</th>
<th>SE</th>
<th>Explained variance R²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>70.507</td>
<td>2.43</td>
<td>29.02</td>
<td>0.000</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>AR</td>
<td>-177.86</td>
<td>33.22</td>
<td>-5.35</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c</td>
<td>-63.00</td>
<td>22.70</td>
<td>-2.78</td>
<td>0.006</td>
<td></td>
</tr>
</tbody>
</table>
with the studies done by Cameriere et al. The difference can be attributed to change in the pattern of patient selection and the geographic distribution of the population and the resolution used for scanning of the radiographs.

Lastly, the results of this study confirm the validity of use of areas of the tooth and the pulp for estimation of age as has also been suggested by others. In future when a software program with the capability of automatic tracing of radiographs is available, the bias in the film density, development, fixation and also of the observer can be eliminated.

Further, research should also aim at involving larger sample size, including not only age and gender but also race and culture parameters.

References

Comparision of dermatoglyphic pattern of population of western Rajasthan and Garhwal Region of Uttarakhand
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*Lecturer, Dept. of Anatomy MGIMS, Sevagram, **Lecturer, Dept. of Physiology MGIMS, Sevagram, ***Sr. Lecturer, Dept. of Anatomy MGIMS, Sevagram, ****Assoc. Professor, Dept. of Anatomy MGIMS, Sevagram, *****Professor, Dept. of Anatomy MGIMS, Sevagram

Abstract

The importance of dermatoglyphics in comparative human population studies hardly needs emphasis for the simple reason that dermatoglyphic traits are under genetic control. Besides, they are known to vary considerably owing to the fact that they are controlled by many additive genes. The study reports on bilateral palm prints among 200 unrelated individuals (100 from Rajasthan and 100 from Uttarakhand). The parameter studied were TFRC (Total Finger Ridge Count), AFRC (Absolute Finger Ridge Count), Finger Tip Ridge patterns and a-t-d angle. Furuhata’s index was calculated and results obtained were compared for both groups using statistical tools.

Key Words

Dermatoglyphics, TFRC, AFRC, Finger Tip Ridge patterns, Furuhata’s index. Rajasthan population, Uttarakhand population.

Introduction

The dermal ridge pattern of finger and palm drew interest long ago, probably Henman first observed them. The record of acquaintance with patterned traceries of fine ridges on fingers and palm i.e., dermatoglyphics, prior to period of scientific study had been observed in unwritten historical aboriginal Indian carving found at the edge of Kejimkoojik Lake in Nova Scotia. The maker of this petroglyph has drawn the whorl of thumb, flexion creases under primitive conditions. The literally meaning of word dermatoglyphic (Derma – skin, glyphe- carve), describes the pattern traceries of fine ridges on finger, palm, sole excluding flexion creases and other secondary folds. The dermal ridge configurations are result of physical and topological growth forces.

Various workers have studied the dermatoglyphic pattern in various caste groups1,2 in India and across the globe.3,4 Historically it’s been said that Rajasthani people in the days of yore during war time had migrated to Garhwal region of Uttarakhand. Looking at this fact it was decided to undertake the present study.

Aims

The main objective of this study was to see similarity between dermatoglyphic pattern of population of two regions.

Material and Methods

In the present study 100 Rajasthan and 100 people from Garhwal region of Uttarakhand were selected. Most of the subjects are Medical and Dental students of the region who voluntarily participated in the study. Ink method was used as described by Cummins & Midlow which requires ink slab, inverted ‘T’ shaped pad, Kore’s duplicating ink, white paper, magnifying lens, protractor, scale, soap & pencil. Hands were thoroughly washed with soap before taking prints. Then requisite amount of ink was placed on the ink slab & inverted ‘T’ shaped pad was soaked in it. The ink was evenly spread on the ink slab by light dusting. Then fingers were rolled laterally on the slab on which ink was transferred. Then they were placed on a white paper with one lateral edge & then rolled over in opposite direction. [See Fig.1]

Fig. 1: Showing the procedure of taking the impressions of hand

To take palm print palm was lightly dusted with the same ‘T’ pad. The palm was then kept on white paper & firm pressure was given on the center of the dorsum of hand & interdigital areas. Thus dermatoglyphic patterns were recorded & studied with magnifying lens. Qualitative parameters {fingertip patterns – arches, radial & ulnar loops, whorls & quantitative parameters TFRC (total finger ridge count), AFRC (Absolute Finger Ridge Count), ‘a-t-d’ angle were studied. [See Fig.2 & Fig. 3]

Observations and Results

1. The mean TFRC in our study of 100 cases Left and Right summed up was 64.3 in Rajasthan population while Uttarakahnd subject had 71.45. (t = 3.6, P<0.0001)
2. The mean AFRC (Absolute Finger Ridge Count) was 87.7 in Rajasthan population while 90.5 in Uttarakahnd subject. (t = 0.75, P> 0.05)
3. Average ‘a-t-d’ angle combined was 38.3° in Rajasthan population while 40.59° in Uttarakahnd subject. (t = 2.69, P<0.02)
4. Finger tip ridge pattern for each finger along with Furuhata’s index is shown in table no.I.
Discussion

The concept of inheritance and racial variation in dermatoglyphic characters is well established. The normal finger ridge count is considered as an autosomal trait not influenced by sex chromosome (X or Y). In present study both TFRC and AFRC of Uttarakhand population showed higher values as compared to rajasthan ones. TFRC being significant whereas AFRC not. TFRC is a single count and is pure quantitative measure of a single trait whereas AFRC evaluates the pattern intensity comprising of pattern size and pattern type dependent on the number of triradii which is strongly inherited.7

The ‘a-t-d’ angle on an average was 38.30° in Rajasthan population while 40.59° in uttarakhand population when both right and left hands were combined. The study for utility of ‘a-t-d’ angle in dermatoglyphics for satisfactorily universal ethnic comparison and genetic investigations was done.8

The frequency of arches, whorls and loops were in ascending order both population. In Rajasthanis it was 6.30 %, 38.40 % and 55.30 % and in Garhwalis people it came out to be 4.40 %, 30.40 % and 65.20 % respectively. Similar study was conducted in Hinduised population of UP1 and the frequency of pattern types for whorl, loop and arches were 40.88 %, 55.08% and 4.03%.

Similar studies were conducted on Tibetan males Where whorls were seen in predominance, Brahmin of Bengals10 where loops were in predominance.

Conclusion

The predominance of ulnar loops in both the population may signify their common origin. Whorls, arches and radial loops follow the ulnar loop pattern.

Acknowledgement

The authors sincerely thank Bhaskar Juyal, student of Seema Dental College, Rishikesh, Uttarakhand for the help rendered by him.

<table>
<thead>
<tr>
<th>Finger Tip Ridge Pattern</th>
<th>Rajasthan population (100)</th>
<th>Uttarakahnd population(100)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right Hand</td>
<td>Left Hand</td>
</tr>
<tr>
<td>Arch</td>
<td>33</td>
<td>30</td>
</tr>
<tr>
<td>Whorl</td>
<td>202</td>
<td>182</td>
</tr>
<tr>
<td>Ulnar Loop</td>
<td>256</td>
<td>275</td>
</tr>
<tr>
<td>Radial Loop</td>
<td>09</td>
<td>13</td>
</tr>
<tr>
<td>Furuhat's Index</td>
<td>69.44</td>
<td></td>
</tr>
</tbody>
</table>

Student ‘t’ test was applied for statistical analysis of the results.

Furuhat’s index was calculated by using following formula:

\[
\text{Furuhat’s index} = \frac{\text{Percentage frequency of whorls}}{\text{Percentage frequency of loop (Radial + Ulnar)}} \times 100
\]
References

A Rare Case of 2, 4-Dichlorophenoxy Acetic Acid (sodium salt) Poisoning Induced fatality
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Abstract
2, 4-Dichlorophenoxyacetic acid (2, 4-D) is a selective herbicide widely used to kill broad-leaved plants in wheat cultivation. Only a few cases of documented poisoning cases with this compound in ethyl ester form have been reported from India. This case report aims at presenting a rare form poisoning with 2, 4-D in its sodium salt form and management dilemmas encountered.

Key Words
2, 4-Dichlorophenoxyacetic acid (2, 4-D), suicide, fatal intoxication and Herbicide.

Introduction
2, 4-Dichlorophenoxyacetic acid (2, 4-D) is a selective, hormone-type phenoxy acid herbicide, primarily used as a post emergence herbicide on broadleaf weeds in turf. It is the widely used as herbicide all over. 2, 4-D is also used as an important synthetic plant hormone, so it is often used in laboratories for plant research and as a supplement in plant cell culture media such as MS medium. Several hundred commercial products contain Chlorophenoxy herbicides in various forms, concentrations, and combinations. The exact composition must therefore be determined from the product label. Sodium, potassium, and alkyl amine salts are commonly formulated as aqueous solutions, while the less water-soluble esters are applied as emulsions. Low molecular weight esters are more volatile than the acids, salts, or long-chain esters. It is mainly used as an herbicide in areas where wheat is cultivated and is rarely reported as an agent used for attempting suicide. We report a rare case report of a poisoning with 2, 4-D in its sodium salt form and difficulties encountered with its management.

Case History
25 year old lady from Hosor Chennagiri Taluk admitted to S.S.Institute of medical sciences on 27-12-09 with an h/o consumption of 2-4 D. At the time of admission, patient was unconscious with limited limb movements to painful stimuli. At the time of admission she was anemic and there was tachycardia with hypotension. (Pulse rate of 130beats/min, BP 80/-), cold peripheries. Pupils were dilated and sluggishly reacting to light. On the day one, investigations revealed anemia (Hb- 6.9g/dl) with elevated renal parameters (Urea-90, Cr- 1.8mg/dl). Liver functions were within normal limits. (Bilirubin 0.6, SGOT-26, SGPT-25, ALKP-74). Blood electrolytes showed hypokalemia, with hypokalemia & hyperchloremia. Arterial blood gas analysis revealed respiratory alkalosis with metabolic acidosis. Anionic gap was 16, suggesting possible mixed metabolic acidosis. Urine output was 1800ml.

On day 2, there was improvement in hypokalemia. Despite correction, metabolic acidosis persisted. But renal parameters also showed improvement due to treatment with Urea-42mmol/L, Creatinine -1mg % and Renal output was to 3600 ml. Anemia improved from 6.9g/dl to 10.2g/dl as patient was given 3 units of packed cell transfusion.

On day 3, there was deterioration of liver enzymes and persistent hypernatremia. On the day 4, patient’s general condition started to deteriorate. There was anemia and thrombocytopenia (HB-8.5g/dl PLT- 26 thousand) suggesting probable bone marrow failure. Renal parameters also deteriorated. (Urea-70 mmol/L, Creatinine.-1.6mg%). Patient also developed severe hypotension, which was not responding to vasopressor agents. Metabolic acidosis continued to persist despite correction. Finally patient died on the 4th day probably due to multi organ failure.

Treatment
Since there is no specific antidote available, management was supportive in the form of maintaining hydration, supporting respiration, preventing aspiration and it is said that alkaline diuresis and hemodialysis will be helpful in preventing renal damage.

As the urine alkalinisation enhances herbicide elimination and should be considered in all seriously poisoned patients. But with the present case, Alkalinizing the urine would mean intravenous administration of sodium bicarbonate (44-88 mEq per liter) and it would again run a risk of introducing extra sodium as it was a 2.4 D poisoning in its sodium salt and role of hemodialysis was doubtful was this compound is highly protein bound.

Autopsy findings
The autopsy showed hemorrhagic oesophagitis, gastritis and pulmonary edema. The mucosa of stomach and intestine were congested. Several necrotic areas of mucosa of esophagus. All the internal organs showed congestion. Blood and viscera were collected and sent for chemical analysis. The forensic science report confirmed the poisoning.

Discussion
2, 4-D may be encountered as a vapor, liquid or as a component of mixtures. It may cause damage at the point of contact (skin, eyes, lungs and gastrointestinal tract). Occupational exposure may occur through inhalation and dermal contact when 2, 4 D is produced or used. Several hundred commercial products containing Chlorophenoxy herbicides are presently available in the market. The exact composition of the herbicide used must therefore be determined from the product label. Some of the important commercially available products are, 2, 4-dichlorophenoxyacetic acid (2, 4-D), 2, 4-dichloro-phenoxypropionic acid (2, 4-DF), Dichlorprop, 2, 4-dichloro-phenoxybutyric acid (2, 4-DB), 2, 4, 5-trichlorophenoxy acetic acid (2, 4, 5-T) and 2-methyl-3, 6 dichlorobenzoic acid.

The systemic toxicity of Chlorophenoxy compounds are known mainly from clinical experience with cases of deliberate suicidal ingestion of large quantities. The reports of fatal outcomes involve renal failure, acidosis, electrolyte imbalance, and a resultant multiple organ failure and anemia. The presence of severe anemia in this case may be due to gastrointestinal hemorrhage. Patients will also present with vomiting, diarrhea,
headache, confusion, and bizarre or aggressive behavior. In some cases mental status changes occurs which may be progressed to coma in severe cases.  

**Toxicokinetics**

Rapid and complete absorption of Chlorophenoxy compounds from the gastrointestinal tract has been reported. Nearly complete absorption of 2, 4 D occurs within 24 hours in humans. 2, 4 D is primarily metabolized by acid hydrolysis, and minor amount is conjugated. It is highly protein bound and widely distributed. The chief organs of deposition are kidneys, liver and central and peripheral nervous systems. It gets excreted unchanged in kidney (90%) via the renal organic anion secretary system. The estimated half –life is 18h.  

**Mechanism of toxicity**

Is a plant growth regulator that stimulates nucleic acid and protein synthesis and affects enzyme activity and respiration and in humans, on acute ingestion causes miosis, coma, fever, hypotension, tachycardia, muscle rigidity, possible respiratory failure and pulmonary edema. Alterations in liver functions such as elevated lactate dehydrogenase and aspartate amino transferase has also been reported. On chronic exposure, it has been reported to damage liver, kidney, muscular and nervous system.  

**Confirmation of poisoning**

Gas-liquid chromatographic methods are available for detecting Chlorophenoxy compounds in blood and urine. Urine samples should be collected as soon as possible after exposure because the herbicides may be almost completely excreted in 24-72 hours under normal conditions. Urine samples can also confirm overexposure.  

**Conclusions**

Since a variety of compounds are being used by the farmers, all efforts must be made to identify the offending agent correctly. Due to the widespread use of this pesticide in commercial and residential applications, newer methods are required to monitor worker and population exposure. It is also shown that several forms of absorption (e.g., inhalation, dermal, oral) are of concern in assessing human exposure hence development of newer methods for identification and effective treatment 2, 4-D are needed for the better prognosis.

**References**

A hospital based study of burn patients in an apex Institute of Maharashtra
Pravin N Yerpude*, Keerti S Jogdand*
*Assistant Professors, Dept of Community Medicine, Katuri Medical College & Hospital, Guntur (A.P.)

Abstract
Burn injuries constitute a major public health problem. A hospital-based descriptive observational study was conducted among 278 burn patients admitted in the KEM hospital, Mumbai in 2007 to assess the demographic and clinical profile of burn patients and to study the medico legal and social causes. Majority of patients were females (56.12%), literates (73.74%), in the age group of 21-40 years (49.64%). Occupation-wise housewives were 38.85% followed by unskilled worker (18.72%). Majority of the cases (55.04%) were accidental whereas suicidal and homicidal cases were 20.50% and 24.46% respectively. According to the size 25.3% patients had 20% -39% of body surface burns and 21.7% had 80% or more burns. 53% of the cases were given blood transfusion and 22.12% died in the study period.

Key Words
Burn, hospital based study, demographic and clinical profile.

Introduction
Burn injuries occur universally and have adversely affected mankind since antiquity till the present day. In all societies burns constitute a serious medical and psychological problem. It has also severe economic and social consequences not only to the individuals, but also to their family and society in general. In developing countries, the problem of burn injuries is more severe due to the reason that the care of burn patients requires specialized units that are expensive and not always readily available. Burn injuries are a major public health problem due to its high mortality, morbidity and disability amongst young and middle-aged adults. Burn has also a social dimension. It may be associated with accidental, suicidal or homicidal causes.

In spite of such importance of burn both from clinical as well as social point of view, there is a dearth of research material on burn in India. Thus this short descriptive observational study had been undertaken to find out the medico legal and social causes of burn and to assess the demographic and clinical profile and treatment outcome of burn patients in the KEM hospital, Mumbai.

Materials and method
The Descriptive type of observational study was undertaken in March-August, 2007. The study population was 278 burn patients who admitted in the burn unit of the KEM Hospital, Mumbai at any point of time during the six months study period. The data were collected by interview of patients and/or their relatives with the help of pre-designed and pre-tested schedule. The bed head tickets, admission register and the referral note were also reviewed.

Size of burn determined by Lund and Browder’s chart was obtained from bed-head ticket. Outcome variables were analyzed for 217 (78.06%) patients because 61 (21.94%) patients were still admitted in the hospital on expiry of the study period.

The medico legal aspects were obtained by interviewing the patients or their relatives with the help of the schedule and also by reviewing the relevant records like admission register and bed tickets.

Results and discussion
Out of 278 burn patients, 56.12% were female, 49.64% were of 21-40 years age. Overall female predominance in our study conforms to some previous reports. By occupation, 38.85% patients were house-wives, 20.14% unskilled workers like labourers, causal workers and maids. 14.75% were male skilled workers like mason, driver, farmer, carpenter, tailor etc. 73.74% patients were found to be literate as shown in table I.

Table 1: Distribution of burn patients according to sociodemographic profile

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
<th>Percent</th>
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</thead>
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<td>Age 0-20</td>
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</tr>
<tr>
<td>21-40</td>
<td>138</td>
<td>49.64</td>
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<tr>
<td>41-60</td>
<td>49</td>
<td>17.63</td>
</tr>
<tr>
<td>&gt;60</td>
<td>12</td>
<td>4.31</td>
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<tr>
<td>Gender Male</td>
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<td>43.88</td>
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<tr>
<td>Female</td>
<td>156</td>
<td>56.12</td>
</tr>
<tr>
<td>Occupation Student</td>
<td>39</td>
<td>14.03</td>
</tr>
<tr>
<td>Housewife</td>
<td>108</td>
<td>38.84</td>
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<tr>
<td>Service</td>
<td>14</td>
<td>5.04</td>
</tr>
<tr>
<td>Skilled worker</td>
<td>41</td>
<td>14.75</td>
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<tr>
<td>Unskilled worker</td>
<td>52</td>
<td>18.72</td>
</tr>
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<td>Business</td>
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<tr>
<td>Farmer</td>
<td>19</td>
<td>6.83</td>
</tr>
<tr>
<td>Education Illiterate</td>
<td>73</td>
<td>26.26</td>
</tr>
<tr>
<td>Primary</td>
<td>79</td>
<td>28.42</td>
</tr>
<tr>
<td>Secondary</td>
<td>91</td>
<td>32.73</td>
</tr>
<tr>
<td>Secondary +</td>
<td>35</td>
<td>12.59</td>
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</table>

Considering the size of the burn, it was revealed that 25.30% patients had 20 to 39% burn. 80% or more burn was recorded in 21.7% patients. 3 cases of burn of 100% body surface area were also admitted. Majority of burn patients had initial treatment at other health care facilities before being referred to the Burn unit of KEM Hospital, Mumbai. 48 out of...
217 i.e. 22.12 % of the patients died in the study period. Most of the dead patients (75%) sustained grievous burn injuries (80-100%). 66.67% patients with 80-100% burn did not survive even in a most specialized setting. Death among patients with 60-79% burn was also unacceptably high (22.22%). Majority of the patients had died within 72 hours of sustaining burn injuries.

In a study on burn patients in Indore 4, most deaths were associated with 3rd degree flame burn. In a study of paediatric burn patients in Mumbai mortality rate was 10.4%. Mortality rate was more in patients with more than 40% burn 5. It was observed that 76.47% of patients were discharged within the study period after completion of treatment. Another 18.07% burn patients were still admitted at the completion of the study period of 6 months.

In this study it was seen that blood transfusion was required mostly in burn patients with more than 50% body surface area burnt. Most patients (31.3%) were transfused less than 5 units of blood. More than 10 units were required in only 4.8% of patients. 47% burn patients were not given blood and it was found that either they had lesser degree of burn or they expired before blood could be arranged.

As regard to causes, electricity was the leading cause of burn among males while flame was by far the females. Household flame was responsible for 61.45% of all burn cases in this study as compared to 80.3% flame-burn in the Indore study 4. Thermal burns being most common type is also reported by most of the patients. Among the causes of thermal burns leading causes were kerosene stove (32.3%), open flame (23.1%), kerosene lamp (14.2%) and gas stove (5.7%).

Out of 278 burn cases, most of the cases were reportedly accidental (55.04%), followed by 24.46% homicidal and 20.50% suicidal as shown in table II. Among the accidental cases, most common social causes were - household work, principally cooking (27.5%) - mainly among females; playing in makeshift kitchen (23.5%) by children and electrical repair work by adults (17.7%). Other common causes being - touching live electric wire (12.42%), lighting (8.49%), performing puja (4.58%).

Table 2: Distribution of burn patients according to medico-legal causes

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidental</td>
<td>153</td>
<td>55.04</td>
</tr>
<tr>
<td>Suicidal</td>
<td>57</td>
<td>20.50</td>
</tr>
<tr>
<td>Homicidal</td>
<td>68</td>
<td>24.46</td>
</tr>
</tbody>
</table>

Among homicidal burn, social conflict (41.18%) tops the list. Dowry deaths (33.82%) still pose a serious threat to our society and ranks close second among the causes of homicidal burns. Other causes were household quarrel (16.18%) and put on fire (8.82%) probably because kerosene is cheap and popular as a fuel. 1

Household quarrel (59.65%) is the most prevalent cause of suicidal burns followed by due to failure in examination (22.81%) and mental depression due to indebtedness (17.54%).

Accidental burn leads both among males (90.63%) and females (43.14%). But suicidal (25.50%) and homicidal (31.36%) causes of burn were more among females. Accidents caused 61.45% of all burns in this study as compared to 67.7% in the study of burn patients in Indore 4.

Conclusion

The mortality, morbidity and disability related to burn injuries can be prevented to a great extent by educating people about safety measures, implementing good health and safety regulations, legislations, proper appliance designing, prompt treatment of the cases of burns and appropriate referral services. The social aspect of burn could be taken care of by increasing literacy rates, empowering women, counseling, appropriate legislations and their proper implementation.

Source of support: Nil

Conflict of interest: None declared

Acknowledgment

We are grateful to Dean, Dept of Plastic Surgery for their kind cooperation and necessary permission for the study.

References


Ventricular aneurysm causing sudden cardiac death in the young: A case report
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Abstract
This report highlights rupture of ventricular aneurysm as one of the rare causes of sudden cardiac death in the young. The victim was otherwise healthy and not known to have coronary artery disease. The lesion must have been present since early childhood as presumable from its morphology, and hence most probably a developmental cardiac anomaly.

Case report
A young man aged 19 years was admitted in a local hospital for complaints of sudden chest pain during travel, where he succumbed to the disease in spite of resuscitation and intensive care treatment. His body was then brought for autopsy to the Medical College Hospital, Alappuzha. He was physically well built, tall (Height 173 cm) and weighing 100 Kg and not known to have been suffering from symptoms suggestive of heart disease.

Internal examination revealed 450 gms of blood clot in the pericardial sac, on opening of which, the heart weighing 350 gm showed a saccular outpouching of the wall, 5 x 3. 5 x 3 cm in size, seen arising from the upper, anterior part of the left ventricle, close to atrioventricular junction (Fig. 1) and compressing the left atrium. Its attachment was by a broad base (Fig. 2), the wall 0.2-0.3 cm thick and Its surface showed multiple small ruptures. Bluish discoloration was noticed on its surface as well as adjoining ventricular wall. On opening, its cavity containing thrombus and blood clot was seen communicating with that of the left ventricle (Fig. 3). The circumflex branch of the left coronary artery was coursing through its junction with the left ventricle and had no communication with it. Thickness of the left and right ventricular walls were 2 cm and 0.5 cm respectively. The septa, papillary muscles and valves were within normal limits. Both coronary arteries and their major branches were patent throughout their course as far as discernible by gross dissection.

Microscopic examination of the wall of the lesion showed thick fibrous tissue with adherent thrombus on its inner surface (Fig. 4). The endocardial lining was seen over most areas and there were tears in the wall with extravasation of blood. Numerous capillaries were seen in the wall, indicating organization of preexistent thrombus. No muscle tissue was noted in the entire wall of the lesion even after staining with Masson's trichrome (Fig. 5). The gross and microscopic features of the cardiac lesion were quite fitting with a saccular aneurysm of the left ventricle. There were no necrosis, fibrosis or inflammatory reaction in the myocardium around the base of the aneurysm.

Among the other organs, only the lungs and spleen showed some changes of significance. Lungs were edematous, weighing 600 and 560 gms (Right and Left respectively) and showed congestion and edema of alveoli without heart failure cells. Spleen weighed 200 gm and showed diffuse congestion. Aorta showed a few fatty streaks. Other organs showed no significant changes other than congestion.

Discussion
Ventricular aneurysms are rare, but important lesions, and the most common among them are acquired as a complication of myocardial infarction. Congenital ventricular aneurysms are...
only rarely reported, probably because most of them are 
clinically asymptomatic and are difficult to differentiate clinically 
from the more commonly occurring diverticula. According to 
Pome et al1 aneurysms may or may not have muscle layer while 
diverticula have all the layers of the heart. The authors also 
have classified the diverticula as muscular and fibrous types, 
the latter being more commonly found near the atrioventricular 
valve ring. By gross morphology, differentiating between them 
may not be easy, although the broad base of attachment in 
contrast to the narrow stalk of a diverticulum and the 
localization away from the apex may favour aneurysm.2,3 
However, congenital apical left ventricular aneurysm has also 
been reported.4 The theory that the pathogenesis of aneurysms 
is most probably related to the deficiency of muscle fibres can 
be best explained in post myocardial infarction states and in 
cases of the berry aneurysms arising at the bifurcation points 
of arteries. The atrioventricular valve ring may also be likewise 
deficient in muscle fibres. In the heart, they may remain clinically 
silent until complicated by thromboembolic phenomena or 
rapture, the latter being the most fatal complication. Most of 
the cases are, therefore diagnosed only during autopsy. In our 
case, the large size and the thickness of the wall of the lesion in 
a young man point to its early onset, also supported by the 
otherwise healthy myocardium and state of the coronary 
arteries, virtually ruling out the possibility of previous infarction. 
Absence of muscular layer demonstrated by microscopy 
differentiates it from diverticulum, supported by the absence of 
other co existing anomalies. 

Despite the rarity of the lesion, modern day imaging 
technology is bringing out promising results in antenatal 
detection of such developmental anomalies4  and exclusion of 
other abnormalities. It may be amenable for surgical repair 
even in late adulthood, if promptly detected before life 
threatening complications ensue2,5, 4.

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Diagnosis of Sickle Cell Disease at autopsy: A case report

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Abstract

Individual suffering from sickle cell disease may present to forensic pathologist as a case of sudden death. The postmortem diagnosis of SCD related death is often difficult because of failure to anticipate the presence of such disorder. In addition, actually making the diagnosis of sickle cell crisis as a cause of death is confounded by the likelihood of antemortem, perimortem or postmortem sickling unrelated to the cause of death. In this communication we are presenting the findings related to the diagnosis of SCD at autopsy by using hemoglobin electrophoresis. In the present case, we are able to obtain result up to 5 hours postmortem interval.

Key Words

Death, autopsy, sickle cell disease, electrophoresis.

Introduction

Individual suffering from sickle cell disease (SCD) may present to forensic pathologist as a case of sudden death. If such death occurs in children then it raises speculation and apprehension. Herrick first described sickle cell anemia in 1910 and Pauling et al recognized that SCD results from a defect in the hemoglobin molecule¹. Clinically diagnosis is established by characteristic history, physical findings, peripheral blood smear morphology, abnormalities of the complete blood cell count and hemoglobin sickling. Of the many methods available, hemoglobin electrophoresis is routinely used as reliable means for initial screening ².

The postmortem diagnosis of SCD related death is often difficult because of failure to anticipate the presence of such disorder. In addition, actually making the diagnosis of sickle cell crisis as a cause of death is confounded by the likelihood of antemortem, perimortem or postmortem sickling unrelated to the cause of death ³. In developed countries hemoglobin electrophoresis is the method most commonly used to diagnose SCD at autopsy (3-5). However, in India no attempt had been made to explore the feasibility and utility of such modality in our setup and environmental condition. In this short communication we are presenting the findings related to the diagnosis of SCD at autopsy.

Case report

A 2 year male child presents to emergency department of Government Medical College Nagpur in gasping condition. There was history of breathlessness and fever since one day and intermittent pain in abdomen since five days. He was diagnosed case of sickle cell trait with AS pattern. On examination peripheral pulses were feeble, pallor present, spleen and liver were palpable. After about 15 minutes he sustained cardio-respiratory arrest. A forensic autopsy was conducted on same day. On external examination no injury was evident. Internal examination revealed pale brain, lungs were oedematous and heart was unremarkable. Liver and spleen were enlarged weighing 1000 g and 300 g respectively. Other abdominal organs were pale. Microscopic examination revealed unremarkable brain and heart. Lungs showed oedema and focal collapse. Liver showed congestion and microvesicular steatosis. Spleen showed marked congestion with multiple sickle RBCs. Blood smear prepared from heart blood revealed few sickle shaped RBCs (Fig 1).

Fig. 1: microphotograph of blood smear showing sickle RBC (arrow) (Leishman, X100)

Material and Methods

The blood was obtained from heart after opening the chest. The blood was collected in EDTA bulb using it as an anticoagulant. The blood was centrifuged and supernatant discarded. Then the sample was washed thrice. Cellulose acetate electrophoresis at pH 8.6 was the method used in the present case. It is based on principle that different hemoglobin has different net charge because of the variation in their structure. TRIS-EDTA-Borate buffer was used along with acid ethanol as fixer. The sample was placed in cut part of gel. The gel slide along with two-filter paper was placed in the chamber. The chamber was closed and current was adjusted. The slide was removed and immersed in a fixer for 30 minutes and in dehydration solution for half an hour. The slide was dried and bands were observed.

Results

Blood smear showed sickle red blood cells. HbS was demonstrated as a single band on electrophoresis in a position between HbA and HbA₂ (Fig 2 and 3). Hb electrophoresis diagnosis was “SS” pattern.
usually diagnosed at adulthood, either by chance or when they most often are unaware that they carry the gene. They are sickle ß-thalassemia patients are usually asymptomatic and discussed earlier, the problem may be resolved by electrophoresis in agar gel at pH 6.0. On this medium, HbS and HbD separate widely. A two-band pattern on agar gel would confirm sickle cell HbD disease and a one-band pattern homozygous SCD.

On the same line, sickle cell ß-thalassemia may also present diagnostic problems. Clinically, the presence or absence of splenomegaly may be useful in differential diagnosis. The enlarged spleen of the sickle cell ß-thalassemia patient’s persists into adulthood, whereas the homozygous sickle cell patient’s spleen atrophies and becomes impalpable.

Apart from this, other methods that can be employed to characterize such mutant hemoglobins include isoelectric focusing and/or high-pressure liquid chromatography. DNA and amino acid sequencing are more sophisticated and specific methods for identification of the specific hemoglobin variant but are not available for routine use in our set-up. Considering the present case, the patient presented with breathlessness with fever and was landed in ACS. The past investigation revealed that his hemoglobin electrophoresis pattern was AS but postmortem hemoglobin electrophoresis revealed SS pattern. Death due to SCT in early age is uncommon unless the carrier is exposed to hypoxic conditions and/or exertion and in the present case no such history was available. In fact the child had repeated admission with joint pain, exertion and in the present case no such history was available.

There is a dearth of data on SCD in India as compared to that in Africa and America. Death is attributed on most instances to sickle cell crises characterized by vaso-occlusive episodes leading to multi-organ infarct and failure or acute chest syndrome (ACS). ACS can be severe with reported death of 1.8 % in children and 4.3% in adults and presumed to occur due to in situ sickling within lung, producing pain and temporary pulmonary dysfunction. The risk factors for development of ACS in patients with SCD are earlier age, a lower concentration of HbF, higher steady hemoglobin concentrations and higher steady state WBC counts.

Traditionally autopsy diagnosis of SCD rests on gross and light microscopic findings. Utility of blood smear in autopsy practice remains limited. On histology, presence of sickle cells in capillaries of brain, lung, liver, spleen and bone marrow are sufficient to make diagnosis of SCD in SS pattern but real difficulty arises in AS pattern or other varieties. It had been demonstrated that in control sickle cell trait (SCT) cases intravascular sickled red blood cells were noted and these cells were generally indistinguishable from the cases that died of causes unrelated to SCT. Because death itself involves hypoxia, hypoperfusion and other processes that could initiate sickling, differentiating whether the sickling occurred in the immediate antemortem period, perimortem period or in the postmortem period is difficult. Therefore relying solely on microscopic examination may be disastrous. To overcome this problem, postmortem hemoglobin electrophoresis is the most common test currently in use for diagnosing Hbs related hemoglobinopathies. Though not definitive, electrophoresis at pH 8.6 on cellulose acetate membrane is simple, inexpensive and reliable means for initial screening. HbS is demonstrated as a single band in a position between HbA and HbA,. However, one cannot depend solely on cellulose acetate electrophoresis at pH 8.6, as some important hemoglobin variants are electrophoretically silent on this method. Similarly about 50% hemoglobin variants have a similar mobility to HbS but real difficulty arises between HbS and HbD differentiation. Under such circumstances, agar gel electrophoresis at pH 6.0 in citrate buffer can be used as a complementary method because each method detects different variants. Comparison of results obtained in each system usually allows unambiguous diagnosis.

Red cells from patients with HbS and HbD migrate in the same position on cellulose acetate; the two diseases appear to be identical. As discussed earlier, the problem may be resolved by electrophoresis in agar gel at pH 6.0. On this medium, HbS and HbD separate widely. A two-band pattern on agar gel would confirm sickle cell HbD disease and a one-band pattern homozygous SCD.

On the same line, sickle cell ß-thalassemia may also present diagnostic problems. Clinically, the presence or absence of splenomegaly may be useful in differential diagnosis. The enlarged spleen of the sickle cell ß-thalassemia patient’s persists into adulthood, whereas the homozygous sickle cell patient’s spleen atrophies and becomes impalpable.

Apart from this, other methods that can be employed to characterize such mutant hemoglobins include isoelectric focusing and/or high-pressure liquid chromatography. DNA and amino acid sequencing are more sophisticated and specific methods for identification of the specific hemoglobin variant but are not available for routine use in our set-up. Considering the present case, the patient presented with breathlessness with fever and was landed in ACS. The past investigation revealed that his hemoglobin electrophoresis pattern was AS but postmortem hemoglobin electrophoresis revealed SS pattern. Death due to SCT in early age is uncommon unless the carrier is exposed to hypoxic conditions and/or exertion and in the present case no such history was available. In fact the child had repeated admission with joint pain, abdominal pain and needed transfusion. Therefore AS pattern remains unlikely. The patient had splenomegaly. Leg ulcers and priapism are said to be uncommon while splenomegaly is common in Indian SCD. This is in contrast to most African or American patients who have non-functional small spleens due to repeated infarcts.
Another important point needs attention, up to what postmortem interval hemoglobin electrophoresis could be done? Considering the present case, we are able to get positive result at about 5 hours of death interval. Further studies are needed to evaluate this point.

**Conclusion**

Sickle cell syndromes are remarkable for their clinical heterogeneity and presentation. Diagnosis of HbS at autopsy may be made by conventional means but difficulty arises with other varieties. Under such circumstances Hb electrophoresis can be utilized for establishing diagnosis in postmortem state. In the present case, we are able to obtain result up to 5 hours postmortem interval. Further research with lengthening postmortem interval is needed and in fact may be rewarding.

**References**

Correlation of pattern of lesions, morbidity and mortality in head injury Cases at KLES’s Hospital & MRC, Belgaum

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**Assistant Professor, Dept. of Forensic Medicine & Toxicology, JN Medical College, Belgaum, Karnataka, India, ***Professor and Head, Dept. of Forensic Medicine & Toxicology, JN Medical College, Belgaum, Karnataka, India

Abstract

Head injury or cranio-cerebral injury as defined by the National Advisory Neurological Disease and Stroke Council is “a morbid state resulting from gross or subtle structural changes in the scalp, skull and/or the contents of the skull produced by mechanical forces”. Among these 540 cases with history of injury, 205 cases had head injury that were admitted and treated in the hospital including both discharged and expired cases. Out of 205 cases, 175 (85.37%) were males and 30 (14.63%) were females. Male to female ratio is 7:1. As the head injury is a complex phenomenon of multiple causation, there is no single remedy that will prevent it, what is required is an organized teamwork by people in many disciplines like education, engineering, medical, law enforcement agencies for effective prevention of occurrence of head injuries and their fatalities.

Key words

Head injury, morbidity, mortality, cause of death.

Introduction

“No injury to the head is too trivial to be ignored or so serious to be despairsed of.”

Head injury or cranio-cerebral injury as defined by the National Advisory Neurological Disease and Stroke Council is “a morbid state resulting from gross or subtle structural changes in the scalp, skull and/or the contents of the skull produced by mechanical forces”, restricted to those forces applied externally to the head, thus excluding surgical ablations and internally acting forces such as raised intra-cranial tension resulting from edema, hydrocephalus or intracranial space occupying lesions. Cranio-cerebral damage (commonly known as head injury) has been recognized since ages. Brain damage as a result of head injury constitutes a major problem world wide and head injury is the most common emergency encountered in trauma units and casualty department. In multiple traumas, head injury plays a major role in cause of death in any given population especially people less than 45 years of age.

Methodology

The present study is a cross-sectional study of correlation of pattern of lesions, morbidity and mortality in head injury cases at KLES’s Hospital and MRC, Belgaum, during the period of 1 year from 23rd October 2005 to 22nd October 2006. KLES Hospital being a tertiary level teaching hospital, receives cases from in and around Belgaum District.

Results

Table 1: Age and sex wise distribution of head injury cases

<table>
<thead>
<tr>
<th>Age group in years</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>2.44</td>
</tr>
<tr>
<td>11-20</td>
<td>10</td>
<td>2</td>
<td>12</td>
<td>5.86</td>
</tr>
<tr>
<td>21-30</td>
<td>60</td>
<td>2</td>
<td>69</td>
<td>33.65</td>
</tr>
<tr>
<td>31-40</td>
<td>51</td>
<td>9</td>
<td>60</td>
<td>29.26</td>
</tr>
<tr>
<td>41-50</td>
<td>23</td>
<td>4</td>
<td>27</td>
<td>13.18</td>
</tr>
<tr>
<td>51-60</td>
<td>23</td>
<td>4</td>
<td>27</td>
<td>13.18</td>
</tr>
<tr>
<td>61-70</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0.97</td>
</tr>
<tr>
<td>&gt;70</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0.97</td>
</tr>
<tr>
<td>Total</td>
<td>175</td>
<td>30</td>
<td>205</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Surgical management of head injury

<table>
<thead>
<tr>
<th>Surgery</th>
<th>Burr hole</th>
<th>Craniotomy</th>
<th>Both</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of cases</td>
<td>26</td>
<td>17</td>
<td>25</td>
<td>68</td>
<td>100</td>
</tr>
<tr>
<td>Survived</td>
<td>14</td>
<td>10</td>
<td>12</td>
<td>36</td>
<td>53</td>
</tr>
<tr>
<td>Expired</td>
<td>12</td>
<td>7</td>
<td>13</td>
<td>32</td>
<td>47</td>
</tr>
</tbody>
</table>

Out of 68 surgically managed cases, surgical Burr hole was done in 26 cases, of which 14 survived and 12 expired. The craniotomy was done on 17 victims, of which 10 survived and 7 expired. Both these procedures were done together in 25 victims.

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The above table shows the type of cranial and intracranial lesions in head injury cases. Out of 205 cases, 121 (59%) presented with skull fracture, 119 victims (58%) presented with intracranial hemorrhage, 61 victims (30%) showed injury to brain parenchyma and 167 victims (82%) had cerebral edema. [Table 5]

In the above table, out of 4 cases of EDH, 3 were seen in the age group of 21-30 years. The SAH is seen in maximum numbers of cases (55 cases) of which majority were in the age group of 21-40 years. Out of 33 cases of SDH, 15 were in the age group of 21-30 years. [Table 8]

### Table 3: Profile of mortality and morbidity in head injury cases

<table>
<thead>
<tr>
<th>Result</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>41</td>
<td>20</td>
</tr>
<tr>
<td>Morbidity</td>
<td>70</td>
<td>34</td>
</tr>
<tr>
<td>Nil morbidity</td>
<td>94</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>205</td>
<td>100</td>
</tr>
</tbody>
</table>

### Table 4: Morbidity in survived cases at the time of discharge

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>94</td>
<td>57.31</td>
</tr>
<tr>
<td>+</td>
<td>37</td>
<td>22.56</td>
</tr>
<tr>
<td>++</td>
<td>16</td>
<td>9.75</td>
</tr>
<tr>
<td>+++</td>
<td>8</td>
<td>4.87</td>
</tr>
<tr>
<td>++++</td>
<td>9</td>
<td>5.51</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>87</td>
</tr>
</tbody>
</table>

The above table shows the type of cranial and intracranial lesions in head injury cases. Out of 205 cases, 121 (59%) presented with skull fracture, 119 victims (58%) presented with intracranial hemorrhage, 61 victims (30%) showed injury to brain parenchyma and 167 victims (82%) had cerebral edema. [Table 5]

### Table 5: Type of cranial and intracranial lesions

<table>
<thead>
<tr>
<th>Type of lesion</th>
<th>Skul fracture</th>
<th>Intracranial hemorrhage</th>
<th>Injury to brain parenchyma</th>
<th>Cerebral edema</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of cases</td>
<td>121</td>
<td>119</td>
<td>58</td>
<td>61</td>
</tr>
<tr>
<td>Percen age</td>
<td>59</td>
<td>58</td>
<td>30</td>
<td>82</td>
</tr>
</tbody>
</table>

In the above table, EDH is seen in 4 cases of which all of them are associated with skull fracture. The SDH is seen in 33 cases of which 22 were associated with skull fracture and 11 without skull fracture. The SAH is seen in 55 cases out of which 30 were with skull fracture and 25 without skull fracture. [Table 6]

### Table 6: Association of intracranial hemorrhages with fracture

<table>
<thead>
<tr>
<th>Intracranial hemorrhage</th>
<th>No. of cases with fracture</th>
<th>No. of cases without fracture</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDH</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>SDH</td>
<td>22</td>
<td>11</td>
<td>33</td>
</tr>
<tr>
<td>SAH</td>
<td>30</td>
<td>25</td>
<td>55</td>
</tr>
<tr>
<td>Combined</td>
<td>20</td>
<td>7</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>32</td>
<td>119</td>
</tr>
</tbody>
</table>

Out of 121 cases of skull fracture, 34 victims expired and 87 victims survived. Fissured fracture is seen in 49 victims, depressed fracture in 24, sutural in 10, comminuted in 20, basal in 5 and combined fracture is seen in 13 victims. [Table 7]

### Table 7: Type of skull fracture

<table>
<thead>
<tr>
<th>Type of fracture</th>
<th>No. of cases</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expired</td>
<td>Survived</td>
<td></td>
</tr>
<tr>
<td>Fissured</td>
<td>0</td>
<td>49</td>
</tr>
<tr>
<td>Depressed</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>Sutural</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Comminuted</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Basal</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Combined</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>87</td>
</tr>
</tbody>
</table>

In the above table, out of 4 cases of EDH, 3 were seen in the age group of 21-30 years. The SAH is seen in maximum numbers of cases (55 cases) of which majority were in the age group of 21-40 years. Out of 33 cases of SDH, 15 were in the age group of 21-30 years. [Table 8]

### Table 8: Distribution of intracranial hemorrhages with respect to age

<table>
<thead>
<tr>
<th>Age</th>
<th>Intracranial hemorrhages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EDH</td>
</tr>
<tr>
<td>0-10</td>
<td>0</td>
</tr>
<tr>
<td>11-20</td>
<td>0</td>
</tr>
<tr>
<td>21-30</td>
<td>3</td>
</tr>
<tr>
<td>31-40</td>
<td>1</td>
</tr>
<tr>
<td>41-50</td>
<td>0</td>
</tr>
<tr>
<td>51-60</td>
<td>0</td>
</tr>
<tr>
<td>61-70</td>
<td>0</td>
</tr>
<tr>
<td>&gt;70</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
</tr>
</tbody>
</table>

The above table shows the survival period among the expired cases of head injury. Out of 41 cases, maximum number of victims (12) survived for 3-7 days following injury. Only 2 out of 41 survived for a period of 15 days to 2 months. [Table 9]

Out of 41 autopsied cases, in 23 cases (56.11%) the cause of death was found to be intracranial hemorrhage. In 8 cases (19.51%), death is due to injury to brain parenchyma, in 7 cases (17.07%) it is due to cerebral edema and in 3 cases (7.31%) pyogenic meningitis as a complication of head injury resulted in death. [Table 10]

### Discussion

During the period of present study, the number of injury cases in the casualty was 18% of the total number of the cases brought to the casualty. In the present study, majority of the victims were males. Male victims were involved in 85.37% while females were involved in only 14.63% of cases. Most commonly
involved age group was 21-30 years (29.26%); where as the extremes of age comprised the minimum number of cases. In a study conducted at the chief medical Examiner’s Office in Baltimore, males were involved in 80% of cases and females in 20%.

In the present study, out of 205 cases of head injury, 68 (33.17%) were treated surgically and 137 (66.83%) were treated conservatively. Among 68 surgically treated cases, 36 survived and 32 cases expired, thus the mortality of surgically treated cases was 47%. The results of our study are similar to those observed in study conducted in Traumatic Neurosurgical Unit, Edinburgh. The present study illustrated a mortality of 20% (41 cases), morbidity of 34% (70 cases) and nil morbidity in 46% (94 cases) of admitted cases of head injury. The results of our study are similar to that of studies conducted at Neurosurgical Unit, Edinburgh (19%); at Germany (16-20%); at Nigeria (22%) and at a major referral hospital, Mumbai (21%).

In the present study, out of 205 cases, 164 victims survived of which 94 (57.31%) were grouped into nil morbidity as they are discharged within 7 days without any neurological manifestations. Out of the remaining 70 cases, morbidity ranged from 1+ to 4+. This is similar to a study conducted at 55 major hospitals in Taiwan (good recovery - 61.9%; moderately disabled – 11.7%; severely disabled – 10.3%)

In the present study, out of 205 cases of head injury, 121 (59%) presented with skull fracture, 119 victims (58%) presented with intracranial hemorrhage, 61 victims (30%) showed injury to brain parenchyma and 167 victims (82%) had cerebral edema. These results are more consistent with those studies conducted at Traumatic Neurosurgical Unit, Edinburgh (Cerebral edema in 82% cases) at Brisbane, Queensland (Injury to brain parenchyma in 32% of cases, intracranial hemorrhage in 60%, skull fracture in 52%) at Taiwan (62% - Skull fracture, 54% - Intracranial hemorrhage, 34% - injury to brain parenchyma, 86% - swelling of the brain). Among the intracranial hemorrhages, EDH is seen in 4 cases and all of them are associated with skull fracture. The SDH is seen in 33 cases of which 22 were associated with skull fracture and 11 without skull fracture. The SAH is seen in 55 cases out of which 30 were with skull fracture and 25 without skull fracture. Combined intracranial hemorrhage is seen in 20 victims with skull fracture and in 7 victims without skull fracture.

Almost similar results are obtained in studies conducted at Chief Medical Examiner Office, Baltimore (75% of skull fractures are associated with intracranial hemorrhage).

In the present study, out of 121 cases of skull fracture, 34 victims expired and 87 victims survived. The fissured fracture is seen in maximum number of cases followed by depressed and comminuted. Least number of cases presented with the fracture of the base alone. All the victims of fissured fracture survived while all the victims of basal fracture expired. In a study conducted based on autopsy findings at AIIMS, New Delhi, skull fractures was present in 79.87% of victims. The fissured fracture was the most common type, followed by depressed, comminuted and compound fractures.

In the present study, 119 victims had intracranial hemorrhages of which majority were in the age group of 21-40 years. All the 4 cases of EDH were within the age group of 21-40 years. No EDH is seen in extremes of age. Maximum number of SDH (15 cases), SAH (19 cases) and combined hemorrhages (12 cases) were in the age group of 21-30 years. As a support to our study, maximum numbers of SAH were seen in most of the studies. In studies conducted at Brisbane, Queensland; at Germany; at Nigeria; at Turkey; at AIIMS, New Delhi; the intracranial hemorrhages were more common in the middle age which is similar to the findings in our study.

In our study, out of 41 autopsied cases, maximum number of victims survived for a period of 3-7 days following head injury. The survival period was less than 6 hours in 17.61% of cases (7 cases). All these 7 cases had severe head injury. The time lapse between the time of injury and arrival to the hospital was less than 2 hours among all the expired cases. In some of the studies, the mortality rate was 50-60% within first 24 hours of injury. This is contrary to our study where 18.86% was the mortality rate in first 24 hours. This low mortality rate in first 24 hours could be due to the fact that most of the victims were admitted within 2 hours of sustaining injury and surgical decompression done in early hours prolonged the period of survival.

In the present study, among 41 autopsied cases, in maximum number of cases (23 cases; 56.11%) the cause of death was found to be intracranial hemorrhage. The next common cause of death is injury to brain parenchyma (8 cases; 19.5%) followed by cerebral edema (7 cases; 17.07%) and pyogenic meningitis as a complication of head injury (3 cases; 7.31%). This is similar to a study conducted at Neurosurgical Unit, Edinburgh ( Intracranial hemorrhage in 56.11%, Injury to brain parenchyma in 19.5%, Cerebral edema in 17.07% and Pyogenic meningitis in 7.31%).

Table 9: Period of survival in expired cases

<table>
<thead>
<tr>
<th>Survival period</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 hours</td>
<td>7</td>
<td>17.61</td>
</tr>
<tr>
<td>6-24 hours</td>
<td>4</td>
<td>9.25</td>
</tr>
<tr>
<td>1-3 days</td>
<td>5</td>
<td>12.19</td>
</tr>
<tr>
<td>3-7 days</td>
<td>12</td>
<td>29.26</td>
</tr>
<tr>
<td>7-15 days</td>
<td>11</td>
<td>26.82</td>
</tr>
<tr>
<td>15 days-2 months</td>
<td>2</td>
<td>4.87</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 10: Causes of death in head injury cases

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intracranial hemorrhage</td>
<td>23</td>
<td>56.11</td>
</tr>
<tr>
<td>Injury to brain parenchyma</td>
<td>8</td>
<td>19.51</td>
</tr>
<tr>
<td>Cerebral edema</td>
<td>7</td>
<td>17.07</td>
</tr>
<tr>
<td>Pyogenic meningitis</td>
<td>3</td>
<td>7.31</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
</tr>
</tbody>
</table>

References


Double inferior polar arteries of human spleen – A case study
Ravi kumar V*, Siri AM**, Ramesh CM***, Vijayakumar B Jatti****
*Assistant Professor, Dept. of Anatomy, JIJ Medical College, Davangere, **Assistant Professor, Dept. of Anatomy, JIJ Medical College, Davangere, ***Professor and Head, Dept. of Anatomy, JIJ Medical College, Davangere, ****Assistant Professor, Dept. of Forensic Medicine, SSIMS & RC, Davangere

Abstract

Spleen is the largest lymphoid organ in the body. Its supplied by splenic artery which divides into 2-3 divisions at the hilum. These divisions give rise to a number of segmental branches which enter the spleen through the hilum. The present study was undertaken in Department of Anatomy J.J.M.M.C. Davangere where 40 spleens were studied from formalin dried cadavers. Superior and inferior polar arteries supply the superior and inferior poles of spleen, the origin of superior and inferior polar arteries are highly variable.

The aim of the present study is to know the origin of inferior polar arteries which are highly variable in origin and size. Hence the knowledge of vascular segments of spleen is needed at the time of operation when splenic conservation is considered.

Key Words

Superior polar artery, double inferior polar artery, Vascular segments of spleen.

Introduction

Splenic artery is the largest branch from the coeliac trunk. Its one of most tortuous artery in the body. It runs slightly upwards a tortuous course to the left on the upper border of pancreas behind the peritoneum. In its course the left cress of diaphragm and left psoas major muscle are crossed by its along with the hilum of left kidney. In the studies by Gupta CD and Gupta SC., on the 50 human spleen, 2 divisions of splenic artery – superior and inferior were seen in 42 cases (84%) and 3 divisions – superior, middle and inferior splenic artery in 8 cases (16%). They also stated that such splenic segments are separated by an avascular plane perpendicular to the long axis of spleen. Anson and Mcvay quote that near the hilus and within the lineo-renal ligament the splenic art divided into increases branches, which are superior polar, left gastroepiploic, superior and inferior terminal arteries.

According to Redmond HP., the polar arteries had a variable origin and size supplying the two poles of spleen, Viz., (i) Superior polar artery was noted to be more tortuous of the 2 polar arteries. In 60% it arose from superior division of splenic artery in 40% of cases from common trunk of splenic artery, (ii) Inferior polar artery is always a segmental artery having either a proximal or distal origin. Those of proximal origin (75%) arose from common trunk, inferior division of splenic artery or from left gastro-epiploic artery. Those with distal origin (25%) arose from adjacent inferior central segmental artery.

The formation of polar arteries is undoubtedly correlated with primitive development and vascularisation of spleen, as it is developed from multiple masses of mesenchyme. The arteries are named superior and inferior polar arteries. Polar segments are pyramidal in shape and are the constant finding.

Material and Methods

The human spleen were procured by embalmed cadavers from Department of Anatomy, JIJMMMC, Davangere and from mortuary of Chigateri General Hospital Davangere. The spleen was freed from posterior abdominal wall. The pancreas along with splenic artery was dissected up to celiac artery. Spleen was removed along with a long segment of splenic artery. Care was taken not to damage the polar arteries. Photographs were taken and labeled.

Results

In our study the splenic artery divides close to the hilum of spleen in to two divisions; superior and inferior divisions in 36 (90%) specimens. It divides in to three divisions, i.e superior, middle and inferior divisions in 4 (10%) specimens. Variations in the origin and number of polar arteries in the present study are listed out. Superior polar artery is present in 7 cases (17.5%). It was arising from superior division in 6 cases (15%) and from main trunk of splenic artery in / case (2.5%).

- Inferior polar arteries are seen in 21 cases (52.5%) single inferior polar artery arising from inferior division is seen in 14 cases (35%) and from main trunk in 1 specimen (2.5%).
- Double inferior polar arteries were seen in 6 (15%) specimens. In 4 specimens double inferior polar arteries arising from inferior division of splenic artery (Fig:1).
- In 1 specimen double inferior polar arteries(5) was arising from main trunk of splenic artery (Fig:2).
- In 1 specimen double inferior polar arteries(5) was arising from left gastro epiploic artery (Fig:3)

Fig. 1: Showing the double inferior polar arteries(5) arising from inferior division of spleen.

Fig. 2 : Showing the double inferior polar arteries(5) arising from main trunk of splenic artery.

Fig. 3 : Showing the double inferior polar arteries(5) arising from main trunk of splenic artery.
from left gastro epiploic artery.

Inferior polar artery was found in 52.5% cases in our study. Both polar arteries superior and inferior were noticed in 4 cases (10%); only superior polar artery in 7 cases (17.5%) and only inferior polar arteries in 21 cases (52.5%).

**Conclusion**

The phenomenon of post splenectomy infection is now well recognized and many surgical procedures have been developed to preserve splenic function. Hence the knowledge of vascular segments of spleen becomes important and polar arteries because of their variable occurrence in size and number gain importance in partial splenectomies as it offers protection under the pneumococcal sepsis. Further advances in the splenic conservation are dependent on better understanding of vascular anatomy of the spleen.

**References**


**Table 1**: ORIGIN OF DOUBLE (TWO) INFERIOR POLAR ARTERY.

<table>
<thead>
<tr>
<th>From</th>
<th>No. of specimens</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inferior division (I.D.)</td>
<td>4</td>
<td>66.4</td>
</tr>
<tr>
<td>Main trunk (M.T.)</td>
<td>1</td>
<td>16.8</td>
</tr>
<tr>
<td>From LGEA*</td>
<td>1</td>
<td>16.8</td>
</tr>
</tbody>
</table>

* LGEA = left gastro epiploic artery

**Discussion**

The superior and inferior polar arteries supply the superior and inferior poles of spleen respectively. Earlier workers have observed the superior polar arteries present in 65% cases. In our study we found superior polar artery in 17.5% cases.
Identification of Skeltonised body by pocket contents of clothes

K Subba Reddy*, L Ananda Kumar*, LC Obulesu**, R Shankar***, Krishna Prasad****, L Reshma Siresha*****

*Asst. Professor, **Professor & HOD Medical Superintendent, Department of Forensic Medicine and Toxicology RIMS Medical College Kadapa-515002 A.P. India, ***Assistant Professor, Dept. of Forensic Medicine &Toxicology, Kurnool Medical College, Kurnool 518001, ****Asst. Professor, Dept. of Forensic Medicine, SVS Medical College, MahabubNagar-509001 AP , India, *****MD (Physiology)

Abstract

Identity means the determination of the individuality of a person by certain physical characteristics. Article 6 of the universal declaration of human rights states that every one has the right to recognition everywhere as a person before the law. In the present case we received the requisition from Sub-Inspector of Police Sidhout P.S Kadapa (Dist) 516237 Cr.No:108/10 U/s 174 Cr.P.C (Death cause not known). (P.M No: 388/10) for conducting spot PM examination on 23-08-2010 on one unknown skelitanised body. The skeleton contains dried clothes and the pocket contained passport size photographs, hall-ticket of his daughter by which the identity of the person was established.

Key words

Identification, Skeletal remains, Pocket contents of clothes.

Introduction

Personal identity means the determination of the individuality of a person. The question of identification of a living person is mostly the concern of the police and is raised in criminal courts in connection with absconder soldiers and criminals or persons accused of assault, rape, sodomy or murder or when there is a mix up of new born babies in hospitals lost children and occasionally in adults who have lost their memory. It is also frequently raised in Civil Courts owing to impersonation practiced by people to secure unlawful possession of property, insurance claims or to obtain prolongation of lapsed pension.

Visual identification becomes difficult or impossible in case of fires, explosions, advanced decomposition mutilation, aircraft accidents, earthquakes etc.. Identification of a dead victim often enables the police to trace the victims movements, his background talk to his friends and find out his enemies identification of dead. Most of the medico legal work catches around a dead person. Therefore identification of the dead is very important. It is a sound and safe rule to take thumb and finger impression in the absence of any satisfactory identification mark. Identification is difficult when body is skelitanised. Identification of unknown dead body is found, it is searched by the police to see if the clothing contains bank books, note books or other articles or documents which give a clue to the name and address of the individual. Clothing helps in finding the occupation, identity and some times cause of death of the individual. The death is also notified so that some relative or friend can identify the deceased.

When the body is skelitanised and there are no clothing and pocket contents, partial identification can be made out like age, sex, race and stature of the skeleton. Any malformation of bones, congenital anomalies and any orthopedic or surgical implants will help to fix the identity.

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Email: drsubbareddy007@gmail.com

Case History

Inquest held over one unknown male skelitanised dead body aged about 40 years near Kothula Bridge Kadapa – Tirupathi State highway road of Sidhout P.S Cr.No: 108/10 U/s 174 Cr.P.C and spot post mortem was conducted.

Fig. 1: P.M.E No: 388/10, Cr.No: 108/10 U/s 174 Crpc, Sidhout (P.S)

Post mortem findings

External appearances: body dressed in light white full hands shirt with brown colour lines, light blue colour pants. Saffron, black colored thread present. The pant right pocket contained passport size photographs, hall – ticket of his daughter by which the identity of the person was established. Some of the thoracic ribs, left fore arm bones, right lower limb below ankle joint bones, left lower limb tibia and fibula. Skeleton is found with legamental attachments.

Skull & Mandible

The basioccipit fused with basisphenoid. The coronal, sagittal and lambdoid sutures started to close on their inner side, posterior 1/3rd of sagittal suture is fusioning and anterior 1/3rd of the sagittal suture and lower half of the coronal suture is fusioning. Mandible, mastoid, occipital protrubence prominent showing male features. No bony injuries found over the available part of the body.

The exact cause of the death could not be determined from the available parts of the body and the time of death is about 2 weeks prior to Post mortem examination.
Discussion

In the present case the availability of the skeletal remains and pocket contents helped to identify the unknown male body during post mortem examination. The pocket contents of dead body has photographs of deceased person’s family members and one hall ticket of deceased person’s daughter, Communist party membership card. Basing on the pocket contents it became easy for the investigating officer and duty medical officer to establish the identity of the individual. In this case there is no need to send any tissues for DNA profile for identification purpose because skeleton examination tallied with the age, sex, stature of the person identified.

Identification of unknown dead body is a great task for the investigating officer and most difficult when the dead bodies are found in forest area where the body is eaten away by vultures and dogs and made it skelitanised. Though it is the duty of the police to establish the identity, it is also duty of medical officer to examine the dead body and to assist the investigating officer to establish the identity by giving it’s age, sex and stature and other peculiarities of the bones as a part of partial identification. Clothes present over the skeleton, the tailor marks, occupational and school uniforms, pocket contents like phone book, small dairies, ID cards, passports, driving license, ration cards, photographs will help the investigating officer to arrive a conclusion about the identity.

References

A Retrospective Study of 5 years of Organ phosphorous poisoning in Ahmedabad

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*Head & Associate Professor, Dept. of FMT, AMC MET Medical College, Ahmedabad, Gujarat, **Associate Professor, FMT, Smt. NHL MMC, Ahmedabad, Gujarat, ***Professor, FMT, Gitanjali Medical College, Udaipur, Rajasthan

Abstract

Poisons are known to mankind since time immemorial. Of the various substances used for suicide in India, Organ phosphorous compounds form a significant group as observed by much workers. The study was aimed to generate a baseline data on the epidemiological factors contributing to the incidence and mortality due to O.P. Poisoning. So as to highlight the problem this requires planned and concentrated effort in dealing with it on a broader horizon. Since prevention is the only logical approach there is an urgent need to take appropriate steps to prevent loss of lives. The analysis of the data revealed that 65 cases of O.P. poisoning brought to the mortuary of Smt.NHLMMC, Ahmedabad for medico-legal autopsy, during 5 years period i.e. 1995 to 1999. The age group ranged between10 years to 40 years and above, with maximum incidence between 21-30 years and males outnumbering females. The main mode of poisoning was suicidal by ingestion.

Key words

Organ phosphorous, Poisoning and Insecticides.

Introduction

Toxicology is a basic science of poisons. PARACELSUS over 400 years ago pointed out that poison in an agent that is capable of producing injury or death when ingested or absorbed. The EBERS PAPYRUS perhaps earliest medical record (1500), record 800 recipes and many contain recognized poisons, e.g. hemlock, aconite, opium, metal such as Cu, Pb etc. HIPPOCRATES while introducing rational medicine, about 400 BC, added number of poisons. THEOPHRASTUS (370-286 BC) recorded numerous poisonous plants in DE HITSORIA PLANTARUM. Romans too made considerable use of poisons. A competent and well respected physician MAIMONIDES (AD 1135-1204) was a profile writer who wrote Poisons and their antidotes. Death due to poisoning has been known since time immemorial and poisoning contributes to be a major problem all over the world although its type and associated morbidity and mortality vary from country to country or even place to place in the same country. Organs phosphorus poisonous compounds are extremely used as pesticides for soft bodied insects in agriculture.

Material and Method

The material for the present study were collected from all the cases showing confirmed O.P. Poisoning on chemical analysis of viscera in the forensic science laboratory which brought to medico-legal autopsy to the mortuary of Forensic Medicine Department, Smt.NHLMMC, Ahmedabad for 5 years i.e.1995 to 1999. Individual victim’s data was entered as P.M. No., deceased name, age, sex, address, marital status, occupation, type of poison consumed, mode of poisoning and time of consumption. All data has been taken in a prepared proforma and analysis made from the data analyzed in various tables.

Result

Table 1: Annual O.P. deaths in comparison to total unnatural deaths-

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Medico-legal autopsies</th>
<th>O.P. Poisoning cases(Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>759</td>
<td>06 (0.8%)</td>
</tr>
<tr>
<td>1996</td>
<td>900</td>
<td>16 (1.8%)</td>
</tr>
<tr>
<td>1997</td>
<td>904</td>
<td>15 (1.7%)</td>
</tr>
<tr>
<td>1998</td>
<td>894</td>
<td>15 (1.7%)</td>
</tr>
<tr>
<td>1999</td>
<td>935</td>
<td>13 (1.4%)</td>
</tr>
<tr>
<td>Total</td>
<td>4392</td>
<td>65 (1.5%)</td>
</tr>
</tbody>
</table>

Table 2: Socio-demographic Profile-

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency n=65</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 10 years</td>
<td>3</td>
<td>4.6</td>
</tr>
<tr>
<td>11 - 20 years</td>
<td>18</td>
<td>27.7</td>
</tr>
<tr>
<td>21 - 30 years</td>
<td>29</td>
<td>44.6</td>
</tr>
<tr>
<td>31 - 40 years &amp; above</td>
<td>15</td>
<td>23.1</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>34</td>
<td>52.3</td>
</tr>
<tr>
<td>Female</td>
<td>31</td>
<td>47.7</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmarried</td>
<td>37</td>
<td>56.9</td>
</tr>
<tr>
<td>Married</td>
<td>28</td>
<td>43.1</td>
</tr>
<tr>
<td>Residential Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>34</td>
<td>52.3</td>
</tr>
<tr>
<td>Urban</td>
<td>31</td>
<td>47.7</td>
</tr>
</tbody>
</table>

Address for correspondence:
Dr. R.C.Zariwala
(Head & Assoc. Prof. of F.M., AMC MET Medical College)
The present study reveals that out of a total 4392 medico-legal autopsies conducted during years 1995 to 1999, O.P. Poisoning was responsible for 65 (1.5%) of the unnatural deaths in Ahmedabad with highest incidence in year-1996. The poisoning was common in the age group of 21-30 years. Male outnumbered the female, the male: female ratio being approximately. Among the deceased 56.9% were married. The number of victims from the rural population was more than urban.

Table 4: Mode of exposure & Route of exposure

<table>
<thead>
<tr>
<th>Mode of exposure</th>
<th>Ingestion</th>
<th>Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suicide</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>Homicide</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Accidental</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>2</td>
</tr>
</tbody>
</table>

—All who choose suicide they prefer ingestion but accidental prey were by inhalation

Table 6: Subgroup of all OP poisoning

<table>
<thead>
<tr>
<th>Sub group</th>
<th>Male</th>
<th>Female</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethoate</td>
<td>3</td>
<td>6</td>
<td>9 (13.8)</td>
</tr>
<tr>
<td>Methyl Parathion</td>
<td>5</td>
<td>1</td>
<td>6 (9.2)</td>
</tr>
<tr>
<td>Phorate</td>
<td>0</td>
<td>3</td>
<td>3 (4.6)</td>
</tr>
<tr>
<td>Pyrethide</td>
<td>0</td>
<td>1</td>
<td>1 (1.5)</td>
</tr>
<tr>
<td>Monothi-monocrotopho</td>
<td>1</td>
<td>0</td>
<td>1 (1.5)</td>
</tr>
<tr>
<td>Malathione</td>
<td>8</td>
<td>9</td>
<td>17 (26.2)</td>
</tr>
<tr>
<td>Phosalone</td>
<td>1</td>
<td>1</td>
<td>2 (3.1)</td>
</tr>
<tr>
<td>Dichlorvos</td>
<td>2</td>
<td>3</td>
<td>5 (7.7)</td>
</tr>
<tr>
<td>Fint malthion</td>
<td>2</td>
<td>0</td>
<td>2 (3.1)</td>
</tr>
<tr>
<td>Non Monothi-monocrotophos</td>
<td>10</td>
<td>6</td>
<td>16 (24.6)</td>
</tr>
<tr>
<td>Oxydimiton</td>
<td>0</td>
<td>1</td>
<td>1 (1.5)</td>
</tr>
<tr>
<td>Quinalphos</td>
<td>2</td>
<td>0</td>
<td>2 (3.1)</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>31</td>
<td>65 (100)</td>
</tr>
</tbody>
</table>

Table 8: Sex wise distribution of time lag in bringing patient to hospital

<table>
<thead>
<tr>
<th>Time Lag</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 to 4.00 hrs</td>
<td>30</td>
<td>24</td>
<td>54 (83.1%)</td>
</tr>
<tr>
<td>5.00 to 9.00 hrs</td>
<td>3</td>
<td>3</td>
<td>6 (9.2%)</td>
</tr>
<tr>
<td>10.00 to 14.00 hrs</td>
<td>1</td>
<td>4</td>
<td>5 (7.7%)</td>
</tr>
</tbody>
</table>

Time & Place of suicide-
Place of suicide was home for 87.7% of victims with preferable time in between 12.01 to 18.00 hrs & in September month (18.5%).

Discussion
The retrospective 5 years study showed 65 cases of O.P. Poisoning brought to the mortuary of F.M. dep’t., Smt.NHLMCC,Ahmedabad. O.P. poisons is now rapidly becoming a very commonly used agent for self poisoning as revealed by the present study. The maximum incidences in the age group of 21-30 years noticed in our study are conformity with the result of Mehta et al. The reasons for this trend may be that this age group is most susceptible associated with frustration, failure at school, unsuccessful in love affairs, conflicts with parents etc. It was observed inn the present study that 52.3% victims from rural background and 47.7% victims from urban background. It is interesting to note that out of 31 females, 58.1% were married and 41.9% were unmarried. Married females outnumbered unmarried female, may be due to social and financial stresses and devil of dowry causes the loss of patience. Married males (55.9 %) are more prone to suicide than unmarried males (44.1%). The factor responsible for the trend observed in our study may be due to early marriage in rural community along with its added familial responsibility social customs and limited resources. Suicide was the common mode of poisoning (93.3%). This endorses our views that the inability to cope up with the demand put forth by standard set by the materialistic modern society is the main factor responsible for fatal poisoning in this region. Different worker in this field have also found similar result in their studies. The initial explanation for increasing incidence was suggested to be easy availability and high lethality. However despite the restriction on sale and distribution of this agent, imposed by authorities has failed to reduce its use as suicidal agent.

Conclusion
This study has brought forth the following issues that there is a need:
1. This study shall form a basis to suggest need of toxicological analytical Center at a hospital.
2. For centralized facility to manage poisoning cases.
3. To evolved measure for checking the increasing incidence and mortality Due to O.P. Poisoning.
4. Psychologically counseling.

References
1. Mehta et al- Cho line esterase and OPC poisoning.
The application of ligature mark obliquity in diagnosis of its etiology
Samar A Ahmed
Ain Shams University Egypt

Abstract

Differentiation between hanging and strangulation has always been a dilemma in the field of forensic medicine.

Aim of Work

To compare the relative importance of obliquity of ligature mark to its incompleteness in differentiation of hanging and strangulation.

Material and Methods

Autopsy reports of 352 cases arriving at the morgue in Cairo (Zeinhom) from the year 2000 till the year 2009 with reported ligature strangulation or hanging were studied for description of external ligature marks on the neck.

Results

The subjects in the study were 200 males and 152 females with a mean age of 34.2 years. When comparing obliquity of the mark to its incompleteness there was a minimum number of cases reported to have oblique marks (13.3%) and incomplete mark (10%). Z test for comparison indicated a greater importance for the obliquity of the ligature in comparison to whether or not it was complete.

Conclusion

There exists a difference in weight of the separate factors defining the ligature mark and differentiating it in cases of hanging from those of strangulation.

Introduction

Differentiation between hanging and strangulation has always been a dilemma in the field of forensic medicine. Without the use of circumstantial evidence it is rather hard to differentiate especially in situations where hanging takes the incomplete form.

Using ligature marks to differentiate and reach a diagnosis is very vital especially when there is no instrument left at the scene of the crime.

The importance in differentiation arises from the fact that strangulation is mostly homicidal whereas hanging is in the majority suicidal. Making the proper diagnosis is the right of the deceased on the judicial system.

Many cases have been reported where there existed a dilemma in the diagnosis of hanging from the ligature mark despite the criteria for separation in the literature.

Aim of work: To compare the relative importance of obliquity of ligature mark to its incompleteness in differentiation of hanging and strangulation.

Material and Methods

Autopsy reports of 352 cases arriving at the morgue in Cairo (Zeinhom) from the year 2000 till the year 2009 with reported ligature strangulation or hanging were studied for description of external ligature marks on the neck. Only cases with a clear distinction and diagnosis were included in the study.

Reports were also studied for the nature of the ligature when available and the type of death if there existed a clear diagnosis. Police reports were studied for those cases and circumstantial evidence was noted out when applicable.

Results were tabulated and a correlation was done between the parameters.

Table 1: Types of knots applied on victims in the study

<table>
<thead>
<tr>
<th>Mode</th>
<th>Noose with fixed knot</th>
<th>Noose with slipping knot</th>
<th>Loop without knot</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suicidal Hanging</td>
<td>29</td>
<td>79</td>
<td>109</td>
<td>217</td>
</tr>
<tr>
<td>Homicidal Hanging</td>
<td>0</td>
<td>12</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Ligature strangulation</td>
<td>28</td>
<td>0</td>
<td>92</td>
<td>120</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>91</td>
<td>203</td>
<td>351</td>
</tr>
</tbody>
</table>
oblique ligature marks whereas only 55.5% were reported to have incomplete marks (table 2).

**Table 2: Level of constricting force/ligature mark**

<table>
<thead>
<tr>
<th>Level</th>
<th>Suicidal Hanging</th>
<th>Homicidal Hanging</th>
<th>Ligature Strangulation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above the level of Thyroid</td>
<td>217</td>
<td>9</td>
<td>3</td>
<td>229</td>
</tr>
<tr>
<td>At level of Thyroid</td>
<td>0</td>
<td>5</td>
<td>34</td>
<td>39</td>
</tr>
<tr>
<td>Below the level of Thyroid</td>
<td>0</td>
<td>0</td>
<td>84</td>
<td>84</td>
</tr>
<tr>
<td>Total</td>
<td>217</td>
<td>14</td>
<td>121</td>
<td>352</td>
</tr>
</tbody>
</table>

Fig. 2: Percentage of cases where ligature mark was reported to be oblique

Strangulation victims were 14 males and 107 females. All cases in the study were reported to be homicidal. The ligature mark showed varied levels in the victims where the majority (70%) were below the thyroid cartilage, 28.3% at the level of the cartilage and only 2.5% above its level. When comparing obliquity of the mark to its incompleteness there was a minimum number of cases reported to have oblique marks (13.3%) and incomplete mark (10%) (table 1).

Victims of homicidal hanging were 2 males and 12 females showing ligature marks higher than the level of thyroid (9 cases) and at its level (5 cases). The sample taken showed 11 cases of incomplete hanging and only 3 cases of complete hanging. When comparing obliquity of the mark to its incompleteness it was evident that obliquity of the mark was more dominant (61.5%) than incompleteness (38.46%) (figure 2, 3).

**Table 3: Z test for comparison of the number of subjects diagnosed as suicidal hanging with a reported obliquity in the ligature mark and those with reported incomplete ligature mark.**

<table>
<thead>
<tr>
<th>Oblique ligature</th>
<th>Incomplete ligature</th>
<th>Z-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>189</td>
<td>120</td>
<td>7.209</td>
</tr>
</tbody>
</table>

The number of suicidal hanging cases reported to have had an oblique ligature mark and those reported to have had an incomplete imprint were compared using Z- test and there appeared to be a directional statistically significant difference between the two findings indicating a greater importance for the obliquity of the ligature in comparison to whether or not it was complete (table 3).

**Discussion**

As in many other previous work conducted\(^1\)\(^-\)\(^11\), data extracted within this study defines the ligature mark appearance in victims of Hanging and those of ligature strangulation. The level of the mark was identified to be higher in cases of suicidal hanging. The level in case of incomplete suspension has been demonstrated to vary above and below the thyroid cartilage and finally it has been demonstrated at a lower level in case of strangulation.

The number of strangulation victims is rather low in comparison to those of hanging and so external appearance of ligature marks of strangulation is rather hard to define in comparison to hanging. This comes as a challenge when the assailant uses a slipping knot. It is also a challenge when cases of strangulation leave the victim with an incomplete mark due to cloths, beard or hand for example between the rope and the skin thus resulting in an incomplete mark\(^12\). Discontinuity of the rope mark is thus not as definitive as it seems.

The rope mark tends to be tapering in the upward direction creating an obliquity in cases of hanging with complete suspension. This fact is also dared when the victim is one of incomplete suspension where the rope mark does not necessarily have to be tapering in the upward direction. It will rather depend on the mechanism used to suspend the victim and the suspension point.\(^13\)

This study has recognized that despite the fact that literature tends to define hanging and strangulation as two separate entities where differentiation could be done depending solely on the discontinuity and obliquity of the mark, yet almost 13% of cases of suicidal hanging failed to demonstrate discontinuity and others left rather horizontal ligature marks (10%). This fact has been verified by other studies\(^14\).

Studying the difference in presentation in cases of suicidal hanging demonstrated a significant difference between the number of cases presented with oblique ligature marks and those presented with incomplete marks. This fact could come in handy in cases where there is a dilemma in reaching a consensus.

**Conclusion**

There exists a difference in weight of the separate factors defining the ligature mark and differentiating it in cases of hanging from those of strangulation. It has been demonstrated that the obliquity of the ligature mark carries more weight in defining hanging than does the discontinuity of the mark. Since there exists variations from normal as demonstrated from previous studies this study had defined that relying on the presence of an oblique ligature mark is a more reliable finding than the presence of an incomplete one.
presence of an oblique ligature mark is a more reliable finding than the presence of an incomplete one.

Acknowledgement

The author would like to thank the colleagues at the morgue in Zeinhom for their help and for facilitating data collection.

References

Study of fatal blunt thoraco-abdominal injuries in Gulberga, Karnataka

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Abstract
In current scenario of alarmingly increasing cases of road traffic accidents study of fatal thoraco-abdominal (blunt) injuries may be no external injuries, internal organs may be damaged resulting in death due to presence of vital structures of respiration, circulation, digestion and spinal column. Totally 108 cases of fatal thoraco-abdominal injuries were studied. The most common age group affected was 21-30 years. Abrasion was most commonest external injury (74 cases).

Maximum number of victims had a combination of chest (50%) and abdominal injuries. There were injuries to the lungs in 57.1% cases. Injury to liver were seen in 62 cases (68.3%) in which 3 were contusion, 59 were laceration. 45.4% of victims of fatal thoraco-abdominal injury died within one hour after injury. Most of the victims of thoraco abdominal injuries died because of road traffic accidents (68.6%). Most common deaths in road traffic accidents were among the pedestrians (48.6%) The commonest cause of death was due to haemorrhage and shock (72.2%).

Keywords
Blunt force, thoraco-abdominal, trauma.

Introduction
Trauma is a leading cause of death and it may lead to short or long term disability. Blunt force to thorax and abdomen is frequently encountered cause of death due to the presence of vital structures of respiration, circulation, digestion and spinal column. Most closed thoracoabdominal trauma are caused by blunt force. Trauma can occur in road traffic accidents, falls, assault by blunt weapon. Fatal thoraco-abdominal injuries can be produced by blunt force, which include injury to lungs, pleura, injuries, cause or aetiology of injury and cause of death.

Methodology
Study of medico-legal autopsies for 2 years from 2005 to 2007 conducted by Department of Forensic Medicine, M.R. Medical College. Total number of cases studied were 108. Detailed information and data pertaining to cases were collected from following sources (1) Inquest Report (2) Brief History (3) Postmortem Report. (4) photograph from the scene of incident.

After receiving all the details, the PME was conducted. In hospital treated cases case-sheet summary was obtained to knew the details. All the external injuries were noted from head to toe.. All the three cavities – cranial, thoracic and abdomen were opened to study the injuries to the organs. Details regarding site, size, shape and age were studied and recorded in details. Findings tabulated in proforma. Photographs were taken, if necessary.

Observations and Discussion

Table 1: Age and Sex-wise Distribution of Thoraco-abdominal injuries

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 10</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>5.5</td>
</tr>
<tr>
<td>11 – 20</td>
<td>6</td>
<td>3</td>
<td>9</td>
<td>8.3</td>
</tr>
<tr>
<td>21 – 30</td>
<td>23</td>
<td>7</td>
<td>30</td>
<td>27.7</td>
</tr>
<tr>
<td>31 – 40</td>
<td>19</td>
<td>5</td>
<td>24</td>
<td>22.4</td>
</tr>
<tr>
<td>41 – 50</td>
<td>18</td>
<td>3</td>
<td>21</td>
<td>19.4</td>
</tr>
<tr>
<td>51 – 60</td>
<td>7</td>
<td>4</td>
<td>11</td>
<td>10.2</td>
</tr>
<tr>
<td>&gt;60</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>6.5</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
<td>25</td>
<td>108</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Age-wise analysis of victims of blunt chest injuries showed a maximum number of deaths in age group of 21-30 years (27.7%), 31-40 (22.4%) and 41-50 (19.4%) with minimum deaths in age group of 0-20 and 51-60 years. Depending upon sex, there was a male preponderance with males constituting 83 cases and females 25 cases. Similar findings have been reported by Agarwal et al.

Chandra et al. in their study found (46.1%) maximum deaths occurred in age group of 21-30 years due to thoraco-abdominal injuries. The findings of present study are in accordance with the above documented series.

Table 2: Distribution of Injuries

<table>
<thead>
<tr>
<th>Site of injury</th>
<th>No. of victims</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest</td>
<td>29</td>
<td>26.80</td>
</tr>
<tr>
<td>Abdomen only</td>
<td>15</td>
<td>14.00</td>
</tr>
<tr>
<td>Chest and abdomen</td>
<td>54</td>
<td>50.00</td>
</tr>
<tr>
<td>Abdomen and pelvis</td>
<td>2</td>
<td>1.80</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100.00</td>
</tr>
</tbody>
</table>

In the distribution of thoraco-abdominal injuries, it was observed that maximum number of victims i.e., 50% had a combination of chest and abdominal injuries, followed by chest
only (26.8%), abdomen only (14%), combine abdomen and pelvis (1.8%), chest, abdomen and pelvis (7.4%). Banerjee et al. (1997) in their study found majority of victims (29%) had involvement of both chest and abdomen, followed by (10.9%) victim has involvement of only abdomen and 7.3% victims had only chest involvement.

Injuries to the cardiovascular system consisted of laceration of pericardium in 4 cases (4.4%), rupture of aorta in 13 cases (14.3%), contusion of heart in 8 cases and laceration in 5 cases. Our observations are in correlation with the study of Banerjee et al. Injuries to bronchi were seen in 3 (3.3%) cases, consisting of contusion in 2 cases and 1 case of laceration. These were mainly seen in road traffic accidents. In this study, injuries to lungs were seen in 52 cases (57.1%) consisting of contusion in 19 cases and laceration in 33 cases. This is comparable to the series of Agarwal BBL who found the lungs to be the commonest organ to be injured (52.7%). In cardiovascular system, pericardium was lacerated in 4 cases (4.4%). The heart was injured in 13 cases (14.3%), associated with fracture of ribs and sternum. Similar findings were seen by Scorpio RJ et al who found cardiac injuries in 14.5% cases. In our study, aorta was ruptured in 13 cases (14.3%), the ascending aorta being the commonest part to be injured. This is comparable to the findings of Sevitt who found aortic rupture in 15% cases.

<table>
<thead>
<tr>
<th>Organ</th>
<th>Contusion</th>
<th>Laceration</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronchus</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Lungs</td>
<td>19</td>
<td>33</td>
<td>52</td>
</tr>
<tr>
<td>Aorta</td>
<td>—</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Heart</td>
<td>8</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Pericardium</td>
<td>—</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Injuries to the abdominal organs consisted of contusion of stomach in 3 cases (5.06%), in which 7 are contusion and 4 are lacerations. Stomach were involved in 4 cases (5.06%) in which 1 is contusion and 3 are laceration. Injury to liver occurred in 62 cases (68.3%) in which 3 were contusion, 59 were laceration. Spleen injuries consisted of 23 cases (22.7%) of which 1 was contusion, 22 are laceration. Pancreas was found injured in 2 cases (2.5%). Kidney was found to be injured in 25 cases (31.6%) of which 4 are contusion and 6 are laceration.

Liver is the most commonest solid organ to get injured. It was damaged in 62 cases (68.3%) and in rest it was intact. In 59 cases, there was laceration and 3 cases showed contusion. Superficial laceration was the most commonest. Next most common solid organ to get injured was spleen (22.7%). There were 22 cases of laceration and one case of contusion.

Fitzgerald JB in his analysis of 200 cases of non-penetrating injury concluded that liver was most commonly injured organ, spleen injury was second most common abdominal injury in the entire series. Guhuraj6 states that pancreas is injured when stomach is empty and rupture is usually vertical. Minor blunt injuries to pancreas can lead to recurrent episodes of chronic relapsing pancreatitis with calcification.

An analysis of overall causes of the blunt thoraco-abdominal injuries showed the most common mode of injury is road traffic accidents in 74 cases (68.6%) followed by railway accidents in 17 cases (15.7%), fall from height in 9 cases (8.3%) and 8 cases (7.4%) of assault.

<table>
<thead>
<tr>
<th>Mode</th>
<th>No. of Victims</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>58</td>
<td>74</td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>84</td>
<td>108</td>
</tr>
</tbody>
</table>

This may be due to the increase in population, rapid urbanization, increase in high speed transport vehicles, overcrowding on the footpaths and road, carelessness both by drivers and pedestrians, drunken driving, popularity of the
two wheelers especially among the college students and office goers is on the increase.

The low percentage of deaths to drivers or occupants of four wheelers indicates that the least dangerous place to be on the road is within a motor vehicle.

These findings are in accordance with the findings of Michael et al.8

Table 7: Different types of Road Users in Road Traffic Accident (n = 74)

<table>
<thead>
<tr>
<th>Road users</th>
<th>No. of Victims</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>Pedestrian</td>
<td>27</td>
<td>9</td>
<td>36</td>
</tr>
<tr>
<td>Motor cyclist</td>
<td>18</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>Bicycle riders</td>
<td>4</td>
<td>—</td>
<td>4</td>
</tr>
<tr>
<td>Car drivers</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Auto occupants</td>
<td>2</td>
<td>—</td>
<td>2</td>
</tr>
<tr>
<td>Car occupants</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Lorry occupants</td>
<td>3</td>
<td>—</td>
<td>3</td>
</tr>
<tr>
<td>Bullock cart drivers</td>
<td>1</td>
<td>—</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>15</td>
<td>74</td>
</tr>
</tbody>
</table>

In road traffic accident deaths numbering 74, there were more number of pedestrians i.e., 36 cases (48.6%). Motor cycle riders were second in number (29.7%). The least number of cases were seen in autorickshaw occupants, car occupants and bullock cart drivers.

Chandra2 in his study analyzed that pedestrians (50%) were the most common road users to be injured and next to that is the motor cyclist (18%).

Table 8: Cause of death (n=108)

<table>
<thead>
<tr>
<th>Cause</th>
<th>No. of victims</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemorrhage and shock</td>
<td>78</td>
<td>72.20</td>
</tr>
<tr>
<td>Intracranial hemorrhage and injury to brain and meninges</td>
<td>16</td>
<td>14.80</td>
</tr>
<tr>
<td>Septicemia</td>
<td>12</td>
<td>11.10</td>
</tr>
<tr>
<td>Uraemia</td>
<td>2</td>
<td>1.90</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Death was due to severe bleeding in 78 cases (72.2%) followed by intracranial hemorrhage and injury to brain and meninges in 16 cases (14.8%), septicemia in 12 cases (11.1%) and uraemia in 2 cases (1.9%).

However, the high percentage of death due to severe hemorrhage may be due to high percentage of rib fractures, lung injuries, aortic lacerations and also the associated injuries due to highly vascular abdominal organs and the long bone fractures. The above findings are similar to chandulal R.9

Summary and conclusion

Study of medico-legal autopsies for 2 years was conducted in Department Forensic Medicine and Toxicology, M.RMedical College, Gulbarga. The present study revealed the following:

1. Most commonly involved age group was 21-30 (27.7%). Next most common age group was 31-50 years (41.8%). The age group 0-20 and >60 constituted only a small percentage of 13.8% and 6.5% respectively.
2. The predominant sex to be involved in fatal thoraco-abdominal injuries were males (76.8%), females constituted 23.2%.
3. The distribution of injuries shows maximum number of victims had a combination of chest (50%) and abdominal injuries followed by chest only (26.8%), abdomen only (14%), combined abdomen and pelvis (1.8%), chest, abdomen and pelvis (7.4%).
4. There were injuries to the lungs in 57.1% cases with laceration being the serious injury in 33 cases. and bronchus in 3.3% cases. Injuries to the heart were seen in 14.3% cases, contusion being seen in 13 cases and laceration in 8 cases. Aortic rupture was seen in 13 cases (14.3%). Stomach were injured in 4 cases (5.06%) in which one is contusion and 3 are laceration. Intestine were involved in 11 cases (13.9%) in which 7 are contusion and 4 are laceration. Injury to liver were seen in 62 cases (68.3%) in which 3 were contusion, 59 were laceration Spleen injuries consisted of 23 cases (22.7%) of which 1 was contusion, 22 are laceration. Pancreas was found injured in 2 cases, kidney was found to be injured in 25 cases, of which 24 are contusion and one was laceration.
5. 45.4% of victims of fatal thoraco-abdominal injury died within one hour after injury. 19.5% of victims died in 1-6 hours, 6.5% of victims died in 12-24 hours.
6. Most common deaths in road traffic accidents were among the pedestrians (48.6%) and motor cycle riders fall in the second group. The least number of cases were seen in autorickshaw occupants, car occupant and bullock-cart drivers.
7. Death was due to severe bleeding in 78 cases (72.2%), followed by intracranial hemorrhage and injury to brain and meninges in 16 cases (14.8%), septicemia in 12 cases (11.1%) and uraemia in 2 cases (1.9%).

Recommendations

It was prominently pointed in the study that the road traffic accident was the commonest etiology of blunt thoraco-abdominal trauma. Vehicular accidents have assumed the proportion of an epidemic and are one of the important causes of mortality in all age groups and in all countries. Among all the etiological factors the commonest aspect was the majority of the victims died within one hour after sustaining injuries.

Considering the above points, the menace of blunt thoraco-abdominal trauma can be dealt in the following ways. Firstly prevention of accidents, secondly precautionary measures to prevent blunt thoraco-abdominal trauma and lastly the emergency trauma service should be given in case of a person who meets with an accident. Though it is a most difficult task to control human errors involved, sincere efforts made in this direction can definitely reduce the mortality and morbidity.

References

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Suicide by electrocution - A case report
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Abstract
Electrocution is a rare method of suicide. Sri Lanka has one of the highest rates of suicide in the world and ingesting liquid pesticides is the commonest method adopted. Historically, suicide by electrocution has been documented only once in Sri Lanka. This paper reports a rare autopsy case, a 40-year-old healthy farmer, who committed suicide using 230 Volts domestic electricity supply.

Key Words
Electrocution, suicide, domestic electricity.

Introduction
Deaths due to electrocution from the domestic current are commonly due to accidents (Fernando and Liyanage, 1990). Suicidal electrocutions are rare (Fernando and Liyanage, 1990; Lawrence et al., 1985; Marc et al., 2000). Even in developed countries like the United Kingdom (Gee, 1984) and in cities like Paris (Marc et al., 2000), electrocution is a relatively infrequent mode of suicide, which is surprising in view of the availability of means. In Sri Lanka, where the suicide rate is extremely high, ingestion of liquid pesticides is the commonest method used (Fernando, 2005) and historically, suicide by electrocution has been documented only once (Fernando and Liyanage, 1990). This communication reports a rare case of suicide by electrocution of a 40-year-old farmer.

Case Report
A 40-year-old identified male was found lying unresponsive on the ground, inside his vegetable plot, with a bare metallic wire encircling his right forearm. The other end of the wire was connected to an unauthorized electrified fence, which was in connection with the decedent’s domestic electricity supply. There was a switch connected to the fence of his vegetable plot. This was used to electrify the fence. As the switch was close by, he was physically able to reach it after encircling the wire around his forearm. The circuit was live when the body was recovered. The relatives were under the impression that the victim was accidentally electrocuted while erecting the electrified security fence around the vegetable plot.

At autopsy, the significant external finding was the metallic wire around the right forearm. The external injury observed is as follows.

1. An electric mark measuring 11 x 2.5 cm. The centre of the injury had a linear gutter like marking with raised edges. It was placed obliquely from the radial border of the right forearm to the ulnar border of the right wrist on the dorsolateral aspect of the distal 1/3 of the right forearm. The base and the edge of the injury were blackened due to charring. There was hyperaemia of the skin surrounding the injury. Macroscopically, blisters were not seen (Fig. 1).

There were no identifiable exit marks at the sites where the current passed to the earth. A suicide note was recovered from the pocket of his underwear, stating that he was committing suicide by electrocution. The wife of the deceased recognized the handwriting of the note as his and admitted that he was left-handed.

Internal findings at autopsy included multiple subepicardial petechial haemorrhages, congested lungs, liver, spleen and kidneys. There were no other significant macroscopic findings in other organs. Natural diseases were excluded.

Histology confirmed the gross findings. Microscopic examination of the electric marks revealed streaming of the epidermal nuclei, microscopic bullae in the epidermis and thermal coagulation artifact. Toxicological analysis was negative for drugs and alcohol. The cause of death was concluded as electrocution.

Interviews by police revealed that the deceased was in the habit of erecting unauthorized electrified fences using non-insulated wires to protect his cultivation from the wild animals. He was in a depressed mood before the incident, because of a dispute with a neighbour.

Discussion
Electrocution by low-voltage can result in death, with currents distributed in the home at 110 to 240 Volts (V) (Marc et al., 2000). Low voltage electrocution can cause death by three mechanisms. It can induce ventricular fibrillation, cause tetanic contraction, spasm of the diaphragm and intercostal muscles, leading to respiratory arrest, or cause paralysis of the respiratory centre of the central nervous system (Lawrence et al., 1985; Lee, 1965; Polson, 1965; Wright and Davis, 1980). In all three mechanisms, the exogenous current disrupts the endogenous electrical polarity of the victim’s cells and causes them to malfunction or cease functioning altogether, leading to hypoxia and death (Bligh-Glover et al., 2004).
In Sri Lanka, the most accessible source of electrical power is domestic current: this is 230 V, 30 Amperes (A), and 50 Hertz (Hz) alternating current. It is more powerful than any endogenous human bioelectric potential by a factor of 20,000. The current cycles from +230 V to –230 V every 20 microseconds. Alternative current (50 Hz) is a very efficient way to depolarize cells since every 20 microseconds the electron density changes from high to low (Marc et al., 2000).

In electrocution, electrical current flows from the energized side of a circuit to the body and then leaves the body at an exit point, usually to the earth or the neutral conductor of the electricity supply. Current flows best through the blood vessels, as blood is a salt solution, but current can also be conducted through the rest of the body because cells are bathed in tissue fluid, also a salt solution (Bligh-Glover et al., 2004).

In the present case, the injury on the right forearm indicates the point of entry of electric current while charring indicates the prolong contact with the wire. An exit wound was not present on the deceased and it is often not seen (Knight, 1996). The electric current is particularly dangerous when it uses one of the circuits involving the heart muscle (head to hand, hand to hand, hand to foot and head to foot) (Marc et al., 2000). Cardiac myocytes are particularly sensitive to 60 Hz current and current fluctuations at this frequency tend to induce ventricular fibrillation (Bligh-Glover et al., 2004). In this case, a plausible explanation would be that the current passed from right upper limb through the heart to the ground at the feet causing ventricular fibrillation and cardiac arrest. Ventricular fibrillation produces little or no cardiac output and therefore leads to systemic hypoxia and death within minutes (Bligh-Glover et al., 2004). Few positive autopsy findings seen in this case are consistent with ventricular fibrillation, which is the usual mode of death in electrocution (Knight, 1996).

A third party involvement was not identified in the history, scene examination or at autopsy. The uncomplicated history, the bare metallic wire encircling the full circumference of the right forearm, absence of violence and the presence of a suicidal note are in favour of suicide. The deceased, most probably, selected a rare method of committing suicide because of his familiarity with electricity.

Acknowledgement

I would like to thank Dr. Prabath Senasinghe for his kind assistance.

References

Fraser syndrome: A rare congenital anomaly
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Abstract
Fraser syndrome is a rare autosomal recessive congenital disorder. The diagnosis of this syndrome is made by clinical examination and perinatal autopsy. Cases are diagnosed on the basis of at least two major criteria and one minor criterion or at least four minor criteria. Here we report a case of Fraser syndrome in a male neonate and review the literature.

Key words
Fraser, autosomal recessive, cryptophthalmos, syndactyly.

Introduction
Fraser syndrome (also known as Meyer-Schwickerath’s syndrome, Fraser-Francois syndrome or Ullrich-Feichtiger syndrome) is an autosomal recessive congenital disorder. Francois observed the main features to be cryptophthalmos, anomalies of the hand, ears, nose, syndactyly and genital abnormalities. The diagnosis of this syndrome is made by clinical examination and perinatal autopsy. Cases are diagnosed on the basis of at least two major criteria and one minor criterion or at least four minor criteria. The four major criteria of this syndrome are cryptophthalmos, syndactyly, genital anomalies and an affected sibling and the eight minor criteria are alterations of nose, ears, larynx, oral clefts, umbilical hernia, renal agenesis (unilateral or bilateral), skeletal anomalies and mental retardation. The incidence of Fraser syndrome is 0.043 per 10,000 live births and 1.1 per 10,000 stillbirths, making it a rare syndrome.

Case Report
A 28 yr old primigravida with oligohydramnios, delivered a full term male baby by vaginal route normally. The newborn presented with unusually long forehead and died immediately after birth. A clinical autopsy was performed on the baby to know the cause of death.

Autopsy findings: The baby weighed 1 kg, crown rump length was 45 cm and head circumference was 25 cm. The craniofacial examination showed complete cryptophthalmos of the right eye with absence of eyelashes and the eyebrow (Figure 1). The left eye was normal. The ears were malformed and low set (figure 2). The nose was flat with wide nasal bridge. Additional abnormalities in the form of complete cutaneous syndactyly (figure 3, 4) of right hand and both feet were noticed. The external genitalia were malformed with microepis and cryptorchidism (figure 5). On internal examination both kidneys were found to be hypoplastic (figure 6) and no other organ systems revealed any anomalies.

Discussion
Fraser syndrome is an autosomal recessive inherited syndrome. The findings in this newborn are compatible with the diagnosis of Fraser syndrome according to the diagnostic criteria proposed by Thomas et al. The four major criteria are cryptophthalmos, syndactyly, genital anomalies and the minor criteria are congenital malformations of the ears, nose and bilateral renal hypoplasia.

The pathogenesis of Fraser syndrome is supposed to be related to a failure of the programmed cell necrosis or a defect in metabolism of retinoids. The developmental defects observed in Fraser syndrome and the associated mouse models suggest that these defects arise from disruption of the epithelial-mesenchymal interaction required for the normal morphogenetic process.

Fraser syndrome can be easily distinguished from other syndromes with facial malformations, such as frontonasal dysplasia (median cleft face syndrome) by concurrent occurrence of acrofacial and urogenital malformations and absence of features like hypertelorism and epibulbar dermoid. Consanguinity is reported in 15-24% of cases and the pattern of inheritance is autosomal recessive.

Antenatal ultrasound finding as early as 18 weeks of gestation has been suggested to help in making the diagnosis of Fraser syndrome for possible termination of pregnancy, particularly in families with affected siblings. Schauer et al have found that antenatal renal agenesis, orbital abnormalities and increased thoracic volume are characteristic manifestations of
Fraser syndrome. Fraser Syndrome should be seriously considered if the antenatal ultrasound shows oligohydramnios sequence with contrastingly voluminous, hyperechogenic lungs. Their explanation for the contradiction between oligohydramnios and voluminous hyperechogenic lungs in the presence of renal agenesis was that it was due to overdistended lungs, and the occurrence of non immune hydrops foetalis secondary to laryngeal stenosis, both of which are incompatible with life. A high serum alpha fetoprotein level may rise the suspicion of Fraser syndrome. Prevention by genetic counseling would be the best approach, the recurrence rate among siblings being 25%.

References

Abstract

Aims and Objectives
To study the frequency of various lymph node lesions in all age groups and their cytohistological correlation.
To compare the frequency of involvement of different lymph node sites.

Material and Methods

The material was obtained from 530 outdoor and indoor patients of all age groups attending the cytology laboratory of Saraswati Medical College, Hapur and Santosh Medical College, Ghaziabad from Jan 2010 to June 2010.
Peripheral lymph nodes were aspirated using 22G needle attached to 20 ml disposable syringe. The aspirated material was expressed onto slides and smears prepared, air dried and stained with May Grunwald Giemsa (MGG) stain. Wherever needed, alcohol fixed smears were prepared and stained by Papani Colaou (PAP) method. Also, Ziehl Neelsen staining for performed for demonstration of acid fast bacilli (AFB).

All the cases of malignancy were confirmed by Histopathological examination.

Observations

The most frequent diagnosis on FNA was tuberculosis in all groups (52.2%), followed by reactive hyperplasia (38.9%). Cervical lymph nodes were involved most frequently in all lymphoid lesions followed by inguinal lymph nodes. Blood mixed aspirates were most common followed by caseous material and then pus.

Conclusions

FNAC is a useful, minimally invasive first line investigation to evaluate lymphadenopathy. An early diagnosis on FNA allows clinicians to plan and institute appropriate treatment in most cases.

Key words
Lymph node, Fine needle aspiration cytology, lymphadenitis.

Introduction

The present study defines the spectrum of peripheral lymphadenopathy in Saraswati Medical College and Santosh Medical College over a period of six months. Fine needle aspiration cytology (FNAC) of enlarged peripheral lymph nodes was done in all the cases and at all ages to see the pattern and frequency of involvement of various lymph node sites at different ages and by different lesions. Wherever needed, histological examination is applied for, especially in cases of metastasis and in a few cases of reactive lymphadenitis. FNAC is probably the simplest and most effective method of establishing the diagnosis of various lymph node lesions. It acts as a safe and inexpensive method to reach to the diagnosis of lymphadenitis (chronic and acute), tubercular lymphadenitis, reactive lymph nodes, lymphomas and metastatic carcinoma.

Lymph node aspirates directly lead to the diagnosis of the cause of lymphadenopathy or pave the way for the need of histopathological examination which is conclusive in almost every case. Tuberculosis is the commonest cause of lymphadenopathy in developing countries like India and should be considered in every case of granulomatous lymphadenopathy unless proved otherwise, whereas evaluation of granulomas is a complex problem in developed countries.

FNAC is now as commonly being applied to paediatric lymphoid lesions as in adults as it permits rapid diagnosis with minimal intervention.
Observations

Out of a total of 530 aspirations, 26 cases were inadequate or contained only blood, thereby being unsuitable for diagnosis.

Table 2: The male to female ratio at different age groups.

<table>
<thead>
<tr>
<th>Age</th>
<th>Males</th>
<th>Females</th>
<th>M:F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 10 yrs</td>
<td>83</td>
<td>25</td>
<td>3.3:1</td>
</tr>
<tr>
<td>10-20 yrs</td>
<td>59</td>
<td>49</td>
<td>1.2:1</td>
</tr>
<tr>
<td>20–30 yrs</td>
<td>68</td>
<td>56</td>
<td>1.2:1</td>
</tr>
<tr>
<td>30–40 yrs</td>
<td>44</td>
<td>24</td>
<td>1.8:1</td>
</tr>
<tr>
<td>40–50 yrs</td>
<td>31</td>
<td>25</td>
<td>1.2:1</td>
</tr>
<tr>
<td>50–60 yrs</td>
<td>16</td>
<td>6</td>
<td>2.7:1</td>
</tr>
<tr>
<td>60&amp; above</td>
<td>26</td>
<td>18</td>
<td>1.4:1</td>
</tr>
<tr>
<td>Total</td>
<td>327</td>
<td>203</td>
<td>1.6:1</td>
</tr>
</tbody>
</table>

There was a clear male preponderance at all ages with the male to female ratio being around 1.2:1 to 3.3:1.

Table 3: Frequency of lesions at different lymph node sites - age wise distribution

<table>
<thead>
<tr>
<th>Age</th>
<th>Cervical</th>
<th>Axillary</th>
<th>Inguinal</th>
<th>Submandibular</th>
<th>Submental</th>
<th>Postauricular</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 10 yrs</td>
<td>91</td>
<td>-</td>
<td>6</td>
<td>9</td>
<td>2</td>
<td>-</td>
<td>108</td>
</tr>
<tr>
<td>10 – 20 yrs</td>
<td>86</td>
<td>8</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>108</td>
</tr>
<tr>
<td>20 – 30 yrs</td>
<td>98</td>
<td>8</td>
<td>12</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>124</td>
</tr>
<tr>
<td>30 – 40 yrs</td>
<td>49</td>
<td>4</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>68</td>
</tr>
<tr>
<td>40 – 50 yrs</td>
<td>43</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>56</td>
</tr>
<tr>
<td>50 – 60 yrs</td>
<td>18</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>22</td>
</tr>
<tr>
<td>60yrs above</td>
<td>40</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>44</td>
</tr>
<tr>
<td>Total</td>
<td>425 (80.2%)</td>
<td>27(5.1%)</td>
<td>52(9.8%)</td>
<td>15 (2.8%)</td>
<td>7(1.3%)</td>
<td>4(0.8%)</td>
<td>530</td>
</tr>
</tbody>
</table>

Table 4: Lymph node groups involved in various types of Lymphadenopathy.

<table>
<thead>
<tr>
<th>Site</th>
<th>Tubercular Lymphadenitis</th>
<th>Reactive hyperplasia</th>
<th>Acute suppurative lymphadenitis</th>
<th>Chronic lymphadenitis</th>
<th>Lymphoma</th>
<th>Metastatic Carcinoma</th>
<th>Inadequate</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical group</td>
<td>211(80.2%)</td>
<td>169(66.2%)</td>
<td>7 (53.8%)</td>
<td>11(68.7%)</td>
<td>4 (57.1%)</td>
<td>7 (77.8%)</td>
<td>16(61.5%)</td>
<td>425</td>
</tr>
<tr>
<td>Axillary group</td>
<td>13(4.9%)</td>
<td>5(2.6%)</td>
<td>2(15.4%)</td>
<td>2(12.5%)</td>
<td>2 (28.6%)</td>
<td>-</td>
<td>3(11.5%)</td>
<td>27</td>
</tr>
<tr>
<td>Inguinal group</td>
<td>32(12.2%)</td>
<td>8(4.1%)</td>
<td>2(15.4%)</td>
<td>2(12.5%)</td>
<td>1 (14.3%)</td>
<td>2(22.2%)</td>
<td>5(19.2%)</td>
<td>52</td>
</tr>
<tr>
<td>Others (submental, submandibular and postauricular)</td>
<td>7(2.7%)</td>
<td>14(7.1%)</td>
<td>2(15.4%)</td>
<td>1(6.3%)</td>
<td>-</td>
<td>-</td>
<td>2(7.8%)</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>263</td>
<td>196</td>
<td>13</td>
<td>16</td>
<td>7</td>
<td>9</td>
<td>26</td>
<td>530</td>
</tr>
</tbody>
</table>

Observations

The distribution of lesions was such that 238 aspirates were taken from the left side and 223 from the right side. In 69 cases bilateral lymph nodes were seen.

Cervical lymph nodes were found to be most frequently involved at all ages followed by inguinal nodes. The other lymph node sites seen were axillary, submandibular, submental and postauricular. More than 80% cases showed enlargement of cervical lymph nodes followed by inguinal lymph nodes at 9.8%. It has been seen that the cervical lymph nodes were involved most often in all types of lymphadenopathy (Table 4).

Gross examination of aspirates showed highest frequency of blood mixed aspirates (55.2%) followed by caseous (35%) and pus (9.8%) (Table 5).

All the caseous and purulent aspirates were subjected to Ziehl Neelsen staining for the presence of acid fast bacilli. In case of blood mixed aspirates, only those showing granulomas were examined for AFB.

The most common lesion encountered at all ages except in the first decade was found to be granulomatous lymphadenitis showing an overall frequency of 52.2%, followed
by reactive lymphadenitis (38.9%). Aspirates from the lymph nodes of patients in the age group 0 to 10 years showed reactive lymphadenitis as the commonest lesion.

The other lesions encountered were acute suppurative lymphadenitis (2.6%), chronic lymphadenitis (3.2%), lymphomas (1.4%) and metastasis (1.8%). Chronic lymphadenitis was seen only in patients less than 30 years of age while metastatic deposits were seen after 40 years. (Table 6).

The cases showing purulent aspirates but negative for AFB were given the diagnosis of acute suppurative lymphadenitis. Few aspirates showing chronic inflammatory cells but negative for AFB were diagnosed as chronic lymphadenitis. 72.2% of cases showing granulomas or non granulomatous necrotic and purulent aspirates were positive for acid fast bacilli. The maximum AFB positivity was seen in fourth decade (88.2%).

In cases of Reactive hyperplasia, cellular smears comprising predominantly of small lymphoid cells along with fair no. of large lymphoid cells (predominantly centroblasts) and some scattered tangible body macrophages were obtained.

Smears of Hodgkin’s lymphoma (two in number) revealed moderately cellular smears with a predominance of lymphocytes, admixed with some neutrophils and eosinophils. Granulomas were observed in one case. The correct diagnosis was based on characteristic Reed Sternberg cells.

Non Hodgkin’s lymphoma cases were five in number – two large cell lymphomas, two small cell lymphomas and one anaplastic lymphoma.

### Discussion

A total of 530 cases of any age group with peripheral lymphadenopathy were subjected to FNAC to study the spectrum of the lymph node lesions as well as to compare the frequency of involvement of various lymph node sites. The adequacy of aspirates was found to be 95%. Inadequate smears resulted due to either lymph nodes being too small in size or aspirates comprising of only blood. Some children were uncooperative leading to haemorrhagic smears.

The frequency of involvement of cervical lymph nodes was found to be 80.2% followed by inguinal lymph nodes at 9.8%. This is because cervical lymph nodes are most commonly involved during the course of tuberculosis as well as tonsillitis, pharyngitis and toothaches which are very common in Indian scenario. The other studies have shown the second commonest site to be axillary group of nodes. This might be because of the fact that our study shows a clear male preponderance and the axillary lymph nodes tend to get more involved in females.

The pattern of lesions (non-neoplastic lesions consisted of tuberculosis, reactive hyperplasia, and pyogenic lymphadenitis and neoplastic lesions included metastatic carcinoma and malignant lymphoma) seen in our study more

### Table 5: Gross examination of lymph node aspirates

<table>
<thead>
<tr>
<th>Lesions</th>
<th>Caseous</th>
<th>Pus</th>
<th>Blood mixed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of cases</td>
<td>186</td>
<td>52</td>
<td>292</td>
<td>530</td>
</tr>
<tr>
<td>%</td>
<td>35%</td>
<td>9.8%</td>
<td>55.2%</td>
<td></td>
</tr>
</tbody>
</table>

### Table 6: Frequency of lesions - age wise distribution

<table>
<thead>
<tr>
<th>Lesions</th>
<th>0-10 yrs</th>
<th>10-20 yrs</th>
<th>20-30 yrs</th>
<th>30-40 yrs</th>
<th>40-50 yrs</th>
<th>50-60 yrs</th>
<th>60yrs above</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granulomatous lymphadenitis</td>
<td>41(36.3%)</td>
<td>36 (60%)</td>
<td>53 (47.3%)</td>
<td>67 (25.5%)</td>
<td>34 (64.2%)</td>
<td>10 (45.6%)</td>
<td>22 (50%)</td>
<td>263 (52.2%)</td>
</tr>
<tr>
<td>AFB positive smears without granulomas</td>
<td>36 (60%)</td>
<td>45 (40.2%)</td>
<td>27 (13.6%)</td>
<td>17 (32%)</td>
<td>8 (36.4%)</td>
<td>17 (38.6%)</td>
<td>1196 (38.9%)</td>
<td></td>
</tr>
<tr>
<td>Reactive Lymph node</td>
<td>61 (54%)</td>
<td>21 (35%)</td>
<td>45 (40.2%)</td>
<td>27 (13.6%)</td>
<td>17 (32%)</td>
<td>8 (36.4%)</td>
<td>17 (38.6%)</td>
<td>1196 (38.9%)</td>
</tr>
<tr>
<td>Acute suppurative lymphadenitis</td>
<td>5 (4.4%)</td>
<td>-</td>
<td>2 (1.8%)</td>
<td>4 (30%)</td>
<td>-</td>
<td>2 (9%)</td>
<td>-</td>
<td>13 (2.6%)</td>
</tr>
<tr>
<td>Chronic lymphadenitis</td>
<td>5 (4.4%)</td>
<td>2 (3.3%)</td>
<td>9 (8%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16 (3.1%)</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>1 (0.9%)</td>
<td>4 (1.7%)</td>
<td>2 (2.7%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7 (1.4%)</td>
</tr>
<tr>
<td>Metastasis</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2 (3.8%)</td>
<td>2 (9%)</td>
<td>5 (11.4%)</td>
<td>9 (1.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>113 (22.8%)</td>
<td>60 (12%)</td>
<td>112 (22.2%)</td>
<td>98 (19.4%)</td>
<td>53 (10.5%)</td>
<td>22 (4.4%)</td>
<td>44 (8.7%)</td>
<td>504</td>
</tr>
</tbody>
</table>
or less is same as reported in other studies from India and other developing countries. Tuberculous lymphadenitis proved to be the most common diagnosis in our study (52.2%). Tuberculous lymphadenitis is one of the most common type of lymphadenopathy encountered in clinical practice in India; whereas it is in sharp contrast to very low frequency of 1.6% in western studies. In our study it was seen most frequently in fourth decade of life (64.3%) with male preponderance at all ages. Khajuria et al. reported the highest incidence in second and third decade of life (58.9%) with female preponderance and decreasing incidence with age.

Reactive hyperplasia constituted the second commonest lesion (38.9%). The highest incidence of reactive hyperplasia was seen in first decade of life (55.7%) with a male preponderance. These findings are in agreement with experience of Gupta et al., Lochan et al. and Khajuria et al. where they have reported the highest incidence in the first two decades of life. This is probably because of the fact that children are more prone to throat infections, toothaches, tonsillitis and skin infection. Also, the lymphoid tissue reacts briskly and for a longer period in children.

Acute Suppurative lymphadenitis was seen in 13 cases with 5 cases(38.5%) being in the first decade.

Chronic nonspecific lymphadenitis observed in 16 cases was seen to be commonest in third decade. These cases showed no granulomas, absence of AFB and predominance of chronic inflammatory cells (lymphocytes and plasma cells).

Metastatic malignancy was diagnosed in 9 patients with 5 squamous cell carcinoma, 3 adenocarcinoma and 1 small cell carcinoma. Out of these only one case of squamous carcinoma resided in inguinal lymph nodes.

Two cases of Hodgkin’s and five of Non Hodgkin’s lymphoma ( 2 large cell lymphoma, two small cell lymphoma and one anaplastic lymphoma) were encountered, all below 30 years of age.

All the cases of carcinomas and lymphomas were confirmed by histopathological examination, thereby proving the fine needle aspiration to be a fairly conclusive technique to be used in malignant lymphoid lesions also.

FNAC is useful in screening, staging and in recognizing residual malignant disease as well as recurrences. We thereby avoid the invasive and operative investigations, making the plight of the patient a little lesser.

References
DNA extraction from heat-treated dental pulp using agarose gel electrophoresis

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Abstract

DNA is an important evidentiary tool for victim identification and verification in forensic science. The role of forensic odontologist is becoming increasingly important for the same purpose as the rate of mass disaster situations and terror strikes have become a day-to-day reality.

Aim

This study paper deals with demonstration of viability of DNA harvested from teeth subjected to increasingly elevated temperatures.

Methodology

DNA isolation from intact tooth specimens subjected to elevated heat-treatment was done using agarose gel electrophoresis technique. DNA bands were visualized under UV light.

Results

The presence of viable DNA was demonstrable from all the specimens.

Conclusion

Obtainment of identifiable DNA is a strong possibility in teeth that have been subjected to increasingly higher temperatures, therefore, increasing the scope of a single tooth specimen as a valuable source for DNA.

Key words

DNA, agarose gel electrophoresis, forensic odontologist, teeth. DNA extraction from heat-treated dental pulp using agarose gel electrophoresis.

Introduction

Forensic identification by means of DNA is a foolproof method of victim identification. Teeth act as valuable sources for obtaining samples has found application in mass disasters and most recently, terror strikes. This study employed agarose gel electrophoresis method to extract DNA from extirpated pulp tissue samples obtained from teeth samples treated at varying temperatures.

Materials and Method

The samples for isolation of genomic DNA were obtained from intact molar tooth specimens. Molar tooth specimens were treated at variable temperatures i.e., 50°C, 100°C, 200°C and 300°C each for one hour duration. Followed by which, DNA was extirpated using conventional endodontic approach. The extirpated DNA (pulp) samples were stored in Eppendorff tubes in normal saline at 4°C till further processing.

The standardized procedure followed is as under

1 ml of sterile deionized water was added to the sample and centrifuged three times at maximum speed for five minutes. Supernatant was discarded and 450 μl of extraction buffer (10 nM Tris-HCl, 100 mM disodium EDTA, 10 nM NaCl, 2% SDS) was added and mixed thoroughly. 30 μl of proteinase K was added and samples were incubated for 18 hours at 56°C. 100% cold ethanol in ratio of 2:1(sample: ethanol) was added and left overnight for DNA precipitation. The supernatant was discarded and ethidium bromide (10 mg/ml) was added. The sample was loaded on agarose gel and run for two hours at 100V, followed by visualization under UV light.

Results

Agarose gel electrophoresis revealed visible DNA bands under UV light illumination in all pulp samples treated at progressively elevated temperatures. Thereby, proving that DNA can be isolated from pulp tissue obtained from elevated temperature resources.

Discussion

DNA isolation is a prime tool acting as an evidentiary material in forensic dentistry. Dental pulp is a soft connective tissue enclosed within the safe and protective environs of surrounding enamel and dentin. Identification of victims of fire accidents, automobile accidents and mass disasters is at times totally dependent upon isolation of DNA which most of the times, is available from intact tooth specimens.

All the samples used in this study had been stored at 4°C for variable periods of time ranging from a fortnight to 4 months duration. This study made use of agarose gel electrophoresis for visualization of DNA from pulp extirpated from tooth samples treated at progressively elevated temperatures i.e., 50°C, 100°C, 200°C and 300°C for equal time periods. DNA was extracted from samples using ethanolic precipitation and detected using agarose gel electrophoresis technique from all the samples. Therefore, it can be proved from the study observations that DNA isolation and extraction from dental pulp in samples exposed to elevated temperatures is a possibility by employing a basic laboratory procedure such as the one employed in this protocol.

Conclusion

Demonstration of DNA from intact tooth samples that have been exposed to elevated environmental conditions is suggestive of the viable nature of tooth as a forensic tool for confirming victim identification.

References

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Reliability of criteria used for sexing human sacrum

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Abstract

This study was undertaken to know the sexual differences in an adult (north Karnataka) human sacrum & thus identify a male from a female sacrum using various indices. 254 dried completely ossified grossly normal human adult sacrum of both sex (190 male & 64 female) where taken from anatomy department of Mahadevappa Rampure Medical College Gulbarga. In the present study the sacral index, curvature index, carporobasal index, alar index showed statistical difference between male & female except the index of body of S1. Identification point & demarking point helped in sexing the sacrum with certainty. The most useful index for sex determination of sacrum in this study was sacral index.

Key Words
Sacrum, sacral index, curvature index, carporobasal index, S1 index, alar index.

Introduction

The bones of the body are the last to perish after death, next to the enamel of teeth. Hence, in establishing the personal identity with respect to sex, age & stature, medico legal experts, anatomist & anthropologist use the skeletal materials for giving their opinion. The exact establishment of identity of sex depends on the number of bones sent for examination. It was observed by Taylor ¹ in his book of medical jurisprudence that

- Skull +femur =97.35%
- Coccyx +sacrum =97.18%
- Pelvis =95%
- Skull alone =91.38%
- Femur =39.84%
- Atlas vertebra = 31.18%

Krogman² made an estimate to decrease the above figures by 5-10%. Taylor¹ & krogman² thus showed the statistical analysis, while the Stanfield’s³ postulation of evolutionary biology says that the genotypic variance is inversely proportional to the intensity of stabilizing the selection. This will explain the difference in the morphology of adult human males & females. Morphological features over the bones depend on the nutritional, geographic & occupational factors. Till now various workers have quoted that skull & pelvis are of much help in determining the sex of the skeletal material. How ever it is observed that no much work is done over the bone “sacrum” Hence, the present work is an attempt to establish some parameters which will be of great help in sex identification, both in anthropometric & medico legal study, of a defined area over a period of time.

Material & Methods

The study was conducted in the department of Anatomy Mahadevappa Rampure Medical College, Gulbarga (North Karnataka). 254 sacra of both sexes (190 male & 64 female) were used in this work.

All the sacra used for the study were completely ossified & had no deformity. From each sacrum following metrical data is recorded as in the manner described below:
Sacral ventral straight length , mid ventral curved length, width of S1, Anteroposterior diameter of S1, transverse diameter of S1 & length of ala. All these parameters are measured with

Fig. 1: AB as Sacral Ventral straight length & CD as Maximum sacral width

Fig. 2: ab as Sacral Midventral curved length
All the indices are calculated using these formulae.

1. Sacral index = \( \frac{\text{Sacral width (width of S1)}}{\text{Sacral ventral straight length}} \) X 100

2. Curvature index = \( \frac{\text{Sacral ventral straight length}}{\text{Mid ventral curved length of sacrum}} \) X 100

3. Index of body of first sacral vertebra (S1) = \( \frac{\text{Anteroposterior diameter of body of S1}}{\text{Transverse diameter of body of S1}} \) X 100

4. Carporobasal index = \( \frac{\text{Transverse diameter of body of S1}}{\text{Sacral width (S1)}} \) X 100

5. Alar index = \( \frac{\text{Length of Ala}}{\text{Transverse diameter of body of S1}} \) X 100

6. Sum of all the values

1. Mean (\( \bar{X} \)) = \( \frac{\text{Sum of all the values}}{\text{No. of values}} \)

2. \( \text{SD} = \sqrt{\frac{\sum (X - \bar{X})^2}{(n - 1)}} \)

3. Range = Mean ± 3 SD

**Observations**

From the obtained values, demarking points were calculated on the lines of Jit & Singh\(^4\) & the percentage of the bones, thus identified were found out in relation to each measurement & index.

Thus, the demarking points for sacral index in males is <89.03 & of females is >107.93. This would cover 99.75% of the samples & help in fixing the sex of an unknown sacrum with reasonable accuracy.

Similarly all the indices were analyzed to arrive at the demarking points, & percentages of identified bones were recorded. Identification point is a limiting point of actual range of every measurable parameter in male & female.

The recordings of Range, Mean, Standard deviation (S.D) & Identified bones (I.B) of various indices in both the sexes are shown in table 1 & 2

The recording of Demarking points of various indices are shown in table 3

**Discussion**

Taking into account, the various indices of the sacrum, the merits & demerits of each measurement such as mean, it’s definitive value for male & female, statistical significance were compared with other worker. Accordingly, in sexual dimorphism of human bones, Davivong’s\(^5\) has stated that as a general rule, the male bones are more massive & heavier than female bone. This rule also governs the size & articular surfaces as well. In his article on Australian aboriginal pelvis, has stated “sex determination by sacrum alone is never satisfactory, overlap of the male & female ranges is very extensive in every measurement of the bone.

Flanders\(^6\) also suggests that larger sample size is required in multivariate techniques & this method is more useful in sexing the long bones. But similar problem of overlap in male & female ranges in various parameters was awfully noticed. Similar difficulties were observed in the work of Hardlicka\(^7\) & Raju et al\(^8\) The reason for the overlap could be due to:

1. Considerable frequency of hypo masculinity in male bones or hyper feminity in female bones.

2. The above factor may be related to genetic, nutritional, socioeconomic & physical stress in the individual. The degree of overlap can however be reduced if the range is derived on the basis of mean ± 3 SD which gives 99.75% confidence limit thereby ensuring the statistical validity. Thus if genetic & geographic factors are important factors, then we can safely presume that the standards laid down for a defined area after extensive & co-related studies will remain constant for a long period of time. However, if predominant influences are observed to be the plastic ones (nutritional, life style & physical stress), it is hypothesized that the anthropometric standards will have to be evaluated from time to time in the perspective of such influences for their validity.

In discussion of every parameter an attempt has been
made in the present work to compare with other’s study.
Table 4 shows comparison of various indices of our study with others study.

1. For 190 male & 64 female sacra studied, the mean value for sacral index in male (190) is 91.31 & that for females (64) is 109.4. Mean value of female is significantly higher than male. Difference between male & female mean is statistically highly significant.


In the present study, the mean value for sacral index are lower both in male & female than the mean values of Davivong,s5 (1963). Charnalia  (1987) & Flander6 (1978). (For whites)

2. The important observation noted from this is that almost all Indian values have standard frequency distribution lower than foreign values comparable to each other. This is applicable for the mean values in male as well as in female.

3. Mean value for Curvature index in males is 99.42 & that of female is 95.08. The study show statistically significant sex difference except Flander6 (1978)(for white). It is comparable with the findings of Raju et al (1980) 8 & Davivong5 (1983).

3. Mean value for Index of body of first sacral vertebra (S1) for male is 67.55 & that of female is 67.89. There is

Table 1: Shows the measurements of various parameters of female sacrum.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Sacral Index</th>
<th>Curvature Index</th>
<th>Index of Body of S1</th>
<th>Corporobasal Index</th>
<th>Alar Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>90.9-128.57</td>
<td>83.67-104</td>
<td>57.77-78.94</td>
<td>31.66-45.00</td>
<td>61.11-108.33</td>
</tr>
<tr>
<td>Mean</td>
<td>109.4</td>
<td>95.08</td>
<td>67.89</td>
<td>36.64</td>
<td>87.69</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>6.79</td>
<td>4.65</td>
<td>5.43</td>
<td>2.83</td>
<td>10.41</td>
</tr>
<tr>
<td>Identification Point</td>
<td>&gt;103.03</td>
<td>&lt;87.69</td>
<td>&lt;93.33</td>
<td>&lt;36.36</td>
<td>&gt;87.5</td>
</tr>
<tr>
<td>Statistical Significance</td>
<td>P&lt;0.001 Significant</td>
<td>P&lt;0.001 Significant</td>
<td>Non - Significant</td>
<td>P&lt;0.001 Significant</td>
<td>P&lt;0.001 Significant</td>
</tr>
</tbody>
</table>

Table 2: Shows the measurements of various parameters of male sacrum.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Sacral Index</th>
<th>Curvature Index</th>
<th>Index of Body of S1</th>
<th>Corporobasal Index</th>
<th>Alar Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>77.77-103.03</td>
<td>87.69- 110.00</td>
<td>50.00-93.33</td>
<td>36.36-59.04</td>
<td>34.16-87.05</td>
</tr>
<tr>
<td>Mean</td>
<td>91.31</td>
<td>99.42</td>
<td>67.55</td>
<td>43.76</td>
<td>66.13</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>5.54</td>
<td>3.77</td>
<td>8.51</td>
<td>5.45</td>
<td>14.29</td>
</tr>
<tr>
<td>Identification point</td>
<td>&lt;90.9</td>
<td>&gt;104</td>
<td>&gt;57.77</td>
<td>&gt;45.0</td>
<td>&lt;61.11</td>
</tr>
<tr>
<td>Statistical significance</td>
<td>P&lt;0.001 Significant</td>
<td>P&lt;0.001 Significant</td>
<td>Not - Significant</td>
<td>P&lt;0.001 Significant</td>
<td>P&lt;0.001 Significant</td>
</tr>
</tbody>
</table>

Table 3: Shows demarking points for various indices in both sexes.

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Index</th>
<th>Sex</th>
<th>Mean ± Standard Deviation</th>
<th>Calculated Range</th>
<th>Demarking Point</th>
<th>Percentage Beyond Demarking Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sacral Index</td>
<td>Male</td>
<td>91.31 ± 5.54</td>
<td>&lt;89.03</td>
<td>74.69-107.93</td>
<td>32.34%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>109.4 ± 6.79</td>
<td>&gt;109.33</td>
<td>89.03-129.77</td>
<td>54.10%</td>
</tr>
<tr>
<td>2</td>
<td>Curvature index</td>
<td>Male</td>
<td>99.42 ± 3.77</td>
<td>&gt;109.03</td>
<td>88.11-110.73</td>
<td>5.88%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>95.08 ± 4.65</td>
<td>&lt;88.11</td>
<td>81.13-109.03</td>
<td>14.00%</td>
</tr>
<tr>
<td>3</td>
<td>Index of body of S1</td>
<td>Male</td>
<td>67.55 ± 8.51</td>
<td>&lt;51.6</td>
<td>42.02-93.08</td>
<td>1.47%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>67.89 ± 5.43</td>
<td>&gt;51.6</td>
<td>51.60-84.18</td>
<td>NIL</td>
</tr>
<tr>
<td>4</td>
<td>Corporobasal index</td>
<td>Male</td>
<td>43.76 ± 5.45</td>
<td>&gt;45.13</td>
<td>27.41-60.11</td>
<td>30.87%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>36.64 ± 2.83</td>
<td>&lt;27.41</td>
<td>28.15-45.13</td>
<td>NIL</td>
</tr>
<tr>
<td>5</td>
<td>Alar index</td>
<td>Male</td>
<td>66.13 ± 14.29</td>
<td>&lt;56.46</td>
<td>23.26-109.0</td>
<td>33.81%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>87.69 ± 10.41</td>
<td>&gt;109.0</td>
<td>56.46-118.92</td>
<td>NIL</td>
</tr>
</tbody>
</table>

no much difference observed between mean values of male & female. The mean value for female is comparable to some extent with the findings of Raju et al. (1980).

4. Mean value for carporobasal index in males is 43.78 & that of female is 36.64. The present study shows statistically significant sex difference. It is comparable with the findings of Davivong (1983). While the mean value for females in the present study is comparable with Flander (1978) for white.

5. Mean value for Alar index is 66.13 & that of female is 87.69. The present study shows statistically significant sex difference. It is comparable with the findings of Raju et al. (1980). It is also one of the important index for sexing the sacrum.

**Conclusion**

After a detailed study of 254 sacra (190 male & 64 female) & comparing with other workers it can be concluded that: identification point & demarking point help in sexing the sacrum with certainty. Of all the indices studied the most useful index for sex determination of sacrum is sacral index. Sex overlapping seen in every parameter is overcome by using the formula of mean + 3 S.D which will certainly provide a broader range. Continuance of such studies in a defined area over a period of time will definitely help in establishing the anthropometric standards. Such studies will also be useful to observe the changing trends if any, in the metric measurements which may be influenced by the environmental socioeconomic factors, physical stress & genetic factors.

**References**


Sildenafil detection in coffee powder using Bromocresol green (BCG) as indicator by visible and ultra-violet spectroscopy
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Chemistry, Department, Faculty of Science, Universiti Teknologi Malaysia 81310, Skudai, Johor, Malaysia

Abstract
Sildenafil Citrate (SC) an active ingredient in Viagra and has become one of the most commonly prescribed pharmaceuticals drugs to cure sexual deficiency. Sildenafil is prohibited but still being sold ‘over the counter’ it prescribed SC is readily available in the ‘black market’ in the formed either doped or as pills to help potency. Most chromatographic study by researches have proven to be a powerful method to detect SC. On the other hand, spectroscopic method that will quantify quantitatively the amount of the SC in its formulation is yet to be explored. In Malaysia it has been reported that SC had been doped to coffee powder to enhance sexual activity to drinkers. In this study, five samples from different manufacturers of coffee powder which claims that their coffee have an extra power that can sexually arouse drinkers were collected from Johor Bahru, Malaysia. These coffee powders were then analyzed for SC using colored method Ultra Violet (UV) Spectroscopy at 424 nm. In this reaction, BCG is used and an intense yellow coloration is formed. This is then, used as an indicator to estimate the amount of sildenafil present. This study illustrated a good result with calibration curve linear up to 0.9983. The percentage of accuracy, error and coefficient variance recorded for sildenafil are 0.12%, 0.2% and 3.01% respectively. From the UV analysis, Sample 5 was identified to be positive and contain 18.81±0.55 µg/ml of SC. The other samples either show the absent of SC contain analogue of SC or maybe the level of detectible of SC in coffee powder was too low.

Keywords
Sildenafil citrate, Coffee powder, Ultra Violet (UV) spectroscopy.

Introduction
Sildenafil citrate (SC) marketed as Viagra™ (Pfizer) was an approved drug for treating male erectile dysfunction (ED) by the US Food and Drug Administration (FDA) on 27 March 1998. Sildenafil citrate is designated chemically as 1-[[3-(6,7-dihydro-1-methyl-7-oxo-3-propyl-1 Hpyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-4-methylpiperazine citrate. Sildenafil citrate is an off-white crystalline powder with a solubility of 3.5 mg/mL in water and a molecular weight of 666.7. Recently, Viagra has become one of the most commonly prescribed and abused pharmaceuticals drugs available in the market1. Prescribed user normally does not encounter problems, however in some cases of abuse, users might encounter headaches, vision disturbances and beside in some cases will experience a more serious effect such as heart problem and failure which might leads to fatality.

Based on the Laws of Malaysia, Poison Act 1952, sildenafil is listed as a prohibited Poison. Therefore it was prohibited to sell this drug by supermarket or pharmacies ‘over the counter’ except for those who obtain license from The Government of Malaysia. Buyers on the other hand, are only for those who obtain permission or prescribed by medical physician [2]. With the increasing negative advertisement from the internet, television and other media, for sexual enhancement drugs, the need and acquire of sildenafil citrate is growing at an alarming rate, to the extend of easy access to the public at the back yard.

Sildenafil was being proved since 1996 that would induce marked penile erection. However, over dosage of this drug will give hazardous effects to the users. Unfortunately, there were still many people abuse this drug for recreational and unaware with the hazardous effect of sildenafil. Manufacturers on the other hand, take advantage on the easy profits by selling this product doped or as pills illegally. Focused action thus, needed to target this ongoing public sickness and health problem. The products in the market, therefore must be analysed and investigated to determine the presence of the sildenafil either doped or on its own as pills. The screening and quantification process must also be done to determine the dosage in every product selected.

Several studies have developed procedures to detect sildenafil either by using simple method or high-technology instrumental techniques. Most of the studies however, were focussed on the detection of sildenafil in biological fluids from the human body [3]. In Malaysia, it was reported that sildenafil was doped to coffee powder to give an extra power to promote sales, however with the side effect of enhance sexual activity. It is therefore, a specific and fast method to detect or screening sildenafil is urgently required, to inform the public that there are dangers awaiting consumers and enforcement of the law

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Tel: 07-5534505
E-mail: manrahim@kimia.fs.utm.my

Fig. 1: Sildenafil citrate

Sildenafil act as potent and selective inhibitor of (type V) specific phosphodiesterase (PDE-5) that is responsible for degradation of cyclic guanine monophosphate (cGMP). Sildenafil has no direct relaxant effect on human corpus cavernosum but, enhances the effect of nitric oxide by inhibiting PDE-5. Increase the level of cGMP in the corpus cavernosum result in smooth muscle relaxation and inflow of blood to the corpus cavernosum, therefore improving the penile erectile function [4].
is urgently required.

The results of this study, would gave some information about the level of dopant of sildenafil and the safety of this super power coffee powders selling in the market. Therefore, hopefully it could increase the awareness to the society in Malaysia and all over the world about the doped and hazards of sildenafil. Development of the effective method in screening and detection of sildenafil hopefully can help the enforcement agencies to do inspection regularly on the product available in the market, and thus can reduce the illegal business of sildenafil-contained products. Regular inspections and announcements of the products being positive to contain sildenafil, would made society being more aware and not easily being cheated or influenced to buy products to contain poison and that do not achieve the standard of safety quality products.

BCG or tetrabromo-m-cresol sulfonphthalein is a gray powder which soluble in water and alcohol. It is been used as pH indicator between pH 4.5 (yellow) and 5.5 (blue) and also as a tracking dye for DNA agarose gel electrophoresis. It can be used in its free acid form (light brown solid) or as a sodium salt (dark green solid). It is also an inhibitor of the prostaglandin E2 transport protein.

Methodology

Experimental

In this study, some analytical technique was been used for both qualitative and quantitative analysis. Samples which are commercial product in the market such as coffee powder which suspected contains of sildenafil was extracted using liquid-liquid extraction (LLE). All the five samples were labeled as Sample 1, Sample 2, Sample 3, Sample 4 and Sample 5 respectively, and then were analyzed using UV spectroscopy. The absorbance of the respective samples at 424nm was recorded. Most analytical procedures in toxicology were relied on a combination of chromatography to separate out the substances in the sample and some form of spectroscopy to detect and identify the separated substances.

UV Spectrophotometry

Extractive spectrophotometric procedures are popular for their sensitivity in the assay of drugs, therefore ion-pair extractive spectrophotometry has received considerable attention for the quantitative determination of many pharmaceutical compounds. Present communication describes two spectrophotometric procedure, first for the assay of sildenafil in the pure form and second for its formulations which are, based on the formation of ion-association complexes with dyes bromocresol green (BCG) and chromoxane cyanine R (mordon blue) in acidic buffer.

Bromo cresol green (BCG) 99%, Potassium Chloride 99% and Sodium Hydroxide pellet purchased by Sigma Aldrich. Chloroform 99%, Hydrochloric Acid Concentration 35% Acetonitrile 99% and Phosphoric Acid 99% purchased by Merck.

Aliquots of standard SC solutions were transferred into a series of 125 mL separatory funnels. Two and half ml of BCG and 3 ml of buffer were added to each separatory funnel, followed by the addition of 5.0 ml of chloroform. The contents were shaken well for 2 minutes and kept aside for 1 minute. After that, the mixture will form two layers of solution, which is organic and aqueous phase. The separated organic phase was then transferred to a 50 ml beaker, while the aqueous phase remained in the separatory funnel. Extractions were again repeated using 5.0 ml of the same new solvent.

The successive chloroform extracts were mixed well and transferred to a 10 ml volumetric flask. Then the combined extract was made up to the mark with the solvent and mixed well. The absorbance of the solution was measured at 424 nm against a reagent blank. The procedure was repeated for the analyze aliquots and a standard calibration plot was obtained to calculate the amount of the analyte drug present in the unknown samples4.

Ultraviolet analysis for sildenafil was done using Ultraviolet Spectrophotometer (Perkin Elmer, Lambda 25) with 0.5 cm matched cells to measure all absorbance based on the formation of ion-association complexes of sildenafil with dyes bromocresol green (BCG). Buffer solutions of pH 2.0 were prepared by mixing appropriate volume of 0.2 M KCl and 0.2 M HCl. Freshly prepared solutions were always employed to maintain the quality of the analyte in the solutions. Stock solution of SC (obtained as research sample from the Jabatan Kimia Malaysia, Johor) of concentration 500 mg L⁻¹ was prepared in 0.05 M HCl. The working standard solutions were then prepared by suitable dilution of the stock solution with water. The standards solutions were prepared ranging from 5 to 25 mg L⁻¹.

Result and discussion

A. Qualitative and Quantitative Analysis of Sildenafil

From the method using BCG as the indicator (Figure 2), the presence of sildenafil in the samples can be detected. Further analysis to quantify the amount of sildenafil in the respective samples was done using UV-Vis spectroscopy. The formation of ion-association complexes of sildenafil citrate with the BCG give an intense of yellow color thus can be detected at 424 nm.

B. Mechanism of Reactions

Fig. 2: Bromocresol green (BCG)

Fig. 3: Ion-association complex of Sildenafil and BCG

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Formation of ion-association complexes of sildenafil and BCG give an intense colour of yellow. The reaction of the formation of ion-association complexes of sildenafil and BCG was proposed by the mechanism in the Figure 3 below.

Sildenafil containing basic functional groups with a pKₐ value of 8.7 has a week acidic moiety. The only site in sildenafil vulnerable for protonation was the nitrogen bonded to electron donating methyl group in the piperazine ring. Anionic dyes such as BCG will form ion-association complexes with the positively charged drug. The drug-dye stoichiometric ratio was 1:1 with BCG.

The intense yellow color based on the concentration of sildenafil formed ion-association complex with BCG was used as an indicator to estimate the present of sildenafil in the coffee samples. The intensity of the yellow color was varied based on the concentration of sildenafil in the mixtures. The color intensity variation gave a color chart that can be used to detect the presence of sildenafil in the mixtures. This is clearly shown by Figure 4.

**C. Series color chart of sildenafil concentrations**

A light yellowish color at 5ppm concentration appears if the sample contains low concentration of sildenafil after extraction with the buffer solution, bromo-cresol green and chloroform. The yellow coloration become deep yellow and turns redish orange when the concentration of sildenafil increases to 1000ppm. If there is no sildenafil in the sample, the mixture will become colorless and transparent. The color change between 5 ppm to 1000ppm sildenafil citrate standards is shown in Figure 4.

![Series of color chart of sildenafil standard concentration and sample.](image)

Table 1. Absorbance of standard Sildenafil at 424nm wavelength.

<table>
<thead>
<tr>
<th>Conc. of Sildenafil (µg/ml)</th>
<th>Absorbance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>0.00000</td>
</tr>
<tr>
<td>5.00</td>
<td>0.73200</td>
</tr>
<tr>
<td>10.00</td>
<td>1.50060</td>
</tr>
<tr>
<td>15.00</td>
<td>2.07650</td>
</tr>
<tr>
<td>20.00</td>
<td>2.73060</td>
</tr>
<tr>
<td>25.00</td>
<td>3.39980</td>
</tr>
</tbody>
</table>

**D. Quantitative analysis of sildenafil using UV spectroscopy**

To further confirm the coloration result, studied were also carried to the sample. Analysis of sildenafil using UV-Vis spectroscopy gives the absorbance of sildenafil at 424nm wavelength. The absorbance is different based on the concentration of sildenafil in the solutions. The absorbance detected for respective standard solutions was as shown in the Table 1.

The UV-Vis spectra of the mixtures were recorded at 380 to 500 nm using Perkin Elmer Ultra Violet Visible (UV-Vis). A color chart for the semiquantitation of sildenafil was prepared using standard samples of 0.00, 5.00, 10.00, 15.00, 20.00 and 25.00 µg/ml sildenafil citrate respectively. Tables 1 show the concentration sildenafil citrate using UV-Vis method at wavelength 424 nm due to the high correspondent of sildenafil. From the table, this method indicates the success determination the presence of sildenafil at different concentrations related to the intensity of yellow color developed by the ion-association complexes of sildenafil and BCG.

![Calibration curve for absorbance vs Sildenafil concentration](image)

Table 2: Results for the concentration of sildenafil in the coffee samples by UV-Vis Spectroscopy.

<table>
<thead>
<tr>
<th>Sample number</th>
<th>Concentration of sildenafil(µg/ml) ± RSD*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not detected</td>
</tr>
<tr>
<td>2</td>
<td>Not detected</td>
</tr>
<tr>
<td>3</td>
<td>Not detected</td>
</tr>
<tr>
<td>4</td>
<td>Not detected</td>
</tr>
<tr>
<td>5</td>
<td>18.82 ± 0.55</td>
</tr>
</tbody>
</table>

Based on the spectra, only Sample 5 shows a strong absorption peak at 424nm wavelength. Therefore, this method indicates the presence of sildenafil in the coffee samples.

![Series of color chart of sildenafil standard concentration and sample.](image)

![The Calibration curve for absorbance vs Sildenafil concentration](image)

Table 2: Results for the concentration of sildenafil in the coffee samples by UV-Vis Spectroscopy.

<table>
<thead>
<tr>
<th>Sample number</th>
<th>Concentration of sildenafil(µg/ml) ± RSD*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not detected</td>
</tr>
<tr>
<td>2</td>
<td>Not detected</td>
</tr>
<tr>
<td>3</td>
<td>Not detected</td>
</tr>
<tr>
<td>4</td>
<td>Not detected</td>
</tr>
<tr>
<td>5</td>
<td>18.82 ± 0.55</td>
</tr>
</tbody>
</table>
absorbance peak compared to the other samples. Compared to the calibration curve standard sildenafil (Figure 5) the calculated concentration of sildenafil in Sample 5 is 18.82 µg/ml (Table 2). The reading obtained by UV spectroscopy was proved the result obtained from color chart above. This qualitative and quantitative analysis, it can be concluded only Sample 5 positive contains sildenafil from those five exhibits samples tested.

Beside the qualitative and quantitative analysis to the concentration of sildenafil, some analytical calculation were also done to do method validation experiments. The precision and the accuracy of the method were evaluated by testing ten replicates of 5 µg/ml standard solution of sildenafil for the day. The precision and accuracy were defined as the relative standard deviation (RSD) and as the error from the nominal concentration, respectively. The repetitive results is shown by Figure 6 below.

**Conc. (µg/ml)**

<table>
<thead>
<tr>
<th>Sample</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4.6</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Fig. 6:** Concentration distribution of ten replicates of 5.00µg/ml sildenafil standard by UV-Vis spectroscopy.

Based on the experiments and the calculations obtained using UV-Vis spectroscopy, it is demonstrated that the amounts of sildenafil detected using this instrument is very significant. It shows that this modified method is reliable, simple and accurate for quantitative detection of sildenafil in coffee powder samples.

**Conclusion**

As the conclusion, the combination of simple coloration and UV Spectrometry analysis methods will be able to identify and quantitatively detect the presence of sildenafil in coffee samples. The result variable colorations from light yellow to reddish orange can be a good indicator for screening qualitatively the presence of sildenafil in samples. Beside bromocresol green (BCG) was stable in its color as indicator which can keep for months without change if protected from contamination. This method can be used in the field work as a quick and effective screening test for sildenafil citrate. While quantitatively, analysis using UV has shown a simple and better result with high sensitivity and accuracy and also as confirmation for the screening test. Good-handling practices also contribute to accuracy and precision of results, to avoid any mistakes, contaminations, and interferences in instrumentations. Finally, besides interpretation, processing of all the data must also be done carefully and systematically, while identifying and quantifying the separated substances.

**Acknowledgement**

Special thanks to Department of Chemistry, Johor Branch and Department of Pharmaceutical, Ministry of Health Malaysia, to make this project a success.

**Interest of conflict**

There is an arising issues which is abusing of sildenafil where many products were being introduced into the market has been added with sildenafil citrate in order to help men to encounter their problem of having sex either they having erectile dysfunction or not. This study will provide information in order to prevent prolong of that problem.

**Reference**

Sudden death in Marfan Syndrome- rare autopsy findings

Sumangala CN*, Devadas PK**, Yadukul S***

*Assistant Professor, **Professor & Head, ***Post Graduate, Dept. of Forensic Medicine, Bangalore Medical College and Research Institute, Bengaluru-02

Abstract

When sudden death occurs in adults and elderly persons, coronary atherosclerosis is the most common cause. On the contrary, a large spectrum of cardiovascular diseases both congenital and acquired may account for sudden death in young. These diseases are frequently concealed and discovered with surprise only at post-mortem by means of thorough macroscopic and microscopic examination. Marfan syndrome is a heritable condition that affects the connective tissue. It maps to chromosome 5q15 and defective gene that encodes fibrillin-1. Ghent's criterion is widely used in diagnosing Marfan syndrome.

Here we present a case of typical Marfan's phenotype with tall stature, arachnodactyly, high arched palate and other features. The autopsy on this case was conducted at Victoria Hospital mortuary attached to B.M.C.R.I., Bengaluru. At autopsy we found an abnormally large heart weighing 1.450kg, aortic root dilatation, atrophied left lung due to pressure effects and a compensatory over-inflation of right lung. Aortic dissection and cystic medial degeneration of aorta remains the salient Histopathological examination findings.

Key Words

Sudden death, Marfan syndrome, Ghent's criteria.

Introduction

Historical perspective:
Antoine Marfan (1896) reported a case of a girl 5yrs who had a congenital deformity of the limbs affecting particularly the distal parts with lengthening and narrowing of the bones. Archard (1902) reported a second case of a girl 18yrs and suggested the name arachnodactyly to describe the condition. Paganini, Akhenaton and Abraham lincoln are several prominent figures who were reported to have marfan syndrome. The late Flo hyman, an Olympic volleyball player, died in 1986 during a match in Japan, of a ruptured aorta associated with the marfan syndrome.

Case Report

A case was reported to Victoria hospital, BMCRI, Bengaluru with history of collapse in his house after coming from work in the night. He was aged about 35yrs, and a native of West Bengal. He was immediately transferred to a hospital where he was declared dead on arrival. There was no history of illness in the past or any trauma to the chest wall. All his family members were healthy.

Autopsy Findings

The body was that of a young male aged 35yrs, with rigor mortis present all over the body. Post mortem staining was present over the back of the body. He was dark brown in complexion and lean built. There were no such external injuries present over the body. The length of the body was 187cms, while the arm span was 191cms. Further evaluation revealed a high arched palate, elongated fingers and toes.

Mild scoliosis was noted in the spine. There were no gross changes in the eye. High arched palate was noted. Mild pectus excavatum was also noted. On opening the thoracic cavity, we were surprised to see a huge pericardium...!! The heart was sufficiently large weighing 1450gms....!!!
aorta.

Histopathology report:

The histo-pathological findings were noted as aortic dissection in H/E stains and cystic degenerative changes along with myxomatous changes in the mitral valve.

Discussion

Although it is one of the most common inherited connective tissue disorder, with an estimated prevalence of 4-6 per 1,00,000 persons, the marfan syndrome is often not diagnosed till autopsy. Sequelae of the syndrome is premature death, that is most often due to cardiac complication. Diagnosis is difficult because there is no racial, ethnic or sexual predilection. There is an extreme variability of clinical expression. Ghent’s criteria is world wide accepted criteria to diagnose marfan’s syndrome.

Signs and symptoms:
- **Skeletal**: Tall stature >95th percentile, arachnodactyly, dolichostenomelia (increased length of the limbs compared to trunk.), deformity of sternum, kyphoscoliosis, high arched narrow palate.
- **Ocular**: Myopia, ectopia lentis.
- **Dermatological**: Elastosis perforans serpiginosa.
- **Cardio-vascular**: MVP with MR, Dilatation of ascending aorta with resultant aortic insufficiency, dissection, aneurysm and rupture.
- **Others**: Inginal hernias, psychiatric and neurologic problems.

Differential diagnosis:
- **Marfanoid hypermobility syndrome**: normal lens, normal aorta, severe joint laxity.
- **Homocysteinuria**: AR, normal aorta, downward dislocation of the lens.
- **E D syndrome**: normal body proportions, poor wound healing, skin hyperextensibility.
- **Cong. Arachnodactyly**: normal eyes and aorta, external ear deformity, symmetrical contractures of fingers.

In a study by Vock R et al a 19-year-old school boy was suffering from fluctuating uncharacteristic chest pain in the last 20 h before his death. He died unexpectedly within a few minutes of a hemopericardium, which resulted from an aneurysmal rupture of the ascending aorta. The patient’s past history as well as the autopsy and ultrastructural findings led to the diagnosis of Marfan’s syndrome. Aoyagi S et al has reported a case of spontaneous non-traumatic rupture of the thoracic aorta in a hypertensive patient. The clinical findings suggested acute aortic dissection, and a large pericardial effusion was detected by echocardiography. Autopsy revealed a longitudinal intimal tear and a rupture in the postero-lateral aspect of the ascending aorta. Dettmeyer R et al in their study have presented two rare cases of sudden death of a 31- and a 44-year-old woman. Autopsy and morphological examination in these cases revealed a dissection of the aorta. In both cases mucoid deposits in all layers of the media and rarefication of the elastic fibers were found, rendering cystic medionecrosis as the cause of the aortic dissection.

Conclusions

- Gross enlargement of heart up to 1450gm, atrophied left lung due to pressure effects from heart and compensatory over-inflation of right lung remains salient gross features of this case.
- While aortic dissection and cystic medial degeneration remains the salient Histopathological examination findings.

References

Estimation of stature by right hand length

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Abstract

Determination of stature is an important parameter of personal identification along with others like age, sex, race etc of an individual. The present study is an attempt to know to establish the relationship between the stature and right hand length of 100 females of Karnataka, in south Indian population in age ranging from 17 to 19 years. Linear and multiple regression equations for stature estimation were calculated.

The co-relation coefficient between stature and right hand length were found to be positive and statistically highly significant (p<0.01). The highest co-relation co-efficient is - (+0.73). The regression formula was checked for their accuracy and reliability.

Key Words

Human Anatomy; Anthropology; Stature; South Indian population.

Introduction

Estimation of stature of an individual from the skeletal remains from the mutilated amputated limbs has obvious significance in the personal identification. Studies on the estimation of stature from them, that is skeletal remains, mostly from the long bones have been reported as indicated by the published work of the Pearson, Trotter and Glesser and steels formula for the mutilated limbs. The Indian perspective of the problem of stature estimation has been studied by the Thakur and Rai, Bhatnagar et al, Jasuja et al. And estimation of stature from foot prints by Raju et al. Estimation of stature from right hand length, has been reported (Saxena; Thakur and Rai; Begum). To the best of our knowledge, only Saxena, has reported from this aspect therefore, in present study, an attempt has been made to estimate the stature from right hand length measurements.

Material and Methods

Present study is based upon various measurements of stature, individual right hand length of 100 female. Subjects were of age ranging from 17 to 19 years are included. Data was collected from the students of SSIAMSRC campus. Care has been taken for inclusion of the unrelated subjects only. Subjects were mostly having right handed preponderance. Measurement of stature was taken by a standard Anthropometer and right hand length was taken by measuring tape.

Measurements

1. Stature: It was measured as vertical distance from the vertex to the floor. Measurement was taken by making the subject stand erect on a horizontal resisting plane bare foot. Palms of hand were turned inwards and fingers horizontally pointing downwards. Anthropometer was placed in straight vertical position in front of the subject with head oriented in eye-ear-eye Plane (Surindarnath, Sehgal V.N). The movable rod of Anthropometer brought in contact with vertex in the mid sagittal plane.

2. Right hand length: Measured as the distance from the most proximal part of acromian process, till the projecting point on the tip of the middle finger. It was measured with the help of a measuring tape. Subject was standing in a anatomical position with hands facing forwards, hanging downwards with fingers extended in normally.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>SD(cms)</th>
<th>Mean(cms)</th>
<th>SD(cms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>4.05</td>
<td>159.16</td>
<td>6.23</td>
</tr>
<tr>
<td>18</td>
<td>2.96</td>
<td>157.66</td>
<td>6.53</td>
</tr>
<tr>
<td>19</td>
<td>5.44</td>
<td>158.57</td>
<td>11.70</td>
</tr>
<tr>
<td>20</td>
<td>-</td>
<td>154.00</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>3.34</td>
<td>157.97</td>
<td>6.85</td>
</tr>
</tbody>
</table>

Table 2:

<table>
<thead>
<tr>
<th>Coefficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>R =0.73 p&lt;0.01 significant</td>
</tr>
<tr>
<td>Regression equation (predictor of ht )</td>
</tr>
<tr>
<td>H_t=49.42+1.5(Right hand length)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predicted Height (cms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right hand length (cms)</td>
</tr>
<tr>
<td>60.0-64.99</td>
</tr>
<tr>
<td>65.0-69.99</td>
</tr>
<tr>
<td>70.0-74.99</td>
</tr>
<tr>
<td>75.0-79.99</td>
</tr>
<tr>
<td>80.0-84.99</td>
</tr>
</tbody>
</table>

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Results

The results of the stature and the right hand length are tabulated in the table-1 measurements of 17-19 years. Present study is evident that means, stature in the females is higher as compared to that of Baul (1974), Thakur (1975), Jasuja (1987), Kler (1990) have also studied the stature. Present study is there exists statistically significant. 'P'-value< 0.01.

Statistical correlation coefficient:

Present study is evident as shown in the table–2, that the measurements have a positive as well as a statistically significant correlation with the stature. Saxena (1984) also reported statistically significant correlation between stature and hand length. An attempt has been made to draw the regression equations to estimate stature from right hand length measurement by using regression equation for stature estimation from right hand length measurement = 49.42+1.5 (R H L)

(* R H L - Right Hand Length)

Right Hand length and medium regression equation:

The present study, regression equations have been formulated with the standard error ranging from 157.34 centimeters in case of the females. The standard error difference measured ranges from 1.73 to 2.31 centimeters, which again indicates that both the parameters are efficient to indicate the estimation. It also indicates that either of two can be used for stature estimation, which is of great significance. As references indicate that very little work has been done for estimation of stature from right hand length except one reported by Saxena S.K. Study of correlations and estimation of stature from hand length, hand breadth and sole length, Anthropol Anz. 1984;42:271-6.

Conclusion

100 female subjects have been studied to know stature relation between right hand length. Statistically significant correlation is present among the stature and right hand length measurements. The regression equations have been derived from these measurements and concluded that stature can be estimated from actual as well as measurements of right hand length by the regression formulae Ht = 49.42+1.5 (R H L)

References

Abstract

Snakebite is an injury caused by a bite from a snake, often resulting in puncture wounds inflicted by the animal’s fangs and sometimes resulting in envenomation. The research’s shows that “at least 4, 21,000 envenomings and 20,000 deaths occur worldwide from snake bite annually. These figures may be as high as 18, 41,000 envenomings and 94,000 deaths.” In this retrospective study, fatal cases of snake bite autopsied during the period 01-01-2004 to 31-12-2009 were analyzed at the Department of Forensic Medicine & Toxicology, J.N. Medical College, Belgaum, and Karnataka. In age wise distribution, maximum number of victims were in the age group 41-50 years (23 cases; 33.8%), followed by 21-30 years (13 cases; 25%) and 31-40 years (16 cases; 23.5%). Rural population (48 cases; 70.6%) had significantly higher incidence rates than the urban population (20 cases; 29.4%). Increased attention and means should be dedicated to snake bite envenoming by researchers, funding agencies, pharmaceutical industries, public health authorities, and supranational organizations, as all have contributed to keeping this important public health problem a truly neglected disease.

Introduction

Snakebite is an injury caused by a bite from a snake, often resulting in puncture wounds inflicted by the animal’s fangs and sometimes resulting in envenomation. Although the majority of snake species are non-venomous and typically kill their prey with constriction rather than venom, venomous snakes can be found on every continent except Antarctica. Snakes often bite their prey as a method of hunting, but also for defensive purposes against predators.1

The research’s shows that “at least 4, 21,000 envenomings and 20,000 deaths occur worldwide from snake bite annually. These figures may be as high as 18, 41,000 envenomings and 94,000 deaths.” In Asia alone, it has been estimated that four million snake bites occur each year, of which approximately 50% are envenommed, resulting in 1,00,000 annual deaths.2 The largest numbers of fatal snakebites occur in South Asia and Africa. In South Asia, there are 25,000–30,000 deaths each year from snakebite.1 India suffered 11,000 deaths alone, the highest of any single country.2 In Maharashtra highest incidences of snake-bites have been reported (70 bites per 1, 00,000 populations and mortality of 2.4 per 1, 00,000/ yr). The other States which show high incidences include Tamil Nadu, Uttar Pradesh and Kerala.4

Ophitoxaemia is the term that characterizes the clinical spectrum of snake bite envenomation. Of the 2500-3000 species of snakes distributed world-wide, about 500 are venomous. Based on their morphological characteristics including arrangement of scales, dentition, osteology, myology, sensory organs etc., snakes are categorized into families. The families of venomous snakes are Atractaspisidae, Elapidae, Hydrophiidae and Viperidae.

The major families in the Indian subcontinent are: Elapidae which includes common cobra, king cobra and krait, Viperidae which includes Russell’s viper, pit viper and saw-scaled viper and Hydrophiidae (the sea snakes). Of the 52 poisonous species in India, majority of bites and consequent mortality is attributable to 5 species viz. Bungarus caeruleus (krait), Ophiophagus hannah (king cobra), Naja Naja (common cobra), Daboia russellii (Russell’s viper) and Echis carinatae (saw-scaled viper).

Snake-bite incidences vary from region to region and depend upon (i) the natural habitat of particular species of snake in the region; and (ii) probability of human being coming in contact. The incidence is particularly high in rural areas of warm regions where snakes are abundant and human activities, increase the risks of man-snake encounters. Case fatality rates can be high where patients do not have rapid access to life-saving anti-snake venom serum (ASVS), a common situation in rural areas of developing countries.5

Material and Methods

In this retrospective study, fatal cases of snake bite autopsied during the period 01-01-2004 to 31-12-2009 were analyzed at the Department of Forensic Medicine & Toxicology, J.N. Medical College, Belgaum, and Karnataka. Sixty eight cases with history of snake bite, from different places of Belgaum were analyzed. Patients included were those with the history of snake bite and presence of swelling, cellulitis, bleeding or blister formation at local site. Data was recorded with reference to the age and sex of the person bitten, site of bite, place and time of bite, type of snake, cause of death and post mortem findings.

Results

A total of 68 cases of snakebite were reported during the study period [Table 1].

Males were involved in 47 cases (69.1%) and females in 21 cases (30.9%). This study demonstrates significantly higher rate of deaths among males with male to female ratio 2.3:1.

In age wise distribution, maximum number of victims were in the age group 41-50 years (23 cases; 33.8%), followed by 21-30 years (13 cases; 25%) and 31-40 years (16 cases; 23.5%) [Table 2]. Rural population (48 cases; 70.6%) had significantly higher incidence rates than the urban population (20 cases; 29.4%) [Table 2]. Rural population (48 cases; 70.6%) had significantly higher incidence rates than the urban population (20 cases; 29.4%) [Table 3].

The peak incidence of snakebite occurred during night hours (43 cases, 63.2%) [Table 5]. Most cases (48 cases, 70.6%) occurred during rainy season (14 cases, 20.6% and 10 cases, 14.7% in June and July respectively) [Table 4]. The lowest time of bite, type of snake, cause of death and post mortem findings.

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Vijay Kumar A G / Indian Journal of Forensic Medicine & Toxicology. July-Dec., 2011, Vol.5, No.2 131
Hemorrhagic shock (16 cases, 23.5%) [Table 10]. Congestion of internal organs is the most common post mortem finding (56 cases, 82.4%) and Bite marks are visible in 48 cases (70.6%) [Table 11].

Table 1: Annual admissions and death due to snake bite.

<table>
<thead>
<tr>
<th>Year</th>
<th>Death</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>09</td>
<td>13.3</td>
</tr>
<tr>
<td>2004</td>
<td>10</td>
<td>14.7</td>
</tr>
<tr>
<td>2005</td>
<td>09</td>
<td>13.3</td>
</tr>
<tr>
<td>2006</td>
<td>07</td>
<td>10.2</td>
</tr>
<tr>
<td>2007</td>
<td>11</td>
<td>16.2</td>
</tr>
<tr>
<td>2008</td>
<td>10</td>
<td>14.7</td>
</tr>
<tr>
<td>2009</td>
<td>12</td>
<td>17.6</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Age and Sex wise distribution of cases:

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>01</td>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td>11-20</td>
<td>05</td>
<td>03</td>
<td>08</td>
</tr>
<tr>
<td>21-30</td>
<td>05</td>
<td>02</td>
<td>07</td>
</tr>
<tr>
<td>31-40</td>
<td>12</td>
<td>04</td>
<td>16</td>
</tr>
<tr>
<td>41-50</td>
<td>18</td>
<td>05</td>
<td>23</td>
</tr>
<tr>
<td>51-60</td>
<td>03</td>
<td>02</td>
<td>05</td>
</tr>
<tr>
<td>61-70</td>
<td>02</td>
<td>01</td>
<td>03</td>
</tr>
<tr>
<td>71-80</td>
<td>01</td>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>21</td>
<td>68</td>
</tr>
</tbody>
</table>

Table 3: Distribution of cases based on place of residence (urban/ rural):

<table>
<thead>
<tr>
<th>Residence</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>48</td>
<td>70.6</td>
</tr>
<tr>
<td>Urban</td>
<td>20</td>
<td>29.4</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4: Month wise distribution of cases:

<table>
<thead>
<tr>
<th>Month</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>03</td>
<td>04.4</td>
</tr>
<tr>
<td>February</td>
<td>02</td>
<td>02.9</td>
</tr>
<tr>
<td>March</td>
<td>04</td>
<td>05.9</td>
</tr>
<tr>
<td>April</td>
<td>04</td>
<td>05.9</td>
</tr>
<tr>
<td>May</td>
<td>05</td>
<td>07.4</td>
</tr>
<tr>
<td>June</td>
<td>14</td>
<td>20.6</td>
</tr>
<tr>
<td>July</td>
<td>10</td>
<td>14.7</td>
</tr>
<tr>
<td>August</td>
<td>10</td>
<td>14.7</td>
</tr>
<tr>
<td>September</td>
<td>07</td>
<td>10.3</td>
</tr>
<tr>
<td>October</td>
<td>04</td>
<td>05.9</td>
</tr>
<tr>
<td>November</td>
<td>03</td>
<td>04.4</td>
</tr>
<tr>
<td>December</td>
<td>02</td>
<td>02.9</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5: Distribution of cases based on time of snake bite:

<table>
<thead>
<tr>
<th>Time</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 am-12 noon</td>
<td>11</td>
<td>16.1</td>
</tr>
<tr>
<td>12 noon-6 pm</td>
<td>05</td>
<td>07.4</td>
</tr>
<tr>
<td>6 pm-12 mid night</td>
<td>30</td>
<td>44.1</td>
</tr>
<tr>
<td>12 midnight-6 am</td>
<td>22</td>
<td>32.4</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6: Distribution of cases based on location at the time.

<table>
<thead>
<tr>
<th>Residence</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor</td>
<td>48</td>
<td>70.6</td>
</tr>
<tr>
<td>Indoor</td>
<td>20</td>
<td>29.4</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 7: Occupation wise distribution of cases.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>31</td>
<td>45.6</td>
</tr>
<tr>
<td>Laborers</td>
<td>24</td>
<td>35.3</td>
</tr>
<tr>
<td>Housewives</td>
<td>06</td>
<td>08.8</td>
</tr>
<tr>
<td>Children</td>
<td>07</td>
<td>10.3</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 8: Distribution of cases based on site of bite:

<table>
<thead>
<tr>
<th>Site of Bite</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower limb</td>
<td>48</td>
<td>70.6</td>
</tr>
<tr>
<td>Upper limb</td>
<td>14</td>
<td>20.6</td>
</tr>
<tr>
<td>Trunk</td>
<td>06</td>
<td>08.8</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 9: Distribution of cases based on type of snake:

<table>
<thead>
<tr>
<th>Type of Snake</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common krait</td>
<td>42</td>
<td>61.8</td>
</tr>
<tr>
<td>Pit viper</td>
<td>14</td>
<td>20.6</td>
</tr>
<tr>
<td>Cobra</td>
<td>08</td>
<td>11.8</td>
</tr>
<tr>
<td>Rat snake</td>
<td>04</td>
<td>05.8</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 10: Distribution of cases based on Cause of death:

<table>
<thead>
<tr>
<th>Causes</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory failure</td>
<td>52</td>
<td>76.5</td>
</tr>
<tr>
<td>Hemorrhagic shock</td>
<td>16</td>
<td>23.5</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 11: Distribution of cases based on Postmortem findings:

<table>
<thead>
<tr>
<th>Causes</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestion of Internal organs</td>
<td>56</td>
<td>82.4</td>
</tr>
<tr>
<td>Visible Bite marks</td>
<td>48</td>
<td>70.6</td>
</tr>
<tr>
<td>Visceral hemorrhage</td>
<td>34</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Discussion

The socio-cultural behavior and geographical features of India expose its inhabitants to the risk of contact with a variety of venomous animals. Although modern means of transportation have contributed to the decrease of such contact, the risk is still present. Only a few studies have described the incidence rates of venomous bites in India, and the size of the problem is still not fully appreciated.

In this study, maximum numbers of victims were males (69.1%) in the age group 41-50 years (33.8%). This is similar to the results of other studies. Higher incidence of snake bite in adult males could be attributed to the occupational predisposition.

In our study Rural population (70.6%) had significantly higher incidence rates than the urban population (29.4%) this because in rural areas in developing countries, adults and children are often employed on the farm and forest, thus incurring an increased risk of making contact with snakes.

During rainy season (60.3%) majority of the farmers (45.6%) become victims because during this period there is intense agricultural activity in the field. Usually snakes are tend to be attracted to agricultural areas, such as rice paddies, where they can find abundant food sources, such as rodents. The peak incidence of snakebite occurred in outdoor (70.6%) during night hours (44.1%). This is due to Open-style habitation and the practice of sleeping on the floor expose people to bites from nocturnal snakes.

Snakebites affected mainly the lower limbs (70.6%). This is due to walking bare foot on the field makes foot is the easy accessible area for snake bite.

In our study common Krait is responsible for maximum mortality (61.8%). All kraits are nocturnal hunters, and are more aggressive during the night and their neurotoxic venom is 16 times stronger than cobra venom. The Krait bite is very difficult for people to know that they have been bitten at all. There may be no pain and no symptoms to be alarmed at; one may not take it seriously and go to hospital, especially in the middle of the night when most of such bites occur. Krait venom is extremely powerful and quickly induces muscle paralysis. Any bite from a Krait is life threatening and a medical emergency. Before antivenom was developed, there was an 85% mortality rate among bite victims. So, unfortunately, the Krait bite is more often fatal than bites from the other snakes.

Being neurotoxic, the viper and cobra causes respiratory failure (76.5%) and vipers are vasculotoxic, they causes hemorrhagic shock (23.5%). In the present study Bite marks are visible in 48 cases (70.6%). Poisonous snakes leave two or occasionally one fang mark. Non poisonous snakes leave a semicircular set of bite marks. Sometimes bite marks may not be visible.

Conclusion

Indeed, it is estimated that India produces around one million vials of antivenom each year. Despite these large volumes of production, several challenges persist that prevent appropriate management of snake bite victims in South Asia. Poor access to often inadequately equipped and staffed medical centres in rural areas, high cost of treatment, and inadequate use of antivenoms are major concerns. Increased attention and means should be dedicated to snake bite envenoming by researchers, funding agencies, pharmaceutical industries, public health authorities, and supranational organizations, as all have contributed to keeping this important public health problem a truly neglected disease.

References


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• Your Affiliation (designations with college address)
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• Conclusion
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Fatal blunt abdominal trauma – A three year analysis

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*Assistant Professor, **Post Graduate, Dept. of Forensic Medicine & Toxicology, KLE University’s JN Medical College, Belgaum, Karnataka, India

Abstract

A retrospective study of fatal cases of blunt abdominal trauma was conducted at Department of Forensic Medicine and Toxicology, Jawaharlal Nehru Medical College, Belgaum between 1-1-2007 to 31-12-2009. During this period total of 51 deaths due to blunt abdominal trauma were autopsied. The peak age at risk in this study is 31 – 40 years followed by 21-30 year age group. Road traffic accident was the common causative factor (74.5%) while Splenic injury was the common post-mortem finding (52.9%). In most of the cases cause of death was Persistent irreversible shock (62.7%).

Introduction

The abdomen is the third common region of the body that is injured in civilian trauma. Blunt abdominal trauma (BAT) is one of the leading causes of mortality among trauma victims. It is the main cause of death in people under 35 years of age in worldwide. Most common cause of blunt abdominal trauma in India is road traffic accident followed by pedestrian accidents, abdominal blows and fall from heights.

The abdominal organs are more vulnerable to injury than those in the nearby thorax because they lack the musculoskeletal protection afforded by the sternum and ribs. Surprisingly, BAT carries a higher mortality rate than penetrating trauma, largely because of the difficulty of diagnosis. In addition, blunt trauma dissipates energy over a broad area of the body and often is associated with severe trauma to other organ systems, such as the nearby thoracic area or a concomitant head injury.

Men tend to be affected more often than women and this may be related to their exposure to travel hazards in search of a means of livelihood. The most commonly injured organs are the spleen, liver, retro-peritoneum, small bowel, kidneys, bladder, colorectal, diaphragm, and pancreas. Approximately 10% of patients with Blunt abdominal trauma have persistent hypovolemic shock as a result of intra-abdominal bleeding inspite of aggressive fluid resuscitation and only an urgent laparotomy s life saving.

Keywords

Blunt Abdominal Trauma, Mortality, Occupation, Cause of Death.

Material and Methods

A retrospective study of fatal cases of blunt abdominal trauma was conducted at Department of Forensic Medicine and Toxicology, Jawaharlal Nehru Medical College, Belgaum between 1-1-2007 to 31-12-2009. During this period total of 51 deaths due to blunt abdominal trauma were autopsied. The following variables were considered: age, sex, cause of the blunt abdominal injury, occupation, post mortem findings and cause of death.

Results

In the present study, out of 549 cases of blunt abdominal trauma admitted 51 cases (9.3%) were fatal. The maximum number of victims were in the age group 31-40 years (15 cases; 29.4%), followed by 21-30 years (11 cases; 21.6%) and 41-50 years (9 cases; 17.6%) [Table 1]. Males were involved in 39 cases (76.4%) and females in 12 cases (23.6%). Male to female ratio being 3.2:1 [Table 2]. Common cause of blunt abdominal trauma is Road traffic accident (38 cases; 74.5%) followed by fall from height (9 cases; 17.7%), Animal hits (3 cases; 5.9%) and Assault (1 cases; 1.9%) [Table 3]. Out of 51 cases, Drivers (22 cases; 43.2%) were more in number, followed by Pillion riders (16 cases; 31.4%), Pedestrians (10 cases; 19.6%), Laborers (2 cases; 3.9%) and Children’s (1 cases; 1.9%) [Table 4]. In the present study, Splenic injury (27 cases; 52.9%) is the most common postmortem finding followed by injury of both liver and spleen (7 cases; 13.8%) [Table 5]. Common causes of death were Persistant irreversible shock (32 cases; 62.7%), Cardio-pulmonary arrest (11 cases; 21.56%) and Septicemia (8 cases; 15.6%).

Table 1: Age wise distribution of cases:

<table>
<thead>
<tr>
<th>Age (Years)</th>
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<th>Percentage</th>
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<tbody>
<tr>
<td>d” 10</td>
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<td>00</td>
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<tr>
<td>11-20</td>
<td>04</td>
<td>07.9</td>
</tr>
<tr>
<td>21-30</td>
<td>11</td>
<td>21.6</td>
</tr>
<tr>
<td>31-40</td>
<td>15</td>
<td>29.4</td>
</tr>
<tr>
<td>41-50</td>
<td>09</td>
<td>17.6</td>
</tr>
<tr>
<td>51-60</td>
<td>04</td>
<td>07.9</td>
</tr>
<tr>
<td>61-70</td>
<td>02</td>
<td>03.9</td>
</tr>
<tr>
<td>71-80</td>
<td>03</td>
<td>05.9</td>
</tr>
<tr>
<td>81-90</td>
<td>01</td>
<td>01.9</td>
</tr>
<tr>
<td>&gt; 90</td>
<td>02</td>
<td>03.9</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

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Dr Vijay Kumar A G
Post Graduate, Dept. of Forensic Medicine & Toxicology
KLE University’s JN Medical College, Belgaum-590010
Karnataka State, India
Tel: 919916735739
Discussion

The incidence of blunt injuries to the abdomen has been rising worldwide because of the increasing frequency of high-speed travel and social violence. The peak age at risk in this study is 31–40 years followed by 21–30 year age group. This may be due to the dynamic lifestyles of these two age groups and this is consistent with studies conducted by Anjum Fazili MS and Shabana Nazir MB where the average age was 34 years. There was a male preponderance in our study and this may be related to their exposure to travel hazards in search of a means of livelihood. In the study done by John Udeani, male to female ratio was 2.1.

Of the 51 patients, Drivers (43.2%) were more in number compared to other occupations. The majority of BAT is often attributed to car-to-car collisions, in which rapid deceleration often propels the driver forwards into the steering wheel or dashboard, causing rupturing of internal organs due to the presence transiently increasing intraluminal pressure, occurring in more serious cases and contusions in less serious cases where speed or forward force is less. A modern road cars steering wheel A modern Formula One cars steering wheel has buttons and knobs to control various functions A steering wheel is a type of steering control used in most modern land vehicles, including all mass-production automobiles. A dashboard or dash board in an automobile is a panel located under the windscreen and... A bruise or contusion or ecchymosis is a kind of injury, usually caused by blunt impact, in which the capillaries are damaged, allowing blood to seep into the surrounding tissue. Injuries to pedestrians occur disproportionately among the young (particularly school-aged children), the elderly and the intoxicated and this is similar to the study done by Zafer Said Matar Facharzt and Ayoade BA, Salami BA, Tade AO, Musa AA, Olawoye OA.

In this study the organs frequently have been be injured are solid organs such as the Spleen and the liver in a rate of 52.9% and 11.8% respectively. The abdomen is vulnerable to injury since there is minimal bony protection for underlying organs. This is similar to the results of other studies. The primary cause of death was Persistent irreversible shock (62.7%), but in death occurring after 48 hours, sepsis was the culprit in 13% of cases. Internationally the accepted mortality rates for hospitalized patients with BAT are approximately 5–10% in ordinary situations. Morbidity occurred in 25% of the cases and showed that complications raised for identified and unidentified injuries and the most common complications found in the form of: Intra-abdominal hemorrhage, infection, sepsis and death. Delayed rupture or hemorrhage from solid organs, particularly the spleen, has been found in many patients. It is critical to remember that the physical examination may not reveal underlying injury, so a high index of suspicion based on mechanism of injury is the key. The findings in abdominal trauma can be subtle, so serial assessments are crucial. The study conducted by Anjum Fazili MS and Shabana Nazir MB, common cause of death was persistent irreversible shock in 5/9 deaths (55.5%) followed by Cardiopulmonary arrest in 3/9 deaths (33.3%) and Septicemia in 1/9 deaths (11.3%).

Conclusion

Blunt abdominal trauma can result in serious injury to the internal organs. The more organs involved the higher the likelihood of major complications and death. The degree of injury to the abdomen is related to the degree of the force

<table>
<thead>
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<th>Table 2: Sex wise distribution of cases:</th>
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<tr>
<td>Number</td>
</tr>
<tr>
<td>39</td>
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</table>

<table>
<thead>
<tr>
<th>Table 3: Cause wise distribution of cases:</th>
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<tbody>
<tr>
<td><strong>Cause</strong></td>
</tr>
<tr>
<td>RTA</td>
</tr>
<tr>
<td>Fall From Height</td>
</tr>
<tr>
<td>Animal Hit</td>
</tr>
<tr>
<td>Assault</td>
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<td>Total</td>
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<table>
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<th>Table 4: Occupation Wise distribution of cases:</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>Driver</td>
</tr>
<tr>
<td>Pillion Rider</td>
</tr>
<tr>
<td>Pedestrian</td>
</tr>
<tr>
<td>Laborers</td>
</tr>
<tr>
<td>Childrens</td>
</tr>
<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Table 5: Post-Mortem findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PM findings</strong></td>
</tr>
<tr>
<td>Spleenic Injury</td>
</tr>
<tr>
<td>Both Liver and Spleen</td>
</tr>
<tr>
<td>Liver only</td>
</tr>
<tr>
<td>Duodenal perforation</td>
</tr>
<tr>
<td>Mesenteric tear</td>
</tr>
<tr>
<td>Colon tear</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Table 6: Distribution of cases based on Cause of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause of death</strong></td>
</tr>
<tr>
<td>Persistent Irreversible shock</td>
</tr>
<tr>
<td>Cardiac Pulmonary arrest</td>
</tr>
<tr>
<td>Septicemia</td>
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<tr>
<td>Total</td>
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applied; however, in blunt abdominal trauma the true extent of the injury may not be immediately apparent. This is demonstrated over and over again by dozens of case studies illustrating that about 40% of all blunt abdominal trauma cases are missed until the patient decompensate. Maintain a high index of suspicion when the mechanism of injury suggests that abdominal trauma is likely. Report your findings about the mechanism of injury to the Emergency department staff so they can share your level of suspicion. The details surrounding the circumstances of the incident plus your physical assessment findings are invaluable and my make the difference in the care of your patient ultimately receives.

References

2. Anjum Fazili MS, Shabana Nazir MB. Clinical Profile And Operative Management Of Blunt Abdominal Trauma (Bat): A Retrospective One-Year Experience At Smhs Hospital, Kashmir, India. JKPractitioner. 2001; 8(4): 219-221.
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