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Contents

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Forensic Odontology- A Prosthodontic Perspective

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Abstract

Teeth, as other calcified human tissues, are often preserved after death and hence can give vital information regarding the identity of the individual.

Forensic odontology involves the management, examination, evaluation and presentation of dental evidence in criminal or civil proceedings. Prosthodontists, who are responsible for restoration and rehabilitation of edentulous or semi edentulous persons, can play a vital role in the forensic odontology team.

This article reviews, some simple measures available with the prosthodontist that can help identify the unknown individual in cases of crime and disasters. These measures may range from simple denture labeling techniques to electronic devices incorporated inside the removable or fixed prosthesis. Endosseous implants can also be used in identification, by virtue of certain unique radiographic features. Casts of bite marks and markings of rugae form are other helpful tools.

Hence, the prosthodontist, as a responsible member of the society, can play an important role in the forensic dental identification work.

Key Words

Teeth, Forensic Odontology, Prosthodontist, Labelling, Bite marks, Implants, Identification

Introduction

Dentists, in general, and Prosthodontist in particular, can be of great assistance, in the detection and solving of crime, and identification of human remains in cases of crime and / or calamities.

Teeth, as other calcified human tissue, are often preserved after death; and hence can give vital clues as to the identity of the person. Forensic dentistry has evolved as a discipline, since about 1960's in the United States, when the first formal training programmes were conducted at the Armed Forces Institute of Pathology.

The term Forensic is derived from the latin word "FORENSIS", meaning, public, to the forum or public discussion, an argumentative form used for investigation or investigation or establishment of facts/evidence in a court of law.

Forensic odontology involves the management, examination, evaluation, & presentation of dental evidence in criminal or civil proceedings. The major field of activity include (a) Civil, (b) Criminal, (c) Research. Dentists, play a major role, in keeping accurate dental records and providing all necessary information, which can be used to recognize malpractice, negligence, fraud, abuse assault, and to identify unknown humans.

Prosthodontists, who are responsible for the restoration and rehabilitation of edentulous or semi edentulous patients, or rehabilitation with maxillofacial prosthesis, can easily ensure positive identification of their patients by incorporating easy identification modes into prostheses. These may range from the simplest form of denture labeling to insertion of RFID tags into the restorations like inlays or FPDs.

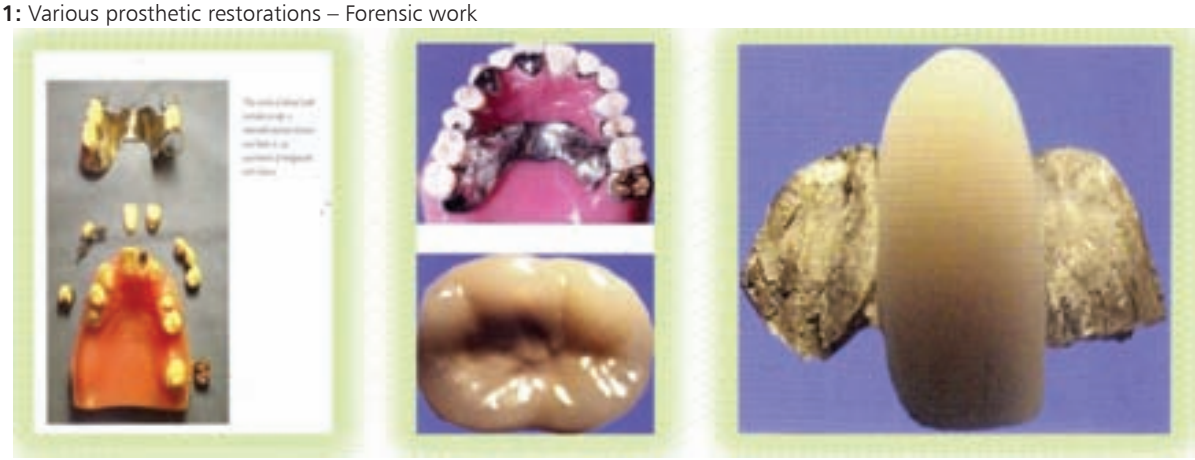
Identification

Dental identification assumes a primary role in the identification of remains when post mortem changes, traumatic injury, or lack of a fingerprint record invalidate the use of visual or fingerprint methods. Dental evidence is often preserved after death.

The status of a persons teeth changes throughout life and the combination of decayed, missing and filled teeth is measureable and comparable at any time.

The fundamental principles of dental identification are comparison and exclusion. The American Board of Forensic Odontology 1986[1], has stated that, the comparison of ante- and post mortem data, can result in any one of the following:

Fig. 1: Various prosthetic restorations – Forensic work



a. Positive Identification: Comparable items are sufficiently distinct in the ante mortem and post mortem database, no major differences are observed.
b. Possible Identification: Commonalities exist among the ante and post mortem databases but, a sizeable information is missing, to enable a positive identification.
c. Insufficient Identification: Insufficient supportive evidence is available for comparison and definitive identification. Identification is conclusive.
d. Exclusion: Unexplainable discrepancies exist among comparable items in the ante mortem and post mortem databases.

Dental Record as a Legal Document

The dental record is a legal document owned by the dentist and contains subjective and objective information of the patient.

The data from the examination of the oral and surrounding structure must be recorded. Also, the results of he clinical and laboratory tests, study casts, photographs and radiographs must be entered into the data and preserved for 7 to 10 years. All records have to be signed by the recording personnel.

Computer generated dental records are becoming more common[1]. One advantage of the electronic record, is that, it can be easily networked and transferred for forensic cases requiring dental records for identification.

Neville et al 2002, stated that, all dental information that may be required to solve a forensic case, should be properly maintained and accessible.

Radiographic Examination

Luntz 1977, stated, that identification becomes easier, if the angulation of the xray films to the xray tube is the same as for the original ante mortem radiograph. Comparison of ante mortem and post mortem radiographs, remains, the most accurate method for identifying the remains (Wood et al 1999). Observations viz; distinctive shapes of restorations, root canal treatment, buried root fragments bases under restorations, tooth root morphology, sinus and jaw bone patterns can be identified only on radiographs. Wood et al 1999, stated that digital dental radiographs can be superimposed and thus, used for identification, by comparing the spatial relations of the roots, and supporting structures of the teeth. When an ante mortem record is unavailable, the post mortem chart of the data can be used to exclude the indivual from the known individuals with known records.

Fig. 2: Identification with the help of ante- and post- mortem radiographs.

Age Determination based on dental data

Age determination is a subdiscipline of forensic sciences. Small variations in tooth formation & eruption among persons has made dental estimation of chronological age the primary method of age determination. Human dentition follows a reliable & predictable development sequence. Radiographs show the morphologically distinct stages of mineralization. Such determinations are also based on the degree of formation of root & crown structures, stages of eruption, & the intermixture of primary & adult dentitions.

Bite Mark Evidence

The bite marks inflicted on a person can be used as evidence and also can be used to identify the bites. The bite mark pattern can be compared with the dentition of a suspect. Animal bites can be distinguished from human bite injuries by differences in arch alignment and specific tooth morphology.

- Sweet et al (2001) stated that, teeth are weapons and that imaging of shape, size and pattern allows a comparative analysis – which helps to as certain if the bite is self inflicted, or formulating a positive identification of a subject.
- Preety et al (2001) stated that the role of the forensic dentist should be to identify deceased individuals.
- Sheashy and MacDonald (2004) established the general guidelines of interest to the general dental practitioner, in context with forensic bitemark analysis protocol.
- Sweet and Pretty (2001) recommended the guidelines for American Board of Forensic Odontology [2]:

1. Documentation of the mark itself on presentation as, overtime the healing mechanism of the body will change the overall appearance. Inflammatory oedema may observe good evidence collection.
2. Location of marks over the body- to determine the nature of attack.
3. Photography of the mark, for comparison with the subject's dentition and also as hard copy of the primary evidence.
4. An impression of the site in preferably, polysiloxane, because of greater dimensional stability. The impression may be gypsum or self cure PMMA.
5. Evidence from suspects includes complete oral examination, charting, photographs, full arch impressions and casts, alongwith wax interocclusal record.

Fig. 3: Visual index of the bitemark severity and significance scale.

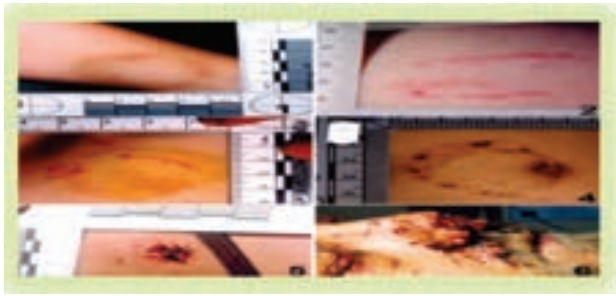
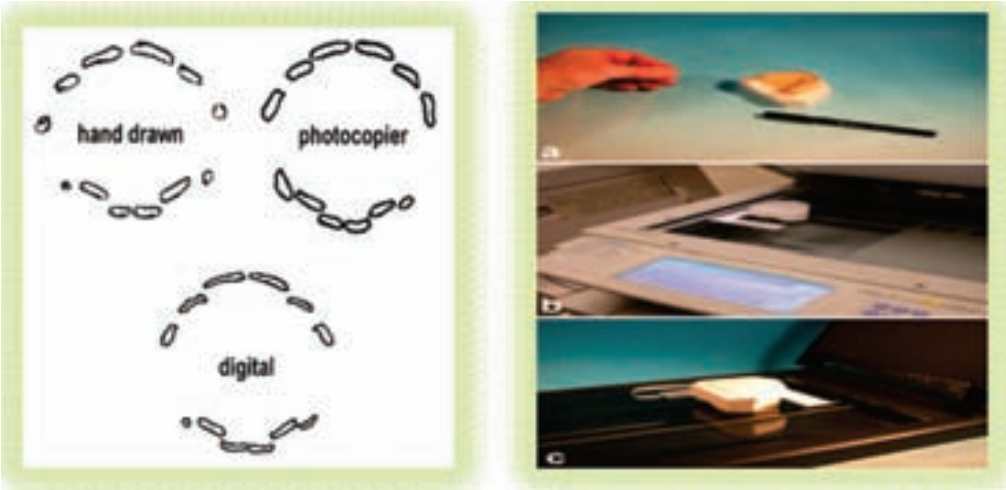


Fig. 4: Overlay production methods and example of resultant overlay



- Berg et al (2000) stated that, if dental imaging methods are employed, for example, Magnetic image resonance, Computer Aided Topography or stereoscopic approaches are used, then the original submittable form of evidence is any visual/ pictorial printout or optical output readable by sight.
- Berg also recommended digital signing or digital water marking if computer generated evidence is used. This involves, assigning a binary encryption key to the data file for the image. This member is inserted into the file data and a twelve to twenty five alphanumeric string is given which can be written down. This will prevent / reveal tampering of the evidence.
- **Traditional methods of forensic dental identification include**
  - Photographic acetate overlay.
  - Hand articulation of physical casts.
- **Newer advances in dental imaging include**
  - Stereophotogrammatic 3-D scanning.
  - Magnetic resonance imaging.
- **Acetate overlays**

The Occlusal surface of the subject's dental casts and the bitemark surface is photocopied on A4 acetate overlays. A direct comparison can be made of the suspect's arch form and the bite marks.

- **Hand articulation of the casts**

Dental stone cast of the suspect and the food item are held accordingly. The bitemark tooth trails and stop points are assessed and the casts can be articulated by hand easily.

- **3-D Stereophotogrammetry**

Originally developed by Faraday Institute university of Glasgow; comprise of twin single lens reflex camera system. The distance between both the eyes is 20 mm from inner canthus. This binocular disparity, when integrated by the visual cortex in the brain, results in a combination of images to create depth and field; the process of fusion being known as "stereopsis". Siebert and Urquhart (1994) developed the C3D models of real objects.

- **Magnetic resonance imaging (MRI) or Nuclear magnetic resonance (NMR)**

Chudek et al (2003) used MRI scan[2] to trace the bitemark trails and stop marks in food items, for forensic purpose. These images can be used, to identify areas of anatomical interest, in order to identify a possible suspect. Example surface lines from fractured areas of enamel, interdental discrepancies. Drawbacks of NMR are the size of the equipment and cost; however the advantages are the overall images and their manipulation to form 3D images, to allow possible positive identification of the individual; without having to make impressions or casts.

- Bite mark analysis steps are as follows:
  - Recognition.
  - Documentation.
  - Evidence collection and preservation (DNA and physical evidence).

Fig. 5: Bite mark for comparative analysis and identification.

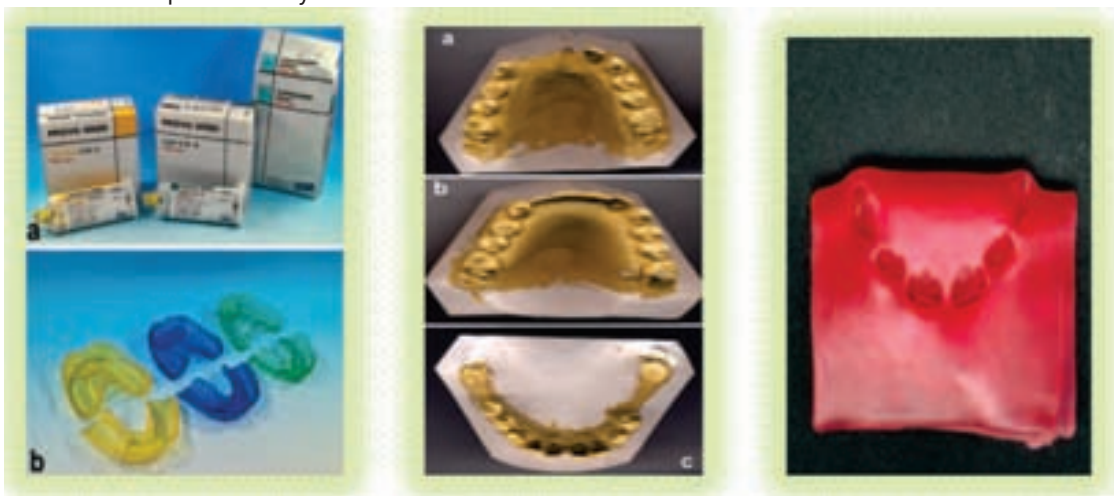
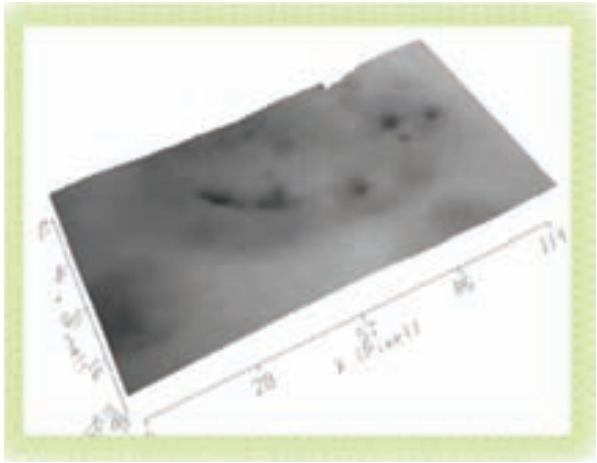


Fig. 6: 3D rendering of a bitemark from a standard MRI image.



- Physical dental profiling of the questioned evidence (bitemark).
- Physical dental profiling of known evidence (suspect).
- Comparison of bitemark and suspect dental profile.
- DNA profiling of bitemark salivary swab and suspect's DNA.
- Communication of results to authorities and legal counsel.

Domestic Abuse

The dentist can recognize domestic abuse, in cases of unusual oral injuries, which are inconsistent with the historical and chronological explanation of their origins. Examples include- fractured teeth, laceration of the labial or lingual Frenum, missing or displaced teeth, fractures of maxilla or mandible, bruised or scars on lip. These injuries may be repetitive in nature and may present in various stages of resolution.

Application in edentulous persons

Edentulous persons possess few features of teeth which can be used for forensic identification. This is further complicated by the alveolar bone resorption and atrophy of maxilla and mandible. Radiographic features of edentulous jaws are significantly changed with time.

One common method used for identification is denture labeling. Richmond et al 2007, outlined the following methods for denture labeling[3,4].

i. Onion skin: with patient's name typed on it, incorporated in the dentures during packing procedure.
ii. Metal strip: with patient's name typed on it embedded into the denture.
iii. RFID: tag or transponder incorporated into the denture.
iv. Fibre tipped pen: used to label a partially polymerized PMMA strip.
v. Photographic slides: incorporated into the denture after labeling.
vi. Stainless steel tape: labeled-incorporated in dentin.

Implant based identification

Sewerin 1992 first described and analyzed radiographic images of ten dental implants from different viewing angles. Morphological features of dental implants depicted on radiographs may be used to develop a dental profile of the individual in forensic cases. Nuzzolese et al 2008 [5] archived radiographic images of Italian dental endosseous implants to be employed in forensic caseworks to narrow the investigation of unidentified victims with one or more dental implants. Some implants have perforations, grooves, apical chambers and threads that are visible only at certain rotation or angulations. These unique features are helpful in recognition of specific products.

Influence of age, sex and body mass index on facial soft tissue depths

Different forensic facial imaging techniques are available to try and recreate the facial appearance of an individual [10]. One method is – "Craniofacial approximation"- which consists of recreating the face of an individual based on skull.

Craniofacial approximation is based on a correct application of rules of thumb in combination with facial soft tissue depth data. Rules of thumb define the shape of the facial tissue envelope.

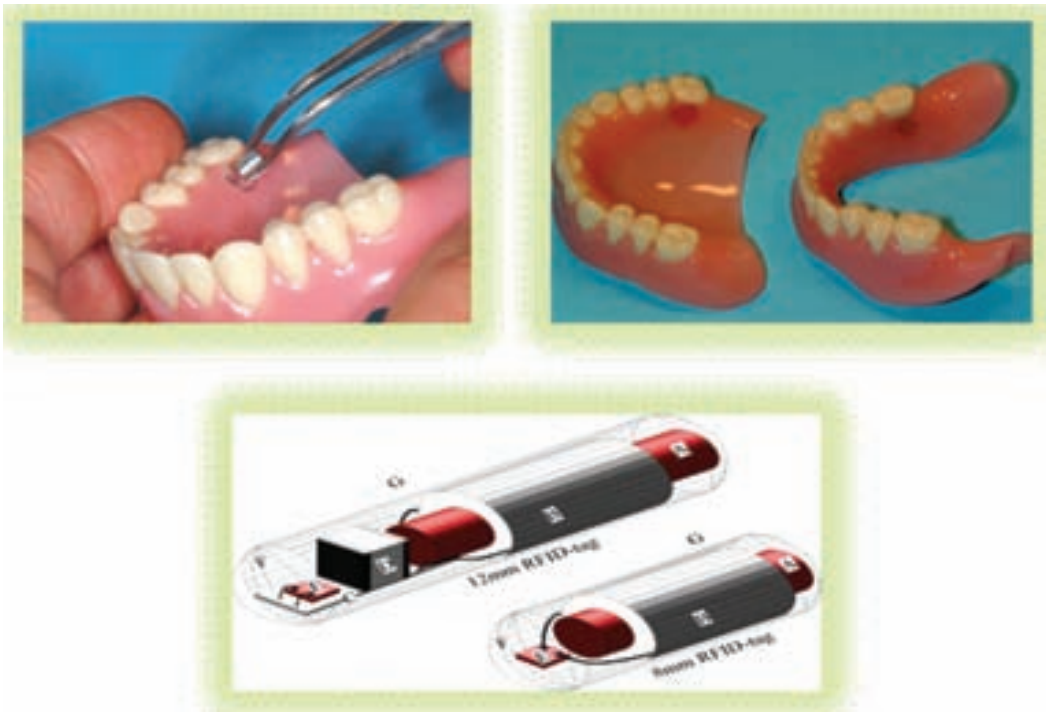
Suzuki (1948) had stated that the tissues around the eyes were not affected by the body mass index.

Aulsebrook and Van Rensberg (1982), concluded that strict adherence to traditional tissue depths for white and black races, in the reconstruction of a skull of mixed racial origin may compromise the accuracy of facial approximation.

Wilkinson(2004), reported that, there are classic statistics of mean, median, standard deviation or ranges for different ethnic groups, subdivided into different categories based on body build, age and sex.

Fig. 7: Domestic abuse identification

Fig. 8: Denture labeling methods traditional and modern - eg RFID



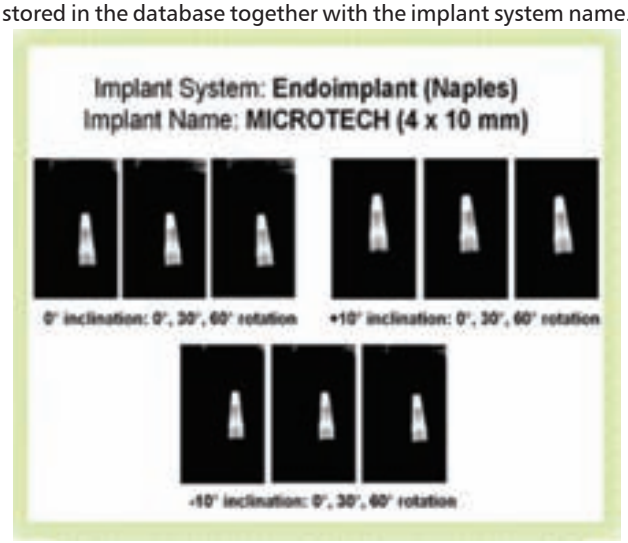
De Graf et all (2009) stated that the cheek and mandible zone are most affected by the body mass index and the anterior nasal spine and chin region are least affected.

Amongst all races, males have thicker tissues over most of the face, especially at the brow, mouth and jaw while females have thicker tissues at the cheeks.

DNA analysis of samples from acrylic prosthesis

- Inoue et al (2000), in their work, demonstrated possibility of personal identification by DNA analysis of samples from dental prosthesis made of acrylic resin. The amount of DNA extracted from 0.5x 0.5x0.1 cm resin pieces, ranged from 35.7 to 1.52ug; irrespective of whether the prosthesis was allowed to dry or the length of time it had been used in the oral cavity. Sex determination by amplification of segments of the amelogenin gene acid typing of 184 bp fragment in the D4S 43 locus was possible.
- They stated that, dental materials in the oral cavity are exposed to saliva, and when they are removed, salivary components may remain on the surface. Submandibular- sublingual saliva promotes the adhesion of microorganisms to PMMA, it may also mediate adhesion of oral epithelial cells and leukocytes to resin prosthesis.
- They concluded that, the size of a resin piece equal to a tooth, was sufficient to obtain DNA for several PCR analysis.

Fig. 9: Examples of the nine images archived per each implant stored in the database together with the implant system name.



Summary & Conclusions

Forensic dental fieldwork requires an interdisciplinary knowledge of dental science. Teeth and prosthetic restorations are helpful in identifying individuals in cases of crime and / or natural disasters. Prosthodontists, with their training in recording of oral structures, can easily identify the individual, by means of simple labeling or marking or electronic surveillance methods. They can also record the bite marks in cases of assault and help to identify the bites.

Fig. 10: Craniofacial approximation

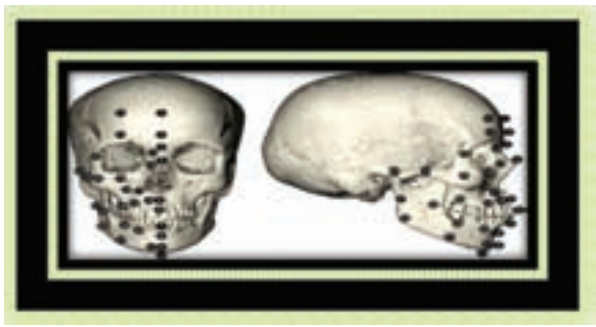
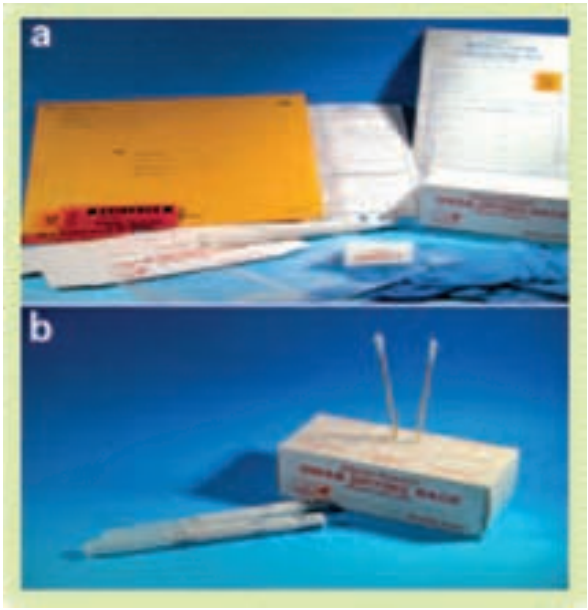


Fig. 11: DNA isolation kit from acrylic prostheses and bitemarks.



This presentation reviews the various methods available to the forensic odontology team, which can help in solving crime, or to identify the deceased in calamities.

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Acute Copper Sulphate Poisoning: A case report and review of literature

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Abstract

Copper sulphate toxicity is a rare event in the US but it is commonly used as a form of suicide in India. It is commercially available and found in products of fungicides, insecticides, and is used in whitewashing, leather manufacture and to bind colors to fabrics. However, the pathophysiology of acute copper intoxication is not well understood and its management has not been established. Here a case of suicidal ingestion of copper sulphate in a young male is presented along with a brief description about the management and literature review regarding copper sulphate poisoning.

Key Words

Copper sulphate; acute poisoning; fatal.

Introduction

Copper is an essential trace material in Humans. It is vital for the functioning of certain enzymes such as Cytochrome C Oxidase[1]. Copper sulphate is odorless, transparent blue triclinic crystals or crystalline granules or powder, having a pH of 4.0, specific gravity 2.28 at 15.6 C and a solubility of 31.6 per 100 cc of water. The compound is Stable under ordinary conditions of use and storage. When heated to decomposition, Hazardous decomposition products like cupric oxide and sulfur oxide may form. It is used in dyeing cotton and silk, manufacturing green and blue pigments, for electroplating with copper soap, ink for marking tin; hair dye; insecticide mixtures[2] (Bordeaux mixture, etc.) for treating the "white disease" of vines caused by Oidium, preserving bides, wood, and railway ties, tanning leather[3], electric batteries, process engraving, destroying algae, etc., in pools and as primary standard in analytical chemistry. Due to its easy availability it is commonly used as a form of suicide in India[4].

Fig. 1: Showing blue stains over external wall of stomach and its adjoining region.

Case Report

A 28 yrs old male, rickshaw puller by profession, was brought to the casualty wing with the history of ingesting some poisonous substance at home. He was allegedly suffering from depression for past few days regarding some financial problem. He was declared brought dead by the attending doctor and the body was sent to the mortuary for PM examination.

During autopsy it was a dead body of young male of average built. Face was congested and no injuries were present over the external surface of the body.

During internal examination, a bluish colored material mixed with mucous was found to be present inside the esophagus. On opening the abdominal cavity, same material was found to stain the external walls of the stomach and the adjoining omentum and intestines (fig 1).

On opening the stomach, about 150 ml of bluish material was present inside it and its walls were congested showing patchy hemorrhages at places (fig 2).

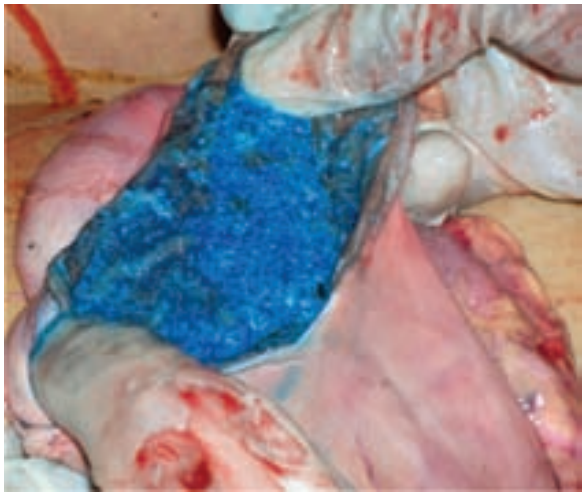
The viscera were sent for chemical analysis whose report shows presence of copper sulphate in the stomach and intestinal contents. The cause of death given was acute copper sulphate poisoning.

Discussion

The lethal dose of cupric sulphate has been described to be as low as 1 gm[5]. Ingested copper induces mucosal irritation, nausea, vomiting and diarrhea. Ionized copper is readily absorbed from stomach and intestine, and the serum copper level increases rapidly. The element is bound to albumin and ceruloplasmin, and is taken up by liver, kidneys, lungs and red blood cells. Hemolytic anemia and renal tubular necrosis may follow 36-48 hrs after exposure. The primary route of excretion is through bile and feces[6].

The toxicity of copper at cellular level is probably related to sulfhydryl groups. Copper inhibits sulfhydryl moieties of Glucose-6-phosphate Dehydrogenase and Glutathione, thereby reducing their free radical scavenging activities. Copper induces hemolysis through oxidation of hemoglobin sulfhydryl groups. Copper also inhibits Na+/K(+)-ATPase and increases the permeability of cell membrane. Since copper is known to damage human skeletal muscle cells[7], copper intoxication could cause rhabdomyolysis. Although a case of copper-induced acute rhabdomyolysis in Wilson's disease was reported, rhabdomyolysis in acute copper intoxication has been rarely reported. This might be because myoglobinuria might be overlooked by the coexistence of hemoglobinuria secondary to hemolytic anemia. The treatment for ingested copper overdosage includes dermal decontamination, cautious gastric lavage and supportive therapy. Dimercaprol, penicillamine and edetate calcium disodium might be considered for massive copper ingestion, and persistent symptomatology or persistently elevated serum copper concentrations. For serious poisoning, it is considered best to administer dimercaprol intramuscularly 4 mg/kg/dose every 4 hours for 5-7 days. Penicillamine is usually ad-

Fig. 2: Showing Stomach content.



ministered orally in doses of 250-500 mg/dose every 8-12 hours. Edetate calcium disodium is also a drug of choice, but the agent has not been approved in Japan for copper intoxication and so was not used in this case. Dialysis or hemoperfusion has not been demonstrated to increase the elimination of copper, since copper binds to serum and tissue proteins. However, chelated copper would be removed from serum by diuresis and dialysis.

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Intraneural Cyst of Common Peroneal Nerve – A Case Report

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Abstract

Intraneural cyst of common peroneal nerve is a rare case of foot drop. A patient presented with swelling on the lateral aspect over the head of fibula and foot drop. The patient had difficulty in walking. Case was investigated. Radiographs revealed no abnormality but MRI was diagnostic. Surgery was done with excision of the cyst and marsupalization of common peroneal nerve. The patient was then followed-up with improvement in dorsiflexion of foot and improved walking over subsequent follow-ups.

Key Words

Intraneural, swelling, dorsiflexion.

Introduction

Acute injury to the peroneal nerve is a frequent occurrence due to trauma, surgery or postural entrapment of the nerve at the fibular head. Non-traumatic causes are rare and commonly involve tumors, intraneural ganglia, hematoma or cysts[2,3].

The peroneal nerve branches from the sciatic nerve at the popliteal groove ,passes over the lateral head of gastrocnemius muscle lateral to the groove; having a very superficial route in the 4 cm long area below the knee and around the fibular head and neck, the nerve is only protected by the skin and superficial fascia. It passes through a fascial fibrous arch surrounded by the long peroneal muscle and the intermuscular septum. In the peroneal nerve mononeuropathy frequently encountered in the lower extremity, the nerve is injured commonly in this 4 cm long area where it shows a superficial location or is entrapped when the fibrous arch is thickened, narrowing the tunnel the nerve passes through[1,3,5].

Fig. 1: Photograph of patient showing foot drop.

Case Report

A sixteen-year old adolescent male presented with foot drop and a small swelling over the head of the fibula on the right side for the past three months. There was no history of trauma, surgery or abnormal posture.

About three months back the patient noticed a small swelling on the lateral aspect over the head of fibula. The swelling increased slowly for the first two months and had remained static for the past one month. Initially he complained of pain in the leg as well as tingling sensation. He had some difficulty in walking and clumsiness of foot which progressed to foot drop.

On examination, the patient had a high-stepping gait. There was atrophy of the leg muscles as well as foot. The patient was unable to dorsiflexion the foot (Fig-1). On neurological examination, there was decreased sensation over the leg and dorsum of foot in the distribution of common peroneal nerve.

There was a small swelling about the size of a coin over the head of fibula on right side (Fig-2). The swelling was non-tender but tapping over the swelling revealed a tingling sensation in the leg. The consistency was soft and margins were well defined.

The case was investigated. The x-ray of the leg and foot revealed no abnormality. Fine needle aspiration cytology of the swelling revealed some cystic material. But the diagnosis was confirmed on MRI which revealed an intraneural cyst of common peroneal nerve as the cause of foot drop (Fig-3).Surgery was carried out with excision of cyst and marsupalization of common peroneal nerve.Patient was followed-up at monthly intervals. In the first few follow-ups, there was slight dorsiflexion of the toes and in the subsequent follow-up there was increased dorsiflexion of foot. Patient now can dorsiflex the foot against gravity and is still under regular follow-up [Fig-4].

Fig. 2: Swelling over head of fibula

Fig. 3: MRI showing intraneural cyst of peroneal nerve

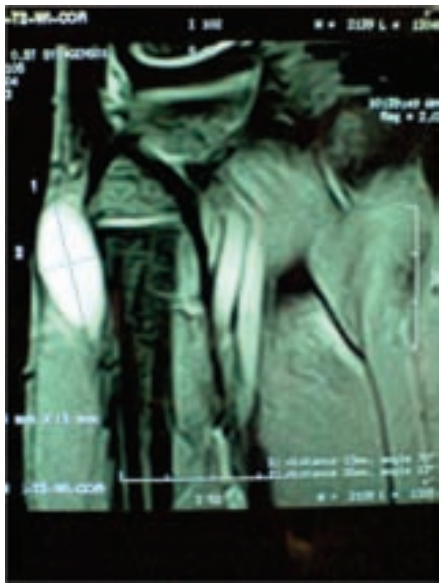

Fig. 4: Follow up showing partial recovery of dorsiflexion

Discussion

Intraneural cysts are rare and benign nerve tumors. There are commonly reported in the legs mostly affecting the common peroneal nerve at the neck of fibula. Lesions may occur in motor or sensory nerves but mostly in mixed nerves. Although they usually affect the ulnar nerve at the elbow, cysts have also been reported at the following sites: (i) the posterior interosseus nerve at the level of brachioradialis; (ii) the median nerve at the level of pronator teres and in the carpal tunnel; (iii) the ulnar nerve in Guyon's canal and at the level of the deep palmar aponeurosis; (iv) the digital nerves and their dorsal branch[4,6,7].

Intraneural cysts often affect middle-aged men and usually present with pain or the symptoms of nerve compression. The appearance of clinical signs after exertion is characteristic. A history of acute minor trauma is often noted. The pain may be due to intracystic bleeding. Soon after neurological deficit appears in the corresponding nerve territory and the pain settles briefly. The time between the onset of symptoms and diagnosis varies from 1-2 months to 2 years[1,8,9].

Pain is usually intermittent and a positive Tinel's sign is uncommon. A swelling or nodule on the course of the nerve may be found. A motor deficit is usually present with sensory change in 50%. Plain radiographs are usually normal. Although ultrasound can identify the location and nature of the cyst, MRI is diagnostic. It can also assess the state of the nerve. MRI allows differentiation between an adjacent articular synovial cyst and a cystic schwannoma[6].

Treatment is always surgical. Nerve resection and grafting must not be performed even if the lesions appear to be extensive. It is essential to maintain nerve continuity, first by incision and drainage of the contents of the cyst after epineurotomy, then by division of the neighbouring fibro muscular arch. An exoneurolysis is also performed. Complete resection of the cyst is dangerous if not impossible. There is no plane of dissection between the tumor and the adjacent fascias. The contents of the cyst are similar to those of synovial cyst. The intracystic liquid is a cellular mucopolysacchandle.[2] The cystic wall has a fibro lamellar pattern and contains some inflammatory cells.

For long-standing tumors, the mean time to neurological recovery which occurs in most cases is ten months. Pain disappears rapidly after decompression and recovery occurs within a few months. Recurrences are rare. Long-term follow-up should include clinical examination and MRI, if necessary.

The pathogenesis remains controversial. The tumor is generally caused by mucoid degeneration of fibrous tissues or metaplasia of neural connective tissue after repeated micro trauma of the nerve within a confined space. Some have proposed that intraneural cysts originate in embryonic, ectopic, synovial fluid and that the cystic masses develop secondarily.

The intraneural cyst of common peroneal nerve is rare and benign tumor which remains an enigma. Successful surgical treatment depends upon early diagnosis before nerve damage has occurred.[5,9] Our principal concern is the risk of recurrences, a worry which warrants long-term review.

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Iatrogenic Periodontal Injury Due to Pulp Devitalizer – A case report

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Abstract

The aim of this paper is to report clinical complications (pain, necrotic gingival tissue and bone sequestration) resulting from accidental spillage of pulp devitalizer. Paraformaldehyde based devitalizers are commonly used in endodontic treatment for pulp extirpation. This paper presents a case where accidental contact of paraformaldehyde with the interdental gingiva led to localized necrosis of the gingiva and interdental alveolar bone. Surgical intervention was required wherein the necrosed bone was removed and the bone defect was filled with bone graft. The flap was coronally repositioned and sutured securely. After the treatment, the patient's complaints had resolved. Spillage of the product was responsible for marked necrosis of the gingiva and the alveolar bone. Therefore, great care must be exercised while delivering of such products during treatment.

Key Words

Gingival necrosis, bone sequestrum, osteonecrosis, paraformaldehyde.

Introduction

There are lots of materials used in dentistry which have been shown to be toxic to the periodontium. Paraformaldehyde based 'devitalising' agents are commonly used in endodontics to devitalize inflamed pulps when effective anaesthesia can not be obtained.[1] Although effective, the use of paraformaldehyde preparations in the palliative treatment of endodontic pain is not without risk as there may be unfavourable adverse effects on soft tissues and bone.[2-4] Caustinerf paste is one such paraformaldehyde based product that is used successfully in dental treatment in various countries for devitalisation of the pulp. Such toxic chemical agents should be used very cautiously in the oral cavity,so that they do not come in contact with the gingiva or other parts of oral mucosa during placement. Unfortunately, sometimes unintentional spillage may occur.[5-6] This may not only lead to superficial mucosal injuries but may also penetrate deeper into bone and cause its necrosis. These local conditions that adversely affect the blood supply or lead to tissue necrosis can also predispose the host to a bone infection or localized osteomyelitis[7,8].

In this paper we describe a case of chemical necrosis of the marginal gingiva and necrosis of the maxillary alveolar bone as a consequence of spillage of pulp devitalizer (Caustinerf) and its treatment.

Case Report

A 20 year old male patient without any systemic diseases was referred to the Department of Periodontolgy and Implantology, Sardar Patel Dental College, Lucknow in January 2009. Patient arrived with the chief complaint of acute pain and discomfort in the left maxillary area. The clinical examination showed a marked area of necrosis of the interdental papilla (Fig.1) and the buccal marginal gingival of the upper left first molar (tooth #26). The interdental gingiva on the palatal aspect was intact (Fig.2). Necrosed gingiva had left the interdental alveolar bone exposed in the cavity. The exposed bone was dark in colour and hard in consistency. A peculiar rotten odour was also noticed. Palpation of the bone revealed that it was mobile as well. Periodontal probing of the buccal gingiva showed an 11mm pocket. The periodontal condition of the rest of the teeth was good. The radiographic examination showed that the tooth was endodontically treated. The coronal interdental bone was less radio-opaque as compared to the apical bone.

Previous history revealed that 3 month earlier the patient had pain in the left side of the maxilla. At that time, the clinical examination showed a deep carious lesion on the distal side with a pulp polyp, chronic pulpitis was diagnosed and endodontic

Fig. 1: Gingival necrosis around maxillary 2nd premolar and 1st molar with exposed bone.

Fig. 2: Palatal view of the same region showing the unaffected gingiva

Fig. 3: Necrotic bone can be seen after flap reflection

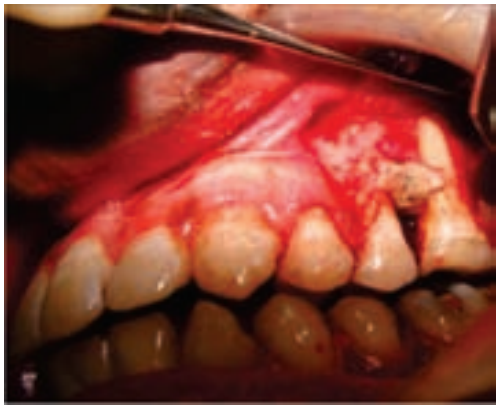

Fig. 4: After curettage Necrotic bone can be seem separated from the underlying healthy bone.

treatment was done. On enquiring from dentist it was revealed that the dentist had devitalized the pulp with a paraformaldehyde preparation (Caustinerf) during endodontic treatment and sealed the cavity with a temporary filling material. Two days immediately after that patient had experienced pain and gingival burning. Patient was advised to use local astringent paste to control burning sensation but when there was no relief patient was referred to our department.

Treatment Rendered

With the clinical diagnosis of localized osteonecrosis the patient was given prophylactic antibiotics for three days and then scheduled for surgical sequestrectomy. On the day of surgery, after locally anesthetizing the area, the full thickness periodontal flap was raised both buccally and palatally. Buccally two vertical releasing incisions were also placed. Surgical exploration of the area confirmed that there was bone destruction and a breakdown of the maxillary buccal cortical bone in the interproximal septum between the first molar and second premolar. On close examination it was seen that the ecrotic bone (Sequestrum) was completely separated from the underneath healthy bone. On exploration an intervening soft tissue zone (Fig.3) was found which kept the necrotic bone attached to the underlying bone. After performing thorough curettage, the sequestrated bone could easily be differentiated from the healthy bone (Fig. 4). The sequestrum was then carefully removed (Fig.5). Removal of the sequestrum left a deep interdental angular defect between the two teeth (Fig.6). After curettage and irrigation of the area, the defect was filled with a block of hydroxyappatite bone graft (Fig.7). The flap was then released by dissecting the periosteum and coronally repositioned so as to cover the graft and to compensate for the recession (Fig.8). The flap was sutured in place and periodontal dressing was given. The postoperative period was uneventful and the patient kept on short antibiotic treatment (amoxicillin 500 mg+clavulanic acid 125 mg) and an anti-inflammatory (ibuprofen 400 mg) three times daily for 7 days, which led to successful healing of the wound. During the healing period the patient was kept on oral hygiene maintenance and chemical plaque control with Chlorhexidine 10ml twice daily.

Fig. 5: The excised pieces of necrosed bone

Discussion

Several agents are used to devitalize extremely painful pulps prior to extirpation. Paraformaldehyde containing products are very commonly used for the same purpose.[9-11] Paraformaldehyde is a strong disinfectant and a fixative recommended in low concentration as an intracanal medicament.[12] Caustinerf is a paraformaldehyde preparation (the paste contains

Fig. 6: Defect seen after sequestrum removal

Fig. 7: Autogenous bone graft placed in the defect

Fig. 8: Flap coronally slided and sutured in place

paraformaldehyde, lidocaine and phenol), used when anaesthesia is not sufficient for pulp extirpation. According to the manufacturer this product should be applied in close contact with the exposed pulp, covered with a cotton pellet and meticulously sealed with zinc oxide eugenol or other temporary cement. The paste should remain in the pulp chamber for a maximum of 2 weeks.

However, paraformaldehyde is extremely toxic and when placed in contact with the tissues of the body. Osteonecrosis in this case occurred due to accidental contact of paraformaldehyde devitalizer with the surrounding gingiva. Caution should be exercised during its use, by properly isolating the surrounding tissues from the tooth. Post-treatment evaluations showed complete healing.

Conclusion

Iatrogenic causes originating from dental treatment, if overlooked, can account to considerable morbidity and occasional mortality. Dental treatment procedures can worsen the oral and systemic health of patients if care is not taken during treatment. The dental practitioner has a responsibility to follow basic precautions during the delivery of various chemicals, with particular attention to safeguard surrounding tissues.

Rubber-dam and other isolation measures can be the important protective factors from iatrogenic morbidity.

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Stevens-Johnson Syndrome- A case report

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Abstract

Stevens–Johnson syndrome is an immune complex hypersensitivity reaction that can be caused by many factors such as infections, drugs and malignancies. We present a case of Steven-Johnson syndrome that developed oral, cutaneous, ocular and genital lesions.

Introduction

Stevens-Johnson syndrome, otherwise known as erythema multiforme majus, is thought to represent a continuum of disease, the most benign type of which is erythema multiforme, whereas toxic epidural necrolysis is the most severe.[1] The condition was first described in 1922 by Stevens and Johnson as a febrile illness with stomatitis, purulent conjunctivitis, and skin lesions.[2] The syndrome is generally described as vesiculobullous erythema multiforme of the skin, mouth, eyes, and genitals.[3]

This study reports a case of Steven-Johnson syndrome that developed oral, cutaneous, ocular and genital lesions.

Case Report

An 11 years male child has reported to the Department of Oral Medicine and Radiology in the Institute of Dental Sciences, Bareilly with the chief complaint of of burning sensation and ulceration in his mouth and lip since 1 week.

Patient gave the history of ulcerative lesion of sudden onset for duration of 1 week with associated symptoms of pain, bullous and erosive erythematous lesion in the oral cavity, conjunctiva and on external genitalia. Same type of lesion was also present on chest, axilla and foot. A patient gave past history of fever, malaise, diarrhoea and conjunctivitis since one month.

On examination there was extra-oral bloody crusting and painful ulceration of lips. Intraorally there was diffuse red and white patch along with sloughed left buccal mucosa. Conjuctivitis was also present. Other findings includes typical 'target' or 'bull's eye' lesion present on chest, trunk, axilla, hands and toes. There was also presence of genital ulcers.

Histopathology

The PAP and H-E stained cytosmears showed normal appearing epithelial squames and inflammatory cells in mucinous background with cell debris. Inflammatory infiltrate comprising of neutrophils, lymphocytes and few macrophages were seen. Bacterial colonies were also appreciated.

Clinical correlations were suggestive of Steven Johnson Syndrome.

Discussion

Stevens-Johnson syndrome occurs most often in children and young adults.[3] Incidence ranges from 1.2 to 6 cases per million per year; the condition is fatal in 5% of treated cases and in 15% of untreated cases.[4] Stevens-Johnson syndrome can be preceded by a prodrome consisting of fever, malaise, sore throat, nausea, vomiting, arthralgias, and myalgias.[5] This prodrome is followed within 14 days by conjunctivitis and by bullae on the skin and on the mucosal membranes of the mouth, nares, pharynx, esophagus, urethra, and vulvovaginal as well as anal regions.

Stevens-Johnson syndrome commonly affects multiple organs, and esophageal strictures develop in some patients[6]. Ocular complications occur in about 70% of patients with Stevens-Johnson syndrome. Photophobia and a purulent form of conjunctivitis may be present initially, but corneal ulcerations and anterior uveitis can develop. Secondary infection, corneal opacity, and blindness can follow.[5] Pulmonary involvement may first appear as a harsh, hacking cough,[3] and chest x-ray films may show patchy areas of tracheal and bronchial involvement. The stomach and spleen can also be affected, and renal complications can occur in the form of acute tubular necrosis[5].

Fig. 1: Bloody Crusting and Painful Ulceration of Lips

Fig. 2: Conjuctivitis

Fig. 3: Target' or 'bull's eye' lesion

Medications appear to be the most common cause of Stevens-Johnson syndrome and have been implicated in as many as 60% of cases studied.[5] Short courses of sulfonamide, aminopenicillin, quinolone, and cephalosporin drugs all increase risk of Stevens-Johnson syndrome. Longer-term therapy with anticonvulsant agents, oxicam, nonsteroidal antiinflammatory drugs (NSAIDs), or allopurinol has also been named as a possible cause of Stevens-Johnson syndrome. Even some chemicals, such as silver nitrite present in a wound dressing, have been implicated. Although many medications have been blamed, some drugs administered for prodromal viral syndromes might have been falsely accused of causing Stevens-Johnson syndrome.

Stevens-Johnson syndrome also has been linked to herpes simplex virus, mycoplasma bacterial species, and measles vaccine. Neoplasms and collagen diseases have also been pointed out as possible causes.[5] However, in up to half of cases, no known cause can be found[5].

Treatment for Stevens-Johnson syndrome is as diverse as the symptoms but should begin by withdrawing any offending agent identified. Many skin lesions can be treated with any of various topical mixtures, such as wet Burrow's compresses. However, extensive skin involvement requires the staffing provided by a major burn unit. Treatment consists of warming the environment, increasing caloric intake, preventing super infection and sepsis,

Fig. 4: Genital lesion

and correcting electrolyte disturbance. Affected patients and their first-degree relatives should be instructed to avoid any identified drug or chemical that may be responsible.

Ocular involvement can be treated with topical corticosteroid agents, artificial hydration, and antibiotic agents when indicated. Pain from oral lesions may be lessened by rinsing with viscous lidocaine. A 50% water-to-hydrogen peroxide mixture can be used to remove necrotic buccal tissue. Antifungal and antibiotic agents should be used for superinfection.

Although mild forms of erythema multiforme majus may resolve in two to three weeks, recovery from Stevens-Johnson syndrome may require two to three months, depending on the number of organs affected and the severity of disease.[3]

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Identification of Humans Through Bones and Skull

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Abstract

The developments in forensic science have introduced many vital crime solving techniques over the past few decades. It has shaped the world of justice, fuelling crime investigations and signifying the progress of modern technology. This article attempts to review different aspects of forensic science and emphasise the key role it plays in determining the identity of humans through skull and bone.

Key Words

Forensic science, skull, medico–legal.

Introduction

The identification of unknown deceased individuals is important for humanitarian reasons, estate purpose and criminal investigation. When a collection of bone is discovered, wherever possible the routine procedure should be followed.[1] The first thing to ascertain is whether any of the bones are human as bones of animals are frequently found, and these are not easy for a lay person to distinguish as being non human.[2] Difficulties arise where human foetal or newborn skeletal remains are concerned as they often bear little or no resemblance to their adult counterparts and may easily be mistaken as belonging to an animal such as dog or rabbit. A trained opinion should always be sought and if any doubt exists the bone should be photographed, collected labeled as to their disposition, and carefully packed and sent for expert laboratory examination.[3]

When human skeletal and dental remains are found the two main problems which arise are identification of the person and determination of the cause of death. Decomposition of soft tissues not only impairs the identification procedure but often makes it difficult to determine the cause of death, in the absence of obvious skeletal trauma. When a body is badly burned or skeletonised human remains are found, in most cases biological profile gender, age, race, occupational traits and habits have to be constructed.[1,3]

Forensic Significance and time since death

These questions are to some extent linked together. In first instance the time required for a body to be skeletonised can vary widely, depending on such factors as the environment in which it has been, temperature, rainfall, state of dismemberment, either at the time of death or subsequently by predators such as foxes, if buried, whether buried in soil or gravel, the depth of the burial and whether or not the body was wrapped, or covered.[2,4]

If cartilage, such as the rib cartilage or joint surface is present, especially if remains of ligaments are still attached, then this is indication of recent death. The presence or absence of the periosteal covering of the bones is of less importance in this respect as periosteum can be found on bones known to have been buried for over 15 years. Where bones are deeply pitted or eroded, the outer surface is powdery or flaky and likely that they are of considerable age. If such bones are drilled there is no smell of burning or powered bone, and shavings, is not obtained. Such bones are not of immediate forensic significance and may of date form Anglo- Saxon time.

Determination of sex

Form a forensic point of view is important to determine sex of skeleton remains early, as this reduces the possible identification of missing person by a considerable degree. This varies with completeness of the skeleton and also whether it is adult or child. In the case of adult bones if the skeleton is complete, determination of sex accurately by an expert is of the order of 98%, when a skull is about 90% pelvic bones about 95% and if only long bones are presents e.g. femur, hummers etc. available then only 80% accurately sexed. The more bones available for examination, the greater the accuracy and thus every endeavor should be made to retrieve as much skeleton as possible.[5,6]

Skull

Determination of the sex of a skull depends upon traits and measurements. This includes the general size and architecture, the degree of musculature markings size of the mastoid processes in the supra–orbital ridges, depth of the symphysis menti, breath of the palate, contour of the forehead and the development of the zygoma or cheekbones etc. Measurements of the maximum length and breath, cranial capacity, basal skull height, etc may be made and though it considerably overlaps but when considered in conjunction with appraisal of the traits exhibited, it will enable a skull to be assigned gender with the degree of accuracy previously stead. There is appreciable sex dimorphism in palate dimension of in the absence of knowledge about race leads to little success as racial difference in size swamp out male female size out male female size difference. If race can be determined form ancillary information, then palatal dimension can correctly classify two third of the cases according to sex.[1,7]

Pelvis

An assessment in this regard is dependent on traits or characteristics and on certain important measurements. With an entire pelvis (the two pelvic bones together with the sacrum) attention is the first paid to the shape of the inlet to the pelvis (heart shaped in the male, more circular or elliptical in the female). In either pelvic bone the size and direction of the acetabulaum (female smaller and more anterior facing the male) the comparison of the diameter of the length of the superior ramus of the pubic bone (approximately equal in male, latter greater in female) the presence of a preauricular sulcus in front of the sacro–iliac joint and degree of the aversion of the ischiopubic ramus and the sub–pubic angle are all sex based.[2,5]

a) The ischio – pubic index (pubic length \ I schial length * 100) and

b) The angle of the greater Sciatic Notch.

In Europiform the range of the former is the 73-94(mean 84) for the male 91-115 (mean 100) for the female, and the latter is 26-50° (mean 50) and 61-93 (mean 74) for male and female respectively.

Sacrum

The female sacrum is usually more concave, particularly distally, and winder in relation to its length then the male.[1,7] The latter can be expressed as the sacral Index (Breath/length X 100) for male it is 112 and for female 116.

Long Bones

Form a general study of the these it is often easy to assess the sex. In male bones tend to be longer and more massive than the female, with more marked muscle attachments but there is enormous variation and overlap. Sex determination based on examination of long bones alone can be very unreliable.[1,2,6]

Femur

The length of the bone, the diameter of the head and the width of condyle are the best criteria e.g. a femur 450mm in length, with vertical head diameter of 48mm and bicondylar width of 78mm is almost certainly male. Conversely one with dimensions of 39mm, 42mm and 72mm is almost likely female. The length of the femur is less reliable than the head dimensions form the point of view of assessing sex.

Humerus

The most reliable criterion is the vertical diameter of the head. If it is over 46 mm than it is most probably male and if under 42 mm than it indicates for female.

Odontometrical method useful in determining gender

Teeth are often used a way of reconstructive identification. They are particularly useful in the determination of the gender by using different odontometical technique, in the case of major catastrophes when bodies are often damaged beyond recognition.[2] Of different methods used, one is based on the measurement of the lower canine and corresponding canine-incisor group. However, it does not take in to account dental alignment. The mesiodistal diameter of lower canine are comparable to those already reported in the literature taking both sex as together (average 6.7-7) or according to sex mesiodistal diameter of lower canine which differ according to sex, men teeth are always larger than those of women. There are also teeth which apart form their upper equivalents, are the most marked by sexual dimorphism. It is the Y chromosome which intervenes most in the size of teeth by controlling the thickness of dentine, where as the X chromosomes, which were for a long time considered to be the responsible chromosome, are responsible for the thickness of enamel.[3,5,6]

Age at death

The estimation of age play an important part in the forensic identification of the skeletal remains. Anatomical and radiograhical investigation of the state of development and fusion of the bones of the skeleton provides a means of age estimation.[6] Similarly the examination of the stage of formation and the progression of age changes in teeth constitute another source of the information. In some cases where advanced decomposition has taken place or in instances where the remains has been subjected to high temperature, the investigation of the resistance to physical damage, the teeth may be the only skeletal evidence remaining in the sufficiently undamaged condition to permit useful examination. In addition to the importance of age estimation for identification purpose, the assessment of age may have a particular medico–legal significance, for instance, in the investigation of death of a young infant it may be necessary to establish whether the child was still born or whether death occurred afterwards. This point may often be resolved by a microscopic examination of section cut form the teeth. The presence of neonatal line will provide a mean of estimating the line interval between birth and death. Dental development in children follows a specific timeline of dental formation, mineralzation and maturation, which over the year has been extensively studied. These studies have lead to quite accurate pediatric age estimation method.[5,6] In adults, however the age related changes in the dentition are much diverse and thus, the variation in age estimation has been developed for adult teeth. The simple age estimation method is the so called 'visual' method which is based upon clinical experience without using formal methods. In forensic sciences, the use of validates and scientifically based formal methods is prerequisite and thus visual estimate is simply unacceptable. Formal methods of calculation based on morphometric measurements and amino acid racemization have also been developed. The later method, amino acid racemization, suffers form a number of limitations: it is methodologically complex (requires special biochemistry laboratory facilities and experience), time consuming and costly as well. Morphometric of dental age related changes, which are applies into mathematical regression models. One problem with morphomertric methods is that they have not always been subsequently validated in an independent material set or formally compared to each other. Age estimation methods present combination of accuracy, precision, procedure, and requires different equipment. It is best to estimate age in addition to visual age assessment, choose one or more methods that would be best served.[5,6]

Age identification by bones

The bones of the human skeleton (206 in adult) all develop form cartilaginous or membranous precursors by processors of ossification from a number of centers, which vary from bone to bone. The time of appearance of ossification centers, their site, coalescence and degree of fusion with other parts of the definitive adult bone are criteria used in skeletelized whilst the centers race infused it is very difficult to assign them accurately to the appropriate bone. It should also be borne in mind that ossification centers appear earlier often one to years in girls than in boys.[2,8,9]

Detection of drugs on teeth

Forensic toxicology may be valuable aid if applied to potentially one of the best preserved tissue, the teeth. In fact the sensitivity and specificity of modern forensic toxicology analyses have given investigators very powerful means from detecting even small quantities of xenobiotic substances. Although the detection of morphine or other drug related substances from teeth will certainly not per se solve the problem of identification nor provide a certain cause of death, it can give important indication as to particulars habits or indicate a history of drug abuse.[1,5,10]

Conclusion

There are several other methods which are used for identification, majority of which have been mentioned. But the

last which can be done for identification, is DNA testing, STA analysis or Capillary Electrophoresis techniques. By solving the entire questions which were mention earlier can help till some extend the identification of adult skeleton and even collection of foetal bones.

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An Unusual Case of Suicidal Cut Throat- A case report

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Abstract

A young female of 25 years found in a dead condition in public sulabh souchaly's bathroom of Dadar (West) railway station and concerned investigating officer called us for crime scene examination. The concerned investigating officer was asked to take the detailed photograph of crime scene from different angles. External examination of body shows cut throat injury of neck surrounded by multiple superficial incised wounds. The incised wounds were also present on the anterior aspect of both forearms at lower1/3rd levels. Her body was sent to Sion hospital mortuary for medico legal autopsy. The detail case findings were discussed in this case report.

Key Words

Cut throat, suicide, homicide and hesitation cuts/tentative cuts.

Introduction

Usually most common methods adopted by females for committing suicides were by consumption of poison, by setting herself on fire, by hanging and jumping in river/well etc. Male most commonly adopts methods of hanging, cut throat, slashing of wrist and use of firearms. The females rarely use method of cut throat injury for committing suicide as this method involves courage.

Case Report

a. **History:** A female of 25 years resident of Manpada, Thane was travelled to Dadar and she had purchased two kitchen knifes from the Dadar market and then she entered in the public bathroom situated near Dadar (West) railway station. After long time she did not come out of bathroom so attendant informed to Shivaji Park police station and then police broke the door of bathroom. The deceased female was nurse by occupation.
b. **Crime scene examination:** On reaching the crime scene we saw she was lying in a pool of blood with two kitchen knives lying near by her and one carry bag kept over the window of bathroom. Detail inspection of crime scene reveled that it was a compact place and there was no other way of asses to bathroom except the door which was broken by police. Blood sample was collected and two knifes were collected. Body was sent to Sion hospital for medico legal autopsy.
c. **External examination of deceased:** Hesitation cuts were found on anterior aspect of lower1/3 of both forearms and just above both wrist joints. Both sides of neck show multiple horizontal, parallel, shallow, half-hearted cuts on the neck initially suggestive of hesitations cuts around the main fatal wounds. The cut throat injury of neck had head of wound towards the Right side of neck and sloping towards the floor of mouth on Left side and tailing towards the Left. The direction of all injuries over neck was from Right to Left and tailing of wound towards the Left.
d. **Internal examination of deceased:** Following neck structures were clean cut: Skin, subcutaneous tissues, Laryngeal cartilage and Right internal carotid Artery. All internal body organs like liver, spleen, kidneys, brain and lungs were pale. Genital examination was normal and uterus was non gravid. Stomach was containing 100cc blackish coloured liquid, no peculiar odour and mucosa was pale.
e. **Samples preserved:** Blood sample was preserved for toxicological analysis and for detection of blood group.
f. **Cause of death:** "Haemorrhagic shock as a result of cut throat injury" (UNNATURAL).

Discussion

Interesting facts of case was the depth of cut throat wound and clean cutting of Right internal carotid artery. Clean cutting of Right internal carotid artery was pointing towards homicidal cut throat but the multiples hesitations cuts over neck and anterior aspects of both wrist joints pointing towards the suicidal cut

Right hand showing hesitation cuts

Left hand showing hesitation cut

Left side of neck showing cut throat injury surrounded by hesitation cuts

Close view of Left side of neck

Right side of neck showing cut throat injury surrounded by hesitation cuts

Photograph showing cut throat injury and hesitation cuts

throat. Other points which were in favors of suicidal cut throat: the wound was predominately situated on Right side of neck with the slope of wound towards the floor of mouth on Left side and victim was found in a closed room of bathroom and its door was broken by police. The direction of all wounds present over neck was from Right to Left and tailing of wound was towards the Left.

Conclusion

As the victim was nurse by occupation so she had some knowledge of anatomy hence possibility of such depth of cut throat was quite possible. In suicidal cut throat cases victim usually stands before mirror and extend his/her neck to inflict injury. This extension of neck causes internal carotid arteries to go behind the sternocleido mastoid muscles hence they were escaped. In this case victim was in public bathroom and there was no mirror in the bathroom so there was less possibility of extension of neck and more possibility of clean cut injury of Right internal carotid artery. The two knifes were recovered from crime scene. In our opinion inflicting injuries over the vital part of body i.e. neck by these two knifes at given point of time was less possible. One of the possibilities of inflicting suicidal injuries by these two knifes was that one knife might have been used for inflicting minor injuries over wrist etc. and second knife might have been used to inflict fatal injury over Right side of neck. Hence opinion of suicidal cut throat was given in this case.

Photograph of crime scene showing blood stains and two knifes

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Prosthetic Rehabilitation of Edentulous Segmental Mandibulectomy Patient: A case report

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Abstract

An understanding of postsurgical anatomy and physiology is an obvious prerequisite to the development of new prosthetic procedures for mandibulectomy patients. Loss of the potential basal seat area, atrophic and fragile oral mucosa, reduction in salivary output, angular pathway of mandibular closure, deviation of the mandible and impairment of the motor and sensory control of the tongue, lips and cheeks makes the fabrication of a prosthesis difficult in these situations. Several prosthetic options include sectional prosthesis, use of palatal ramp, setting double rows of teeth on the unresected side in maxilla and use of functional chew in technique. This article describes the use of two rows of maxillary posterior teeth on the unresected side in a patient who had undergone segmental mandibulectomy. The inner row helped in restoring the function whereas the outer row helped in restoring the cheek support and esthetics.

Key Words

Segmental mandibulectomy, double rows of teeth.

Introduction

One of the most consistently difficult areas of maxillofacial rehabilitation is the treatment of edentulous patients who have had a radical cancer surgery of the tongue, floor of the mouth and mandible. Only a complete understanding will permit functional utilization of these unusual postoperative anatomic conditions.[1]

Cantor and Curtis[1] (1971) devised a prosthetic classification that is as follows:

Class I: Mandibular resection involving alveolar defect with preservation of mandibular continuity

Class II: Resection defects involve loss of mandibular continuity distal to the canine area

Class III: Resection defect involves loss up to the mandibular midline region.

Class IV: Resection defect involves the lateral aspect of the mandible, but are augmented to maintain pseudoarticulation of bone and soft tissues in the region of the ascending ramus.

Class V: Resection defect involves the symphysis and parasymphysis region only, augmented to preserve bilateral temporomandibular articulations.

Class VI: Similar to class V, except that the mandibular continuity is not restored.

Schaaf [2] in 1976 have outlined various factors to be considered in partial mandibulectomy patient who are also completely edentulous. These are amount of mandible remaining, amount of deviation, remaining kinesthetic sense and control, actual present ridge relationship, nature of denture bearing areas, status of the patient's disease, type of the treatment patient has received, preoperative success with complete dentures and overall vigor of the patient.

Both mandibulectomy and Commando's procedure involve an extensive loss of tissues and associated function. The most significant difficulty encountered is mandibular deviation towards the defective side. The greater the loss of tissues, greater will be the deviation of the mandible to the resected side, thus compromising the prognosis of the prosthetic rehabilitation to a greater extent. Apart from deviation, other dysfunctions in such patients are observed in swallowing, speech, control of saliva, mandibular movements, mastication, respiration and psychic functioning.[3]

Treatment options are varied and several authors have taken different approaches in these situations. Swoope[4] described the use of palatal ramp prosthesis to correct deviation. However he believed in sectional mandibular complete dentures and said that nothing is gained by extension onto the movable and unsupported tissues of the surgical site. Schaaf[2] and Rosenthal[5] suggested setting of double rows of maxillary teeth on the unresected side. The inner row helped in restoring the function whereas the outer row helped in restoring the cheek support and enhancing the esthetics. The variations in closure of the jaws is observed in this technique on right and left side and then a central and relaxed position is recorded. Another technique by Cantor and Curtis [6] involved functional chew in of the maxillary posterior wax blocks while lower denture in mouth.

Case Report

A 48 yr old male patient reported to the Department of Prosthodontics, A.B. Shetty Memorial Institute of Dental Sciences, Mangalore after surgery and radiation for squammous cell carcinoma involving left alveolus. Segmental mandibulectomy and supraomohyoid neck dissection was performed six months back. Reconstruction was done using pectoralis major myocutaneous flap. Later he underwent post operative radiotherapy which is over 1 1/2 months back. This patient falls under class II of Cantor and Curtis classification.

Fig.1: Mandibular secondary impression

Fig. 2: Mandibular master cast

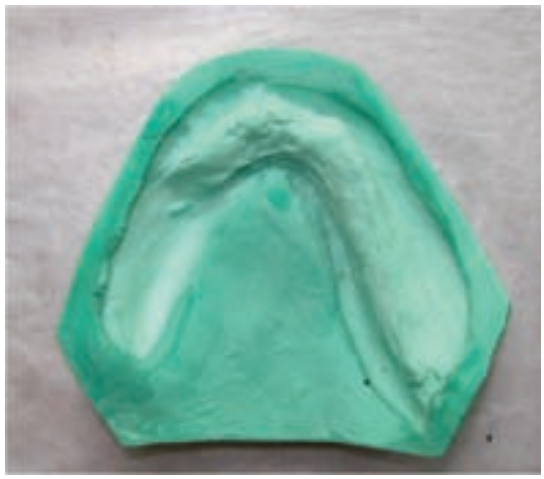

Fig. 3: Processed complete dentures

Clinical examination revealed total edentulousness and missing left mandible from canine region onwards. There was severe mandibular deviation towards the resected side. As the patient was made to bring the mandible towards the right side, he complained of moderate pain in the right temporomandibular joint area. A decision was then made to fabricate the complete denture prosthesis in repeatable and relaxed position. As the deviation was marked, two rows of maxillary posterior teeth on the unresected side were planned.

Primary impressions were made using alginate (Neocolloid, Dentsply) with stock trays. Lower stock tray was modified with modeling wax on the left side. Custom trays were fabricated using self cure resin (DPI-RR, Mumbai, India). Border moulding and secondary impression was made with greenstick compound and zinc oxide eugenol impression paste for maxillary arch while putty consistency (Zetaplus, Zhermac Clinical, Italy) and light body condensation silicone (Oranwash L, Zhermac Clinical, Italy) was used for mandibular arch (fig.1) and cast poured in dental stone (fig.2)

Self cure resin record bases were made and occlusion rims fabricated. Additional block of wax was put in maxillary posterior unresected segment to support the lower wax rim while the patient closes. Wax rims were then adjusted until a tentative vertical jaw relation is established. A face bow transfer was done and the maxillary cast mounted on Girrbachs (Artex) non arcon semi adjustable articulator. For horizontal registration, patient was

Fig. 4: Occlusion on the resected side

Fig. 5: Occlusion on the unresected side

made to bring his mandible to unresected side as far as possible without causing pain. The wax was softened and the position was sealed. The lower cast was mounted in this secured relation.

Teeth arrangement was done while arranging two rows of teeth (Acry rock, Ruthinium,Valsad, India) in the maxillary posterior unresected side. Try in of the waxed up denture was done and evaluated for esthetics, speech, occlusion and vertical dimension. The dentures were then characterized, processed and occlusion was adjusted (fig.3). After finishing and polishing, the prosthesis was inserted into the patient's mouth. Any occlusal interferences in normal range of movements were checked and corrected. Routine postinsertion instructions were given to the patient.

Discussion

Four most important factors that effect rehabilitation in mandibulectomy as listed by Cantor and Curtis are location and extent of surgery, effect of radiation therapy, the presence or absence of teeth and psychosocial factors.[7] Boucher stated that the amount of biting force tolerated by a denture is directly proportional to the size of tissue bearing area. Since mandibulectomy patients have markedly reduced masticatory strength and little hard and soft tissue support, it is important to record and utilize as broad a denture base area as possible.[6]

In many dentulous mandibulectomy patients, the guide flange is used as a training prosthesis, and its continued use can lead to eventual mandibular control without the prosthesis. However, patients who are edentulous in the maxilla or mandible or both usually cannot be considered for such a prosthesis because extreme mediolateral forces placed on the prosthesis may prevent maintenance of border seal and lead to denture instability.[8]

In this case, two rows of maxillary posterior teeth were arranged on the unresected side. This treatment modality is in accordance to case reports by Schaff[2] and Rosenthal.[5] Desjardins [8] also observed that in edentulous patients and in patients who

Fig. 6: Before prosthesis insertion

Fig. 7: After prosthesis insertion

cannot attain the ideal mediolateral relation of the remaining segment, a maxillary table can provide a surface against which the natural or artificial teeth of the mandible can occlude.

Also in this case, considerations were given to acceptance of an easily achievable maxillomandibular relationship rather than a strained one. This is in accordance with Desjardins[8] who stated that this easily attainable maxillomandibular relationship may be more condusive in achieving the goal of mandibular stability in the mandibular denture.

To conclude, in this segmental mandibulectomy case, successful rehabilitation has been achieved by the use of two rows of maxillary posterior teeth on the unresected side and this can be considered as a viable treatment option for these type of cases.

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Study of Incidence, Innervation and Clinical Importance of Axillary Arch of Langer

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Abstract

Axillary arch muscle is a muscular band that extends from the lattisimus dorsi to the pectoralis major, crossing the axillary neuro-vascular bundle. It is one of the rare muscular variations in the axillary region. Axillary arch muscles have been described as having variable and sometimes multiple insertions. In our study of 50 upper limbs in 25 adult human cadavers, we observed 2 variants of the arches, which were unilaterally present in 2 adult male cadavers. The innervations, relationships of the axillary arches are reported and the surgical significance of such anomaly is discussed.

Key Words

Axillary arch; Pectoralis major; Lattisimus dorsi; Muscular variation; Axillary neuro vascular bundle.

Introduction

The axillary arch muscle (AAM) also called as Langer's axillary arch, axillopectoral muscle, pectodorsal muscle, arcus axillaris or the aschelsbogen muskel is a rare muscular anomaly of the axilla. Numerous variation of this muscular anomaly have been observed like the muscle adhering to the coracoids process of scapula, teres major, long head of triceps brachii, medial epicondyle of humerus, coracobrachialis, biceps brachii and pectoralis minor. But the most common type of arch extends from lattisimus dorsi to pectoralis major. The arch is muscular when it receives major contribution from pectoralis major or is tendinous when it receives major contribution from lattisimus dorsi.

The axillary arch is said to be complete when it extends from the axillary portion of lattisimus dorsi to the posterior layer of the pectoralis major tendon at its insertion on the humerus. In incomplete form the arch proceeds from the lattisimus dorsi but has varied site of insertion. Axillary arch occurs in 7% of the population[1]. The nerve supply of the axillary arch is most commonly from either the medial pectoral nerve, or when closely connected to lattisimus dorsi, the thoracodorsal nerve[2] or by perforating branches of the second and third intercostal nerves[3].

Axillary arch has been implicated as a potential cause of the neurovascular compression in the cervico-axillary region and hyper abduction syndrome. Hence the surgeons should be aware of such variation. The aim of the study was to study the incidence of axillary arch in the cadavers of south Indian population paying special attention to its innervations and its clinical importance due to its close relationship to the axillary neurovascular bundle.

Material and Methods

Over a span of 3 years routine dissections as a part of the medical students training were carried out on 25 cadavers preserved in formalin (10%). Both the upper limbs were dissected completely and presences of any muscular arches were noted paying attention to their site of origin & insertion as well as their innervations. Axillary arches were seen in 2 adult male cadavers, which were traced from their origin to insertion and later classified as complete and incomplete arches.

Results

Case 1: Complete axillary arch

The axillary arch was seen in a 50 year male cadaver on the right side which was thin, muscular band extending from the outer edge of the lattisimus dorsi to the posterior layer of the pectoralis major at its humeral insertion. It was 8 cm in length and 0.4 cm in width. The arch was present anterior to the axillary neurovascular bundle with only intercostobrachial nerve present in front of it. The arch was partly fleshy and partly tendinous did not present any aponeurotic intersection. It was innervated by branches from medial pectoral nerve. However similar arch was not seen on the left side in the same cadaver (refer fig.1).

Case 2: Incomplete axillary arch

In this case the arch extended from the outer border of lattisimus dorsi muscle to the coracoid process of scapula, measuring 7.5cm in length and 1.2cm in breadth. The arch was passing anterior to the Axillary nerve and Thoracodorsal artery while it was passing behind the axillary vessels and various branches of brachial plexus. Adherence of the axillary arch to the fascia of the axillary fossa was noted during dissection. It also did not present any aponeurotic intersection. Here the arch was innervated by Thoracodorsal nerve supplying lattisimus dorsi but not by any separate branch (refer fig.2).

While in the rest 48 cases studied there was no presence of any muscular band in the axilla which could be termed as axillary arch.

Discussion

The axillary arch was first identified by Alexander Ramsey in

Fig. 1: Depicting axillary arch muscle (AAM) extending from lattisimus dorsi (LD) to pectoralis major (PMJ) insertion with axillary neurovascular bundle passing behind it while intercostobrachial nerve (IBN) passing in front of it. AA - axillary artery.

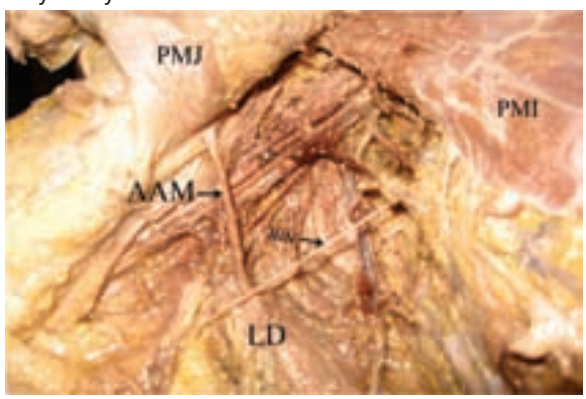

Fig. 2: Depicting axillary arch muscle (AAM) extending from lattisimus dorsi (LD) to corocoid process with axillary neurovascular bundle passing in front it except for Thoraco dorsal artery (TDA) and axillary nerve (AN) passing behind it. AA - axillary artery.

1795, though reported in 1812. However it was Langer in 1846 who described the muscle after which it was called Langer's arch. Langer's arch usually appears as a single band, but it can divide into double or rarely multiple slips which can have varied insertions either to pectoralis minor, coracobrachialis, corocoid process, first rib, axillary fascia according to Testut. The nerve supply to this variant muscle is most commonly from medial pectoral nerve or thoracodorsal nerve[1,2,3].

Earlier studies on axillary arches revealed its incidence ranging from 0.25% to 10%. In the present study the incidence of the axillary arch is 4% which is well within the above range. Based on Testut classification, in our study we had one complete and one incomplete axillary arch. The complete arch reached the tendon of pectoralis major near its site of insertion; the incomplete arch extended from lattisimus dorsi to corocoid process of scapula, similar variations were described earlier[2,3,4,5].

Clinically the axillary arch has been implicated in the costoclavicular compression syndrome, axillary vein entrapment and median nerve entrapment.

In the present study the incomplete arch passed behind the axillary vein, while the axillary neurovascular bundle passed behind the arch which could be compressed especially during abduction and lateral rotation of the shoulder joint. Other lesions linked to axillary arch include thoracic outlet shoulder instability syndrome and lymphodermia[6].

The presence of an axillary arch muscle during physical examination may be detected as a palpable mass within the axilla or a loss of the typical axillary concavity. However a physical examination may not necessarily reveal all arches, magnetic resonance imaging may be needed for an accurate diagnosis. Furthermore the identification of Langer's arch or its remnant may be of particular importance when performing sentinel node biopsy because for the need of adequate exposure and good homeostasis during this procedure[6].

Embryological derivation of Langer's arch remains unknown, but the most reliable theory supports its origin from the panniculus carnosus, which is an embryological remnant of a more extensive sheet of skin associated musculature lying at the junction between the superficial fascia and subcutaneous fat, which is well developed in lower mammals. In humans Langers arch is most common embryonic remnant of panniculus carnosus in the pectoral group of muscles[7,8].

Axillary arch can also lead to contractures of muscles leading to hindrance of movements of shoulder joint especially elevation of the arm above the head. Radical lymph node dissection for breast cancer is the most common type of surgery performed in axilla, which may be effected if Langers arch is encountered. Access for bypass surgery using the axillary vessels may be compromised if there is failure to identify Langer's arch[9].

Conclusion

Knowledge of the anatomical variation in the axilla is important for surgical intervention. Hence the surgeons operating in this area should be aware of such uncommon anatomical variant. If there is presence of the axillary arch, it should be recognized and excised to allow adequate exposure of the axillary contents to achieve a complete lymphatic dissection and preserve vascular, lymphatic and nervous structures.

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Bio-medical Waste Management: A review

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Abstract

The waste produced in the course of health care activities carries a higher potential for infection and injury than any other type of waste. Environmental pollution has become a major concern for the future of life on our planet. Appropriate management of health care waste is thus a crucial component. Government hospitals, Private hospitals, Nursing homes, Physician's office, Dentist's office, Dispensaries are some of the sources of Bio Medical Waste (BMW). "Sensitizing" the generators of waste to properly segregate the waste at the source of generation is the "key" to the successful implementation of Bio Medical Waste Rules, 1998.

Key Words

BMW, hazards, management.

Introduction

Waste management has emerged as a critical and important function within the ambit of providing quality care. The waste produced in the course of health care activities carries a higher potential for infection and injury than any other type of waste. Inadequate & inappropriate handling of health care waste may have serious public health consequences & it has a very significant impact on environment[1].

Environmental pollution has become a major concern for the future of life on our planet[2]. Unscientific disposal of healthcare waste may lead to transmission of communicable diseases-Respiratory infections, gastro enteric infection, hepatitis-B,C,E, AIDS, etc[3]. Appropriate management of health care waste is thus a crucial component of environmental health protection and it should become an integral feature of health care services.

Hospital waste if not scientifically managed has the potential to create health hazards for the hospital staff and for the community. Therefore institutionalizing effective waste management systems in all health care facilities is a key prerequisite to improving efficiency and effectiveness of health care.

Biomedical waste is defined as "any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals". According to WHO, around 85% of the hospital waste is non-hazardous, 10% infective and 5% non-infective but hazardous. Quantity of biomedical waste varies according to hospital policies, practices & type of care taken. Quantity of biomedical waste produced in developed countries, ranges from 1- 5kg/bed/day and in developing countries like India ranges from 1- 2kg/bed/day[4].

History

Management of hospital waste became an issue of concern only in 1980's, when mass hysteria was generated in the US on noticing hospital waste floating along east coast beaches and children playing with used syringes. This lead to the enactment of the Medical Waste – Tracking Act of Nov 1988, which required the US Environment Protection Agency (EPA) to identify alternative approach to medical waste management[5]. The Ministry of Environment and Forests, Government of India notified the Bio-Medical Waste (Management and Handing) Rules on 27th July 1998; under the provision of Environment Protection Act 1986[4].

Hazards from Bio-Medical Waste

Government hospitals, private hospitals, nursing homes, physician's office, dentist's office, dispensaries, primary health centers, medical research and training establishments, vaccinating centers & bio-technology institutions are potential sources of BMW[6].

Pathogens in infectious waste may enter the human body through a puncture, abrasion or cut in the skin, through mucous membranes by inhalation or by ingestion may lead to some of the diseases like hepatitis B, C, AIDS, respiratory infections, gastroenteritic infections and some of the communicable diseases like Cholera, Malaria etc. Chemicals used which are toxic, genotoxic, corrosive, flammable, reactive, explosive or shock-sensitive may cause intoxication. Hazards caused from radioactive waste may range from headache, dizziness and vomiting to much more serious problems. Toxic emissions like dioxins, furan gases, carbon, sulphur particles from defective/ inefficient incinerator, indiscriminate disposal of incinerator ash residues cause environmental hazards[1].

BMW needs to be managed scientifically in order to have good health and environment, for legal reasons, aesthetics and for ethical reasons. BMW can be classified into following categories according to schedule 1.

2 Deep burial shall be an option available only in towns with population less than five lakhs and in rural areas

Management of BMW

To ensure a clean and healthy environment, stages in the management of BMW to be followed systematically. Segregation, collection, storage, transportation, treatment and disposal are the steps followed in the management of BMW.

Working group of Hospital Waste Management constituted by WHO in 1983 unanimously agreed upon that health care establishment should be held legally accountable for their waste management practices, based on the universal principle: "generator is responsible"[6].

Segregation

Sorting or systematic separation of BMW into Categories is known as segregation. Segregation is the most important step, which should be strictly followed as per bio-medical waste

category. It will be done at the source of generation e.g. all patient activity areas, diagnostic service areas, operation theatres, labour rooms, treatment rooms etc. The responsibility of segregation lies with the generators of bio-medical waste, i.e., doctors, nurses, and technicians, etc. Special attention to be given to infectious and hazardous wastes during segregation. Emphasis on sharp to be given as it has highest disease transmission potential[6].

Bio-Medical Waste should be segregated at source of generation and collected in prescribed colour-coded bins.

Notes

Color-coding of waste categories with multiple treatment options as defined in Schedule I, shall be selected depending on the treatment option chosen, which shall be as specified in Schedule1.

Waste collection bags for waste types needing incineration shall not be made of chlorinated plastics.

Categories 8 and 10 (liquid) do not require containers/bags.

Category 3 if disinfected locally need not be in containers/ bags.

Collection

Containers used to carry BMW should be tight with cover & size enough to be carried and placed in different parts of the hospital. Inner plastic bag is to be used to facilitate the lifting of waste content for transferring.

Storage

Storage means the holding of Bio-Medical Waste for such period of time, at the end of which waste is treated and disposed off. The container in which such wastes are stored shall display promptly International Biohazards symbol. The packaging of all such wastes should be done in sturdy leak proof containers. No waste should be stored beyond a period of 48 hrs[4].

Transportation

It means "movement of Bio-Medical Waste from the point of generation or collection to the final disposal is known as transportation. BMW should be transported on site or off site in a vehicle, specially designed and recommended for the purpose.

Schedule 1: BMW categories in India[7]

Option	Waste category	Treatment and disposal
Category No-1	Human Anatomical Waste: human tissues organs, body parts	Incineration[2] /deep burial
Category No-2	Animal Waste: Animal tissues, organs, body parts, carcasses, bleeding parts, fluids, blood and experimental animals used in research, waste generated by veterinary hospitals colleges discharges from hospital animal house	Incineration[2] /deep burial
Category No-3	Microbiology and Biotechnology Waste: Waste from laboratory cultures, stocks or specimens of microorganisms, Live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, waste from production of biological, toxins, dishes and devices and for transfer of cultures.	Local autoclaving / microwaving/ incineration[2]
Category No-4	Waste sharps: Needle, syringes, scalpels, blades, glass etc that may cause puncture and cuts. This includes both used and unused sharps.	Disinfection (chemical treatment@ /autoclaving / microwaving and mutilation/ shredding)
Category No-5	Discarded medicines and Cytotoxic drugs: Wastes comprising of outdated, contaminated and discarded medicines.	Incineration @ destruction and drugs disposal in secured landfills
Category No-6	Solid waste: Items contaminated with blood, and fluids including cotton dressings solid plaster casts, linen, bedding, other material contaminated with blood	Incineration@ autoclaving/ microwaving
Category No-7	Solid waste: Waste generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc	Disinfection by chemical treatment@@ autoclaving /microwaving and mutilation/ shredding # #
Category No-8	Liquid waste: Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities	Disinfection by the chemical treatment @@ and discharge into drains
Category No-9	Incineration ash: Ash from incineration of any bio-medical waste	Disposal in municipal landfill
Category No-10	Chemicals used in production of biological chemicals used in disinfection, as insecticides, etc.	Chemical treatment @@ and discharge into drains for liquids and secured landfill for solids

@@ Chemical treatment using at least 1% hypochlorite solution or any other equipment chemical reagent. It must be ensured that chemical treatment ensures disinfection.

Mutilation/ shredding must be such so as to prevent unauthorized reuse.

@ There will be no chemical pretreatment before incineration. Chlorinated plastics shall not be incinerated.

Schedule II[7]: Color-coding and type of container for disposal of bio-medical wastes

Color coding	Types of container	Waste category	Treatment options as per Schedule 1.
Yellow	Plastic bag	Cat. 1, Cat. 2, and Cat. 3, Cat.6	Incineration/ deep burial
Red	Disinfected container/ plastic bag	Cat.3, Cat. 6, Cat.7	Autoclaving / microwaving / chemical treatment
Blue / White translucent	Plastic bag/ puncture	Cat. 4, Cat. 7	Autoclaving / microwaving / chemical treatment and Destruction / Shredding
Black	Plastic bag	Cat.5 and Cat. 9 and Cat.10 (solid)	Disposal in secured landfill

Transportation of BMW should not clash with peak working hours, visiting hours and meal distribution timing. The timing of transportation of infectious and non-infectious waste should be different.

The guidelines make it mandatory for containers carrying hospital waste to prominently display wash proof labels saying "bio-hazard" and "cytotoxic hazard". While transporting outside the hospital premises, details regarding sender and waste category also to be mentioned along with[8].

Treatment of BMW

Any method, technique or process for altering the biological, chemical or physical characteristics of waste to reduce the hazards, it presents and facilitate, or reduce the costs of disposals is known as treatment of BMW. Objectives of treating BMW are volume reduction, disinfection, neutralization and change of composition. Five technology options for treatment are chemical treatment, thermal treatment, mechanical treatment, irradiation, biological method.

Disposal of BMW

It means "burial, deposit, discharge, dumping, or release of any Bio-Medical Waste into or on any air, land, or water"

After treatment of the Bio-Medical Waste, it becomes non infectious or non hazardous. The following disposal options like landfill, use of pills, composting and biogas methods are used for disposal of solid wastes. Disposal of liquid waste is done by discharge into sewers, waste stabilizing pond and soakage pits[4].

Recommended measures for BMW by The United Nations Conference on the Environment and Development (UNCED) in 1992 are, to prevent and minimize waste production, reuse or recycle the waste to the extent possible, treat waste by safe and environmentally sound methods and dispose off the final residue by landfill in confined and carefully designed sites[1].

Duties of Operator

"Authorized person or an institution owing or providing the BMW facility" is known as operator.

Authorization

If generator is treating more than 1000 patients/ month, it is mandatory to register with State pollution control board. Pollution control boards of every state have been given the task of authorizing and implementing the rules[6].

Legal Implications

Proper implementation of BMW rule 1998 is mandatory for all generators of BMW. Installation of incinerator is mandatory if more than 50 beds in a hospital. The State pollution Control board may take action against the defaulting hospitals under section 15(1) of Environment (Protection) Act 1996. Accordingly it says, whoever fail to follow the rules, will be punishable for imprisonment for a term which may extend up to 5 years or fine of 1 lakh or both may be applied[4].

Conclusion

The management of healthcare waste is an integral part of a national health care system. A holistic approach to healthcare waste management should promote adoption of safe and environmentally sound technologies. Healthcare waste management should go beyond data compilation, enforcement of regulations and acquisition of better equipment. It should be supported through appropriate education, training and the commitment of the healthcare staff, management and healthcare managers within an effective policy and legislative framework. BMW management programme cannot be successfully be implemented without the willingness devotion, self motivation, co-operation & participation of all sections of employees of any health care establishment. Therefore institutionalizing effective waste management systems in all health care facilities is a key prerequisite to improving efficiency and effectiveness of health care.

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A Retrospective Study on Different Aspects of Road Traffic Accident Victims in N.R.S. Medical College, Kolkata in Last 3 Years (2006-2008)

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Abstract

With rapid growth of civilization in all corners of the world, road surface transport is a must for social, commercial & many other purposes. Side by side, road traffic accidents (RTA)-disability-deaths are increasing. The present study highlights the different aspects of RTA victims whose autopsies were perform in NRS Medical College, Kolkata during period 2006 to 2008.

Key Words

RTA, Victims

Introduction

In India, at every four minutes one man dies or injure in RTA. (Source- National Transportation planning & Research Center)[1]. There are many factors like condition of roads; type & design of vehicle, site, direction & force of impact, ejection of victims, fire, explosion, health status of person etc that determine the extent & fatality of injury.

Keeping aside the homicidal cases which sometimes mimic RTA, the primary aim of autopsy in RTA deaths is to find out the cause of death, portion of the body injured & whether there was any co-morbid condition exist or not & any associated factors in victims which had attributed to accidents.

Material & Methods

The study has an aim to find out pattern & different aspects of RTA in a part of Kolkata during the period from 2006 to 2008.

The study conducted at NRS Medical College Hospital, Kolkata. Out of total 10160 autopsies performed during this period, 1382 deaths were due to RTA.

General information of each case & autopsy findings entered in Proforma & then tabulated to retrieve the relevant data for observation & compare with various previous studies.

Observation

Table 1: Year wise distribution of RTA victims according to identity status.

Identity status	2006	2007	2008
Known	504 (92.31%)	492 (94.07%)	297 (94.89%)
Unknown	42 (7.69%)	31 (5.93%)	16 (5.11%)
Total	546	523	313

Table 1 shows that minor percentage of RTA victims were unidentified until last that may be due to gross mutilation of bodies.

Table 2: Year wise distribution of RTA victims according to sex

Sex	2006	2007	2008
Male	440 (80.59%)	436 (83.37%)	256 (81.79%)
Female	106 (19.41%)	87 (16.63%)	57 (18.21%)
Total	546	523	313

It is obvious from table 2 that during period of 3 years, there was a male predominance.

Table 3: Year wise distribution of RTA deaths according to months

Month	2006	2007	2008
Jan-Feb-Mar	106 (19%)	104 (20%)	79 (25%)
Apr-May-Jun	201 (37%)	182 (35%)	102 (33%)
Jul-Aug-Sep	153 (28%)	163 (31%)	80 (25%)
Oct-Nov-Dec	86 (16%)	74 (14%)	52 (17%)
Total	546	523	313

Table 3 shows that occurrence of maximum no. of RTA were in the month of April, May, and June, which are peak in summer season at Kolkata.

Table 4: Year wise distribution of RTA deaths according to type of vehicle involved

Type of vehicle	2006	2007	2008
Pedestrian	223	212	106
Bicycle/rickshaw	41	43	27
Two wheeler	71	78	49
Auto	17	9	13
Car	54	42	28
Tram	2	0	3
Bus	81	87	53
Truck, tempo etc	57	52	34
Total	546	523	313

Table 4 depicts that pedestrians were a major portion of RTA victims than the occupants of vehicle. Amongst the vehicle involved, two wheelers & buses top the list.

Table 5: Year wise distribution of RTA deaths according to time of death

Time of death	2006	2007	2008
Brought dead	205 (37.55%)	144 (27.53%)	110 (35.14%)
Deaths occur after admission	341 (62.45%)	379 (72.47%)	203 (64.86%)
Total	546	523	313

Table 7: Year wise distribution of RTA deaths according to body part injured

year	Head	Thorax	Abdomen	Extremities	Multiple region involved	Gross mutilation	Total
2006	281	54	46	99	41	25	546
2007	302	43	36	92	31	19	523
2008	129	34	40	61	36	13	313

Head was the most commonly injured body part as compared to others. (Table 7)

From table 5, it is obvious that majority of RTA victims died after hospitalization, though the no. of brought dead victims (including person died on spot & person died on the way to hospital) were also significant.

Table 6: Year wise distribution of pedestrian according to age

Age	2006	2007	2008
≤15yrs	81	72	27
16-35yrs	23	20	16
36-60yrs	42	31	24
>60yrs	77	89	39
Total	223	212	106

Table 6, shows that both upper & lower age groups were the commonest pedestrian victims of RTA.

Discussion

The incidence of RTA deaths found in current study was 13.6%, similar to Merchant et al[2] (13.67%) & almost half that of Chavali et al[3] (35%). The difference may be due to variation in some factors like type & condition of roads, maintenance of traffic rules by common people etc.

The sex wise distribution was quite close to other workers (Merchant et al[2], Chavali et al[3], Gupta et al[4], Ravikiran et al[5], Kaul et al[6], Pathak et al[7], Biswas et al[8], Dhillon et al [9]), that is to say a male predominance.

Present study, shows higher incidence during summer, which is similar to Merchant et al[2] & Biswas et al[8]. However, study of Ravikiran et al[5] shows monsoon predominance.

Vulnerability of pedestrian as RTA victim is a common phenomenon in all study across the country. (Merchant et al[2], Chavali et al[3], Gupta et al[4], Ravikiran et al[5], Pathak et al[7], Singh et al[10], Kochar et al[11]). This indicates that much more attention is needs to be required to safety of pedestrian.

The most commonly involved body region was head in our study, which was quite consistent with observations by Merchant et al[2] & Dhillon et al[9]. So, the role of helmet use in two wheeler riders can be enforcing for all practical purposes.

The no. of brought dead, found to be more than that of other study (Merchant et al[2], Gupta et al[4], Chavali et al[3]) which can be explain by difference in emergency medical or first aid services.

When age of the pedestrian was consider, the present study shows similar findings with Merchant et al[2] & Singh et al[10]. Child & old persons were common victims. This indicates a clear need of strict use of zebra crossing & some escort for child & elderly person to minimize the risks.

Conclusion

Occurrence & victims of RTA death is common & almost similar across the country. Improvement of road surface infrastructure, strict compliance with road safety rules by drivers & pedestrians, rapid emergency services & establishment of trauma care centers are major factors to reduce this hazard.

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Prevalence and Oral Manifestations of Iron Deficiency Anemia: A short study

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Abstract

Aim of the Study

Our study was aimed at estimating the incidence and oral manifestations of iron deficiency anemia and to refresh the knowledge of iron deficiency in general practitioners.

Methodology

Total of 100 cases reporting to the Department of Oral Medicine and Radiology between 18 to 84 years of age were included in study. Hemoglobin estimation was done by SAHLIS-method and iron deficiency status was evaluated by studying the peripheral blood film.

Results

The results indicated 78% were anemic. The normal limit taken was; males-below 13.7g/dl, females-below 11.7 g/dl.

Conclusion

Criteria taken since so many days that Indian standard of Hemoglobin should be lower than international standard is to be revisited as Indian socioeconomic condition is better now. Our proposal is, that it should be considered as same as that of International standards.

Key Words

Iron deficiency anemia, Hemoglobin, Peripheral blood film.

Introduction

Anemia is defined as hemoglobin concentration in blood below the lower limit of the normal range for the age and sex of the individual.[1]

Anemia is one of the common manifestations of widespread nutritional deficiency, indiscriminately affecting all age and both sexes. 10% of the population in developed and 25 to 50% of population in developing countries are anemic. Lower iron levels in the body results from low dietary intake, malabsorption, excessive demand during pregnancy and chronic blood loss.[2]

People who are well educated, upper economic class are also affected by anemia, which reflects faults in lifestyle of people and lack of awareness. Traditionally followed Indian standards of Hemoglobin level in males and females as for the survey done by us in standard labs were below 12g/dl and 11g/dl respectively, which are below International standards (13-18g/dl for males and 12-16.5g/dl for females)[3].

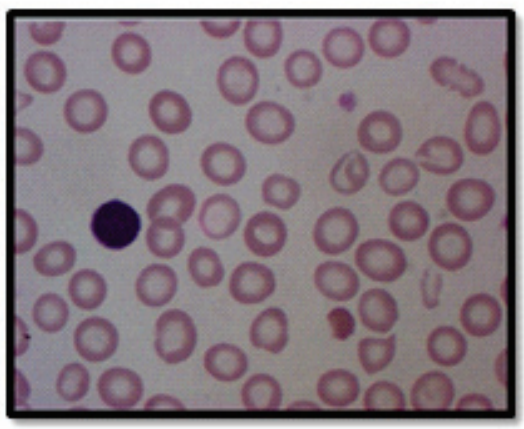
Manifestations of iron deficiency anemia can vary from subclinical, clinical to severe stages of anemia. The spectrum of manifestations can vary from fatigue, headache seen in subclinical stage to transient cerebral ischemia and cardiac failure in severe stages of anemia.

Methodology

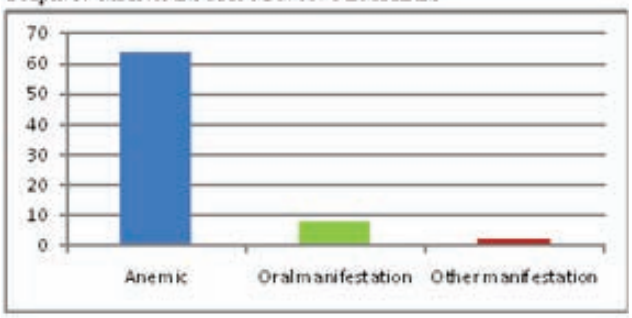
A total of 100 cases reported to the Department of Oral Medicine and Radiology were selected ranging from 18 – 84 years of age. Out of 100, 31 were male patients and 69 were female patients. All patients were examined clinically for signs & symptoms of iron deficiency anemia. Hemoglobin estimation was done using Sahlis method (Fig-1), taking below 11g/dl for females and below 12g/dl for males as anemic & iron deficiency status was evaluated using Peripheral blood film (Fig-2).

Fig. 1: Hemoglobin estimation by SAHLIS method.

Fig. 2: Peripheral blood film to evaluate the iron deficiency state.



Graph-1: MANIFESTATION IN FEMALES



FEMALES- -Anemic-64

Oral manifestation-8

Other manifestation-2

Results

The results indicated 78% of patients were anemic out of total 100. Males – 77.4 % (out of 31), Females – 92.7 % (out of 69).

Majority of patients, 24-males and 64-females were anemic (Graph-1 and Graph-2). Among them 13 males and 54 female patients were in subclinical stage without showing any manifestations. Patients who were anemic and also showing oral manifestations like atrophic glossitis and pallor of the buccal mucosa were 8 males and 8 females (Fig-3 and Fig-4), (Graph-1 and Graph-2) with hemoglobin level ranging from 5- 7.2g/dl in females and 4- 9g/dl in males. Patients showing oral and other manifestations like pallor of the conjunctiva and koilonychia were 3 males and 2 females (Fig-5 and Fig-6), (Graph-1 and Graph-2). Subclinical stage patients showed their hemoglobin level ranging from 8-11g/dl in females and 9-12g/dl in males, in comparison to the normal limit of 11g/dl in females and 12g/dl in males.

Thus a majority of patients in our study were in subclinical stage showing no signs and symptoms of anemia. However the subclinical stage of anemia will have effects on general health of patients.

Fig. 3: Atrophic glossitis.

Fig. 4: Pallor of buccal mucosa.

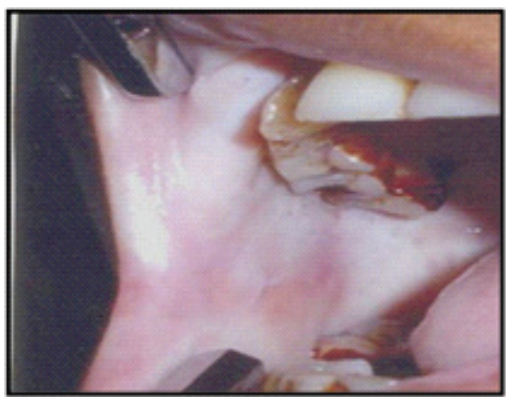


Fig. 5: Pallor of conjunctiva.

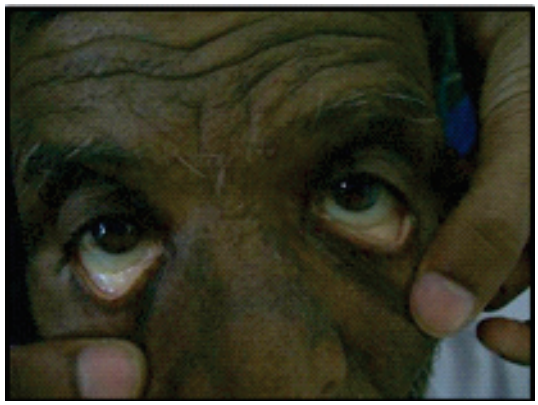


Fig. 6: Koilonychia.

Discussion

Anemia is a general term for either a decrease in the volume if red blood cells (hematocrit) or in the concentration of hemoglobin. Rather than being a disease itself, anemia is often a sign of an underlying disease, such as renal failure, liver disease, chronic inflammatory conditions, malignancies and vitamin deficiencies. Subclinical stage usually presents with the symptoms such as fatigue, headache or light headedness.[4]

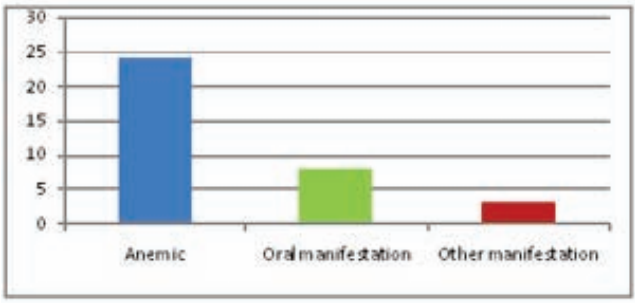
Traditionally followed Indian standards of Hemoglobin level in males and females are below International standards. Considering the changes in population ratios of economically strong and weak sections of society, we believe that awareness and application of International Standards of normal range of Hemoglobin needs to be propogated until and unless there is scientific experiments to justify a lower need for Hemoglobin levels in Indians.

According to a study done by Virender P Gautam et.al on prevalence of anemia amongst pregnant women in rural area of Delhi, suggested that high prevalence of 96.5% were anemic with the Hb % below 11g/dl.[5]

A study done by Jolly Rajaratnam et.al showed the prevalence of anemia was 40.7% in premenarcheal girls as compared to 45.2% in postmenarcheal girls in rural areas of Tamil Nadu. The mean Hb% of premenarcheal girls was 11.63g/dl and that of postmenarcheal girls was 11.52g/dl.[6]

Another study by Malhotra P et.al among adult rural population of North India suggested the overall prevalence of

Graph-2: MANIFESTATIONS IN MALES



MALES--- Anemic- 24

Oral manifestation-8

Other manifestation-3

anemia in 16 to 70 years of age group was 47.9%(n=214), being 50%(n=136) in females and 44.3%(n=78) among males.[7]

The present study showed that out of 100 patients, 78% (77.4% males out of 31, 92.7% females out of 69) were anemic, with the Hb% below 12g/dl in females & 13g/dl in males. The most probable reason for these results can be lack of awareness of nutritional values, life style, decrease use of raw food and vegetables, carelessness towards eating habits.

Conclusion

Anemic patients develop oral manifestations, including pallor of oral mucosa only after the hemoglobin level is reduced below 7g/dl according to our study. Traditionally Indian standards of Hemoglobin level in males and females are below International standard.

We would like to raise a question. Is there any need to do so? NO.

As the Indian economy is growing, numbers of people below poverty line are decreasing, and there is improvement in standards of living, basic facilities and literacy rate. Considering these things, Criteria taken since so many days that Indian standard of Hemoglobin should be lower than international standard is to be revisited as Indian socioeconomic condition is better now. Our proposal is, that it should be considered as same as that of International standards.

As a Dentist and doctor we should advise our patients to improve their health matching the International standards for hemoglobin levels, so that they can be lot more healthier, and have better resistance.

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Myiasis in Gingiva - A case report

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Abstract

Oral Myiasis is a rare pathology in humans and is associated with poor oral hygiene, alcoholism, senility, halitosis and other conditions. A case of oral myiasis in a 59 year old female patient with psychological stress and low socioeconomic status suffering with ulceration in the right maxillary gingiva and tongue. It is a condition in which the soft tissues are invaded by the larvae of the flies. It occurs as a result of female flies depositing eggs or larvae on open wounds or larvae being accidentally ingested through contaminated food. The larvae hatch in the tissues and later migrate out of the tissues.

Key Words

Myiasis, worms in gingivae, deep ulcer in tongue.

Introduction

Myiasis refers to invasion of living tissues by the larvae of certain species of flies. Myiasis is caused by the larvae of flies(order-diptera) which belong to three families namely-CalliPhoridae, Ostridae and Sacrophagidae. It is a condition in which the soft tissues are invaded by the larvae of the flies, mostly occurs as a result of female flies depositing eggs or larvae directly on open wounds or larvae being accidentally ingested through contaminated food. The first case of oral Myiasis was reported by Shira in 1943 and the term Myiasis was first introduced by F.W Hope and is derived from greek word 'myia' meaning fly[1]. Zumpt (1965) defined Myiasis as the infestation of live human and vertebrate animals with dipterous larvae, which at least, for a certain period feed on the hosts (dead or living tissue) or on the ingested food[2,3]. Myiasis is well recognised in the animals but rare in humans, in whom it occurs mainly in the tropics and subtropics. Oral Myiasis in human is usually reported among the poor in the developing world. Mouth breathing during sleep, alcoholism, mental handicap, cerebral palsy and hemiplegia may facilitate the development of myiasis[4,5]. Other contributing factors include poor oral hygiene & low body resistance. The aim of this paper is to report an extensive case of myiasis in gingiva and tongue.

Case Report

A female patient, 59 yrs of age with psychological stress[demise of father] and low socioeconomic status, reported to the clinic, with the chief complaint of ulcerative wounds in the right maxillary gingiva and on the dorsum of the tongue. She had severe continous pain in the gingiva and tongue. Since last three days, the wounds had started in increasing in size and she complained of creeping sensation in the involved area. The worms started wriggling out. On intraoral examination, an ulcer was seen in the right maxillary canine region, the redness and puffiness was extended from canine to first molar region. The corresponding palatal region also depicted swelling and blanching. On probing in the mesial aspect of canine, maggots started creeping out. The alveolar gingival in incisive papillae region was also whitish and friable, apparently due to striking mandibular incisors, being in deep bite. On close examination, maggots larvae were seen in the ulcer on the tongue. The ulcer on the tongue was oval deep with 3-6 mm in dimension, the oral hygiene status was very poor. A thick bridge of calculus was present with Glickmans grade IV furcation involvement in relation to 16. The patient was very thin in built, febrile and restless. She was advised for blood investigations (T.L.C.,D.L.C., Hb%, B.T.,C.T.,& Random blood sugar estimation) and I.O.PA X-ray was done in relation to 13-16. The patient was treated by flushing the ulcers with turpentine oil. The ulcers were gently curetted and irrigated with the mixture of hydrogen peroxide and betadine. Antibiotics were prescribed along with a serratio peptidase and analgesic.

Discussion

In the present case, it was presumed that the eggs were deposited in the periodontal pocket and on the tongue directly by the flies. As the patient was of low socioeconomic status, poor personal hygiene and ineffective fly control were contributing factors to it. The stagnated, warm humid climate of the mouth was also favourable for the larvae. The larvae are called screw worms on account of their morphological characteristics. In the diseased and dead tissues, the larvae hatch in eight to ten hours and burrow deep & they obtain the nourishment from the surrounding tissues. It appears that with the maturation of larvae, tissue inflammation occurs[6,7]. Psychological stress may also be a risk factor[8]. The patient was treated by flushing the ulcers with turpentine oil. The maggots were picked up with the help of tweezers. On the first day ,about 10 maggots were removed from the gingiva and the tongue .maggots were preserved in formalin solution for examination and identification purpose .Maxillary right canine and the 1st premolar were extracted under Local anaesthesia. Lingual nerve block was given on the left side and tongue ulcer was gently curetted and irrigated with a mixture of hydrogen peroxide and betadine [povidine iodine solution]. Antibiotic amoxicillin and cloxacillin was given along with a serration-peptidase and analgesic. On the second day, the clinical picture was less painful and less oedematous. After irrigation of the sites, the patient was discharged for 2 days. On the 4th day, still the patient complained of some creeping sensation and 2 maggots were removed from the tongue ulcer. On the sixth day, the worms were neither reported nor could be traced. The maxillary right side of the effected gingiva resumed its normal colour and appeared less oedematous. On the 10th day, the patient reported with restoration of the normal taste sensation in the tongue ,normal texture and colour of gingiva. The healing was uneventful. The patient was instructed to maintain oral hygiene by continuous use of mouthwash and tooth brushing.

Conclusion

The prevention of human Myiasis is by education and creating awareness for maintaining personal hygiene but unfortunately in the developing countries some people live in low socio –economic conditions, predisposing the occurrence of the infestation.

Psychological status do play a role in deciding the oral hygiene practice patterns.

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A Cross-Sectional Study of Poisoning Cases at District Hospital, Belgaum in the Year 2000- 2001

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Introduction

Poison is a substance which if introduced in the living body or brought in contact with any parts of the body will produce ill health or death. However, Goethe says that, there is no such thing as poison, it all depends on the dose. It is difficult to draw a boundary line between medicine and poison because medicine in large doses acts as poison and that a poison in small dose acts medicine. The only difference is the intention the purpose of introduction of the substance. The incidence of poison is increasing in civilized countries. However, there is a progressive shift towards suicidal poisoning and accidental poisoning in house hold and agriculture. Industrial poisoning is gradually decreasing due to the industrial hygiene and medical services. Apart from the poison that is ingested, animal bites are also quite common in India. At least more than 20000 persons die per year out of 2 lakh snake bite cases in India. Human poisoning due to suicidal, homicidal, accidental are common in India, as poisons are easily available as insecticides, pesticides, rodenticides, weed killers and drugs. In addition there are plant poisons like oleanders, aconite, nux vomica, calotropis, nerium, abrus precatorius are also easily available. Many Indians consider taking off life by poisoning is lesser crime than bloodshed. In Belgaum the age old tradition of suicides by drowning in wells or by hanging have been replaced by poisoning oneself by the use of organophosphorous compounds, barbiturates and others. The high incidence of poisoning and mortality rate have prompted us to study a cross- sectional study of poisoning cases admitted at District Hospital, Belgaum region.

Aims and Objectives

The present study is aimed to study the following aims and objectives,

1. To know the common type of cases.
2. To know the common age group involved.
3. To elicit seasonal variation along with urban and rural oriented trends.
4. To know the manner of poisoning.

Material and Methods

The cross-sectional study was conducted at District Hospital, Belgaum, Karnataka, India from September 2000 to August 2001. Patients who got admitted with history of consumption of poisonous compound and treated in medical wards in this hospital were considered. Cases got admitted were followed up in the wards till recovery or expiry. The cases were broadly divided into poisoning due to ingested poisons and poisoning due to snake bite and insect stings. All cases with history of consumption of poison or bites with positive signs and symptoms and patients with doubtful history of consumption of poison but with definite signs and symptoms of acute poisoning and bite were included. Cases having no positive signs and symptoms were excluded. The cases presented with clinical symptoms like abdominal pain, loose motion, vomiting, hemetemisis, malena, dizziness, vertigo and other general symptoms. The patients showed either individual or combination of these symptoms. In cases of bites, puncture wounds with progressive swelling and tenderness with or without persistent bleeding was noted. The presence of pain, numbness, tenderness, neuroparalytic and haemotoxic signs and symptoms were considered. The treatment of cases were carried out under the standard protocol like removal of unabsorbed poison, administration of antidotes, elimination of poison by excretion and symptomatic management. In cases of bites, first aid followed by antivenin therapy was instituted. Whenever death occurred, the body was subjected to postmortem examination.

Observations

There were 290 poisonous cases out of 2990 admissions during the study period. The incidence was 96.98 per 1000 admissions in medical ward. The ratio of male (74%) to female (26%) was 2.8:1

In the present study 62% of total poisoning was due to pesticides in which Organophosphorous compound is 60.40% chlorinated hydrocarbons 1.60%, benzodiazepines is 12% and due to rat poison 8%. The age of incidence revealed that the majority of the patients were in the age group of 20- 29 year (40%). Approximately 2/3rd of 62% were in the age group of 10-29 year. It was rare in the old age group. As per the occupation it the farmers (74 cases) corresponds to 29.60% formed the large group followed by laborers (55 cases) corresponds to 22.00%, students (43 cases) corresponds to 12%, clerks (23 cases) 9.20%, coolies (19 cases) 7.60% followed by bus conductors, drivers, agricultural officer and lab technician one case each. There was no significant month wise variation observed but the cases from rural areas were 165 (66%) and urban 85 (34%). Majority of the cases were suicidal 126 (67.74%) followed by accidental 55 cases (29.57%) and unknown of 5 cases (2.69%) among which lower financial class were 208 cases (83.20%) and middle class is 42 cases (16.80%).

Table 1: Poisoning cases due to ingested poison:

Poison	Cases	Percentage
OP compound	151	60.40
Diazepam	30	12.00
Rat poison	20	8.00
Barbiturates	14	5.06
Kerosene	11	4.40
Alcohol	07	2.80
DDT	05	2.00
Bhang	04	1.60
Endrin	04	1.60
Phenol	04	1.60
Total	250	100

Table 2: Age incidence.

Age in Year	Cases	Percentage
0-9	14	5.60
10-19	55	22.00
29-29	100	40.00
30-39	45	18.00
40-49	28	11.20
50-59	05	2.00
>60	03	1.20
Total	250	100

Table 3: Manner of poisoning

Manner	Male Cases	Percentage	Female Cases	Percentage
Suicide	126	67.74	49	76.56
Accidental	55	29.57	15	23.44
Homicidal	-	-	-	-
Unknown	05	2.69	-	-
Total	186	100	64	100

Poisoning due to bites admitted in medical wards constituted for 40 cases which corresponded to 13.79%. Among all the 40 cases were snake bites, 15 venomous (37.50%) and 25 non-venomous (62.50%). Majority of cases were in the age group of 20- 39 year (70%). Most of the cases were males (60%). A total of 30 cases had bite on lower limbs, 7 in upper limbs and in other region in 3 cases. The present study revealed accidental bites in which 77.50% of victims were farmers who when working in fields sustained bite and 22.50% were the victims belonging to other section of population with a predominance among rural area, 29 cases (72.50%); urban 11 cases(27.50%). There was no mortality.

Discussion

The most common type of poisoning is due to organophosphorous compound followed by benzodiazepines and rat poisons. The use of drugs as poison was found to be comparatively more. An observation made by DeAlwis LB et. Al. 1988 revealed that 78.8% of poisoning is due to insecticides and in another study by Chirasirisap K et. Al. major type of poisoning

Table 4: Incidence of type of snake bite.

Snake	Cases	Percentage
Venomous	15	37.50
Non- Venomous	25	62.50
Total	40	100

Table 5: Site of bite.

Site	Cases	Percentage
Upper limb	07	17.50
Lower limb	30	75.00
Others	03	7.50
Total	40	100

is due to insecticides, misused therapeutic drugs and house hold chemicals. The disasters were found in the productive age group with predominance in males but poisoning and bites were less in the senior citizen group which is similar to the findings of Giunta F et. Al. and Petersen H et. Al.he farmers and laborers constitute the high risk group as their out door activities with exposure to the stress, burden and the dwelling of reptiles in case of bites. Similar observation was made by Banerjee et al in 1974 in Safdarjang Hospital, New Delhi. Mortality was absent mainly because of prompt treatment as per the observation made during the study period. Sawai et al (1969) however observed the overall mortality due to snake bite in India is 0.1/100,000 population in Uttar Pradesh, 2.1 in Maharashtra and 1.3 in Kerala.

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Drug Abuse and Alcohol Consumption as a Social Habit in Nepal

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Abstract

Being a multicultural and multi-ethnic country, Nepal is largely seen as an ambivalent society regarding alcohol use. The use of alcohol and drugs affects all strata of society. The alcohol industry is powerful and enjoys a stronghold on the national economy generating one of the highest revenues. Alcohol policy favors the marketing of the product, and alcohol is available everywhere in Nepal and to all age groups without any restriction. The easy access to and availability of alcohol have created an extremely conducive social environment, especially among the young, for people to begin drinking. A previous study in Nepal revealed that about 60 per cent of the Nepalese population have experienced alcohol. Among those who have ever drunk alcohol, 38 per cent were found to be using it regularly (1-5 days in 30 days) and 10 per cent are daily users (20+ days in a month). Our study revealed that men than women drink more (32 per cent female as compared to 67 percent male) any type of beverage.

Introduction

In Nepal our present attitudes reflect prejudices that existed in western country more than four decades ago. Alcoholism here is still thought to be self indulgent problem of the emotionally weak-willed and immoral. Due to cultural acceptability of alcohol is used routinely as social drink amongst different ethnic group and both users use equally.

Besides alcohol, there is no restriction for smoking and chewing of tobacco or cannabis and other drugs. Because of easy availability of these materials people start using from juvenile period and it accentuate the danger of abuse.

Nepali society is now firmly in the grip of an alcoholic epidemic and this is the first step towards other substance abuse.

Pokhara, situated in western region of Nepal is mainly habitated by "Gurung" and "Magar" ethnic community and as it is their social custom they use alcohol, tobacco etc. from early age group in their houses irrespective of the sexes.

Material and Methods

A random study of patients attending different departments of Manipal College of Medical Sciences (MCOMS), Pokhara, Nepal during one year period of 2008-2009 was studied and a total 1500 cases were documented for the present work. The patients selected were above 10 years onwards and their statement was recorded regarding their habit of drinking, smoking and taking other form of drugs and tabulated

Observation

Table 1: Distribution of sex

Sex	No. of cases	Percentage (%)
Male	1018	67.87
Female	482	32.13
Total	1500	100

Table 2: Consumption in different communities

Community	No of person consuming drugs	Percentage (%)
Gurung	748	49.87
Magar	461	30.73
Chetri	92	6.13
Brahmin	31	2.07
others	168	11.20
Total	1500	100

Table 3: Prevalence of age

Age Group (years)	No. of cases	Percentage (%)
10-25	208	13.87
26-40	731	48.73
41-55	413	27.53
56-70	119	7.93
More than 70	29	1.93
Total	1500	100

Table 4: Drugs of common use

Name of Drugs	No of person	Percentage (%)
Alcohol	1178	78.33
Tobacco	649	43.27
Ganja/Hashish	145	9.67
Cocaine	1	0.07
Glue sniffing	6	0.40
Codeine & Diazepam	4	0.27

Above chart shows that about 80% of persons were consuming alcohol, next is tobacco 43.27%.

Table 5: Drugs of common use in combination and single

Name of Drugs	No of person	Percentage (%)
Alcohol	728	48.53
Alcohol+tobacco	410	27.33
Alcohol+ganja	40	2.60
Tobacco	206	13.73
Tobacco+ganja	33	2.20
Ganja/Hashish	72	4.80
Cocaine	1	0.07
Glue sniffing	6	0.40
Codeine & Diazepam	4	0.27
Total	1500	100

More than 30% of the total studied subjects were taking combination of either of two substance abuse.

Table 6: Preference of drug of abuse in different age groups

Drugs of Abuse	Preference of age (years)
Alcohol	12-70 or more
Tobacco	10-70 or more
Ganja/Hashish	21-45
Cocaine	28
Glue sniffing	14-17
Codeine & Diazepam	20-24

Results and Discussion

Present study shows both sexes indulge in consuming different drugs of abuse. The male: female ratio appears to 1:2. Though different ethnic group consume different beverages; mostly local made "Ruksy" is consumed. But present study noted that Gurung community had highest incidence of addiction (49.87%), Magar community 30.75% followed by other castes. Majority of the cases had habit of indulging in more than one drug.

Here drug abuse or habit of alcohol intake starts from very early age by 10-12 years. Though alcohol and tobacco were two main addictions but more than 30% of total cases showed history of taking combined drugs. Besides tobacco and alcohol Glue sniffing was found in teen age group.

This study do not cover the entire population or all communities of Nepal and only limited to western region, mostly the people of nearby area of Pokhara attending MCOMS. Therefore further detail and elaborate study is required in different areas of Nepal for final conclusion of drug indulgent.

Conclusion

There had never been a systematic study in Nepal about the drug abuse neither any statistical data available regarding alcohol consumption.

Keeping in view of prevalence of drug users, Nepal government has made Law for punishment of these abusers.

In Nepal Narcotic Drugs (control) Act, 2003 BS (1976 AD) is the legal framework of drug control issues. Section 3 A stipulates Narcotic drugs as Cannabis, Medicinal Cannabis, Opium, plants and leaves of Coca, any substance prepared with mixing opium or coca extract which includes mixtures or salts, any natural or synthetic narcotic drug or psychotropic substance and their salts. Any person violating this act shall be punished by up 20 years of imprisonment and fine. While non-physician prescribed consumption of narcotic is a criminal offence, the act has provision for the prevention and treatment of drug users.

The smoking (Prohibition and Control Act 2058 BS) is awaiting the parliamentary approval. Under National Anti-tobacco Programme, Anti-tobacco communication campaign, a five years action plan has been prepared by the health ministry.

This study is to aware the people of Nepal to learn to accept alcoholism like diabetes, a disease genetically carried and triggered by an environment a person is born to and alert them about the consequences / complications following its consumption.

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Studies on Medico-Legal Evaluation of Material Used in Hanging in Central Orissa

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Introduction

The word hanging means complete or partial suspension of the body by a ligature tied around the neck and the force of construction on neck

being applied by the weight of the body hanged. In hanging death is usually due to Asphyxia or cerebral anoxia or vagal inhibition & fracture of C2, C3, C4 vertebra.

The type of material used in hanging, the definition of hanging, the signs of hanging and the personal history of the individual correlated to the post-mortem findings in hanging should be observed. There are common as well as typical finding that have been encountered in observed cases of material used in hanging. It is in this context that a study on the observed autopsy findings of hanging cases dealt medico- legally in this laboratory had been undertaken to compile and corroborate with those of established findings of asphyxial deaths recorded in literature.

Material and Methods

Two hundred cases of death due to different causes of mechanical asphyxia whose post-mortem examination was conducted during the period from January 2000 to December 2001 in the Department of Forensic Medicine and Toxicology, S.C.B. Medical College, Cuttack, Orissa, India was the material for the present study. The post-mortem findings of all asphyxial deaths were revived year wise and both internal and external findings of victim's body were recorded. The serial number, post-mortem number, police station, date and time of arrival of dead body in the mortuary, date and time of post-mortem examination had been recorded in order to correlate persistent and temporary appearance of the symptoms as decomposition sets in with the passage of time. The sub-varieties of asphyxial death were also specified along with the cardinal findings of asphyxial deaths. The details of ligatures used in mechanical asphyxial deaths were observed and analysed.

Results and Discussion

A total of 2746 death cases autopsied during the period of study, diagnosed cases of death due to mechanical asphyxia were 200. In year-wise break up, 83 out 1362 (6.09%) of cases in the year 2000 and 107 out of 1384 (8.45%) cases in the year 2001 were due to asphyxia. The cases of mechanical asphyxial death were categorised as (i) hanging (151 cases), (ii) drowning (115 cases), (iii) choking (3 cases) and (iv) strangulation (1 case). Higher incidence of asphyxial death in the present study might probably be due to more of rural area and slums in the coastal Orissa being surrounded by rivers. This is in contrast with lower incidence of mechanical asphyxia reported from urban area by Reddy (1974). There were 98 male(49%) and 102 female(31%) victims among 200 cases of death post-mortemed for mechanical asphyxia. Total victims due to hanging were higher (75.5%) than the other modes of mechanical asphyxia (Table 1).

Table 1: Number of male and female victims due to different mechanical asphyxia

Asphyxia (Type)	Male	Female	No. of cases	Percentage
Hanging	56	95	151	75.5
Drowning	38	7	45	22.5
Choking	3	0	3	1.5
Strangulation	1	0	1	0.5

Hanging was mostly suicidal death in nature (Ford, 1957) and comprised higher incidence among mechanical asphyxial deaths which could be explained by the fact that the victim was in impulse search of the most easy and cheap means of instantly available material at the place and resorted to such an act to end his or her life and chose this method as the ultimate choice.

This might be due to the fact that people in the central Orissa usually prefer to bath in rivers and ponds and thus become the victims of such accidental death. Females (75 cases) out numbered males (56 cases) in death due to hanging, whereas reverse was the case in death due to drowning where 38 males died due to hanging as against 7 females. There were 3 cases of death due to choking, while there was a single case of strangulation. No female case of death due to either choking or strangulation was noticed (Table 1).

Table 2: Age and sex distribution of victims of different mechanical asphyxial death

Age group (Years)	Hanging		Drowning		Choking		Strangulation	
	M	F	M	F	M	F	M	F
0-10	--	--	--	--	--	--	--	--
11-20	04	28	06	02	--	--	--	--
21-30	21	41	09	01	01	--	01	--
31-40	13	17	15	03	01	--	01	--
41-50	10	04	04	--	01	--	--	--
51-60	04	05	03	01	--	--	--	--
61-70	04	--	01	--	--	--	--	--

Table 3: Distribution of victims of different mechanical asphyxial death as per their socio-economic, marital and literary status.

Victim's Status	Hanging		Drowning		Choking		Strangulation	
	M	F	M	F	M	F	M	F
LIG	42	32	29	05	--	--	01	--
MIG	14	63	09	02	03	--	--	03
HIG	--	--	--	--	--	--	--	--
Married	34	64	25	05	03	--	01	--
Unmarried	22	31	13	02	--	--	--	--
Illiterate	36	53	26	04	--	--	01	--
Literate	20	42	12	03	03	--	--	--

Table 4: Place of occurrence of different mechanical asphyxial deaths

Place	Hanging		Drowning		Choking		Strangulation	
	M	F	M	F	M	F	M	F
Indoor	51	93	1	--	--	3	--	--
Outdoor	05	02	37	07	--	--	1	--

Table 5: Offending agent in different mechanical asphyxiation

Offending Agent	Hanging		Drowning		Choking		Strangulation	
	M	F	M	F	M	F	M	F
Ligature material	56	95	--	--	--	--	--	--
Fluid	--	--	38	7	--	--	--	--
Foreign Body	--	--	--	--	3	--	--	--

Males predominated females in all the age groups in drowning, choking and strangulation (Table 2). Susan (1980) reported the highest mortality rate in the age group of 14-17 years and old age due to hanging. Warne and Garrow (1947) reported 21-25 years as the common age group of maximum deaths due to drowning irrespective of the sex thus supporting the inference that male and female in this age group are mostly active and frustrated due to non-adjustment in the society for various factors like unemployment, low socio-economic status and marital disputes. The age incidence can never be universally applicable due to different geographical conditions with diversity in work pattern and life style.

In general, suicides are multi-factorial in nature. Socio-economic condition plays a role in committing suicide. Among the low income group (LIG), male victims out numbered female victims in hanging and drowning. There was a single male victim due to strangulation in this category. The situation among the middle income group (MIG) was quite different as female cases predominated over male in hanging and male cases outnumbered females in drowning. There were 3 male and 3 female cases of death due to choking and strangulation respectively. Surprisingly, there were no asphyxial death case from higher income group (HIG) (Table 3).

Ligature material was the most common offending agent in hanging adopted as the predominant method by majority of victims of mechanical asphyxia. Ninety five females and 56 males used ligature material in hanging and a lone male case was recorded to have used ligature material for strangulation.

With regard to the consistency of the ligature material used in mechanical asphyxial death, both soft and tough ligature material was found equally common in cases of hanging. Sixty two female victims used soft ligature material while 42 male victims used tough ligature material. Small number of male victims (14) used soft ligature material for hanging as against 33 females used tough ligature material. Only one male victim used tough ligature material for strangulation. No male or female victim using soft ligature material for strangulation was noticed in the present investigation (Table 6).

The observations made in the present study are reflective of similar findings reported by other workers (Naik, 1998; Polson, 1965).

Cloth or sometimes rope was commonly used as ligature material by the victims. However, the consistency or the type of ligature material was purely a matter of choice or preference of the victim or assailant which was itself dependent upon the gender and availability of ligature material in the immediate vicinity. Further, males preferred a tougher ligature material while the females opted for softer one. It was further noticed that cloth was used in 76 cases, jute rope in 52 cases, Nylon rope in 13 cases and coir rope in 10 cases as ligature material (Table 7) whose mark of position was noticed above the thyroid cartilage in females and at the level of laryngeal prominence in males.

This suggests that married females usually dream to lead an ambitious and luxurious life style failure of which naturally results in frustration and suicide. Marriage and family are sacrosanct entities in Indian social life and carry a great deal of expectations. Marital disharmony is most often heart witching affair for a newly married couple and especially for the bride who is considered the most delicate and weaker gender. Further, lack of institutional support and social sanctions for divorced or a single woman precipitate the determination for such disasters. Literacy has its own role in cases of asphyxial deaths. In this study, literacy implied here is the ability to read, write and mature enough to be able to take responsible decisions in life which is altogether a different proposition. More illiterate females were the victims of death due to hanging than males. Likewise, illiterate males outnumbered the females in drowning.

Table 6: Consistency of ligature material used for asphyxial death

Ligature Material	Male	Female	Male	Female
Soft	14	62	--	--
Tough	42	33	1	--

Table 7: Type of ligature material used for asphyxial death

Ligature material	No of Cases
Cloth	76
Jute rope	52
Nylon rope	13
Coir rope	10

Taking into consideration the place of occurrence of mechanical asphyxial deaths, it was observed that the incidence of such cases occurred indoors in 148 cases (74%) as against the occurrence of 152 cases (26%) outdoor (Table 4). Here again females out numbered males in committing death by hanging in closed space. Thus, 93 female cases were registered as against 51 male cases in this category.

Coming to the incidence of asphyxia outdoor, there were 5 male cases against 2 female cases of hanging, a record number of 37 male cases.

Regarding the external findings in and around the ligature mark, it was found that male victims dominated in imprint pattern finding, while female victims dominated in both parchmentisation of the skin and the presence of the foreign body around the ligature mark. Not a single male victim with foreign body around the ligature mark was noticed in the present study (Table 8). Bleeding from mouth and nostril with or without froth was common feature noticed in hanging and drowning cases. Seminal discharge from urethra was found only in cases of hanging and drowning, but saliva from mouth was noticed in few cases of hanging.

Facial congestion and cyanosis were the most common features in majority of the hanging cases and was followed by cases of drowning, choking and strangulation (Table 7). Petechial haemorrhage was found only in one case of hanging. Protruded and bitten tongue was noticed in all cases of hanging and was a rare finding in cases of drowning and choking (Table 7).

Francis and Hunt (1959) reported hyoid bone fracture in 13 out of 24 cases of strangulation. Polson (1962) found hyoid bone fracture in 36% of hanging cases. Reddy (1974) reported hanging cases with internal injury to strap muscle in 5 to 10% and injury to hyoid bone in 15-20% of cases of more than 40 years of age group.

Paparo and Siegel (1984) noticed fracture of throat skeleton in 11.32% of hanging cases, the incidence of which increased with age group of more than 40 years. Frequency of fracture was found higher in a typical complete hanging, Laryngeal injury and internal neck injury were also common features with cases of complete hanging which increased with age group of more than 40 years and with increased suspension of time. Knight (1996) reported soft tissue haemorrhage in 12.30% and laryngeal fracture in 35-40% cases of hanging. Schewarzackav (1928) found fracture of hyoid bone in 45% of cases of hanging and no fracture was noticed in cases of age group of less than 25 years.

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Factors Influencing Mortality in Flame Burn Cases - A Medico-legal study

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Abstract

A rapid increase in unnatural deaths in females, especially in the first few years of their married life was observed in our society for last few decades. This drew the attention of people and forced the socio-political system to investigate and develop preventive measures[1-3]. As percentage of surface burn area increases, mortality also increases constantly, similarly there is decrease in mean survival period as the percentage of surface burn area increases. More than 30% surface area burned can be labeled as grievous injury & endangering the life.

Key Words

Burn, female, unmarried, accidental, surface area.

Introduction

Flame is a symbol of purity. This is also considered as a womb for light simultaneously it is also linked with agitation, aggression and palpitation. Among many communities especially Hindu & Parsi "fire" is a source of worship, all the sacred work is being done before the "fire". Flame is Goddess till it is under the framework of vigilance, as this flame loss its integrity; it leads to disaster for mankind. Several episodes are in the history of mankind where major calamities are caused by a tiny brisk of flame. Fire is a necessary evil. Even before the primitive man learned to use fire he has been victim of it. Burn continues to be responsible for large number of mortality in developing countries.

Burn injuries are second to motor vehicle accidents as the leading cause of death in USA. In India the exact number of burn cases is difficult to determine but about 7 to 8 lac patients are admitted annually due to burn. Burn cases are among most emergent and priority situation for treating doctor and medico legal person. Intimation to police about incidence and condition of patient for enabling them to record the statement / dying declaration, preparing wound certificate is some of the important work of medico legal personal. Various evil of society like dowry are also linked with burn incidence. Study on the subject would certainly help law enforcing authorities to separate accidental burns from homicidal episodes, it would also be more accurate in evaluating the gravity of burn which would assist judiciary to some extent.

Aims & Objective

The present work has been undertaken to find out the various factors which influences the mortality in flame burn cases. Scope for the study on the factors effect on mortality includes age, sex, surface area, effect of various antibiotics, steroids and other treatment modalities, effect of various type of nursing care, effect of external environmental factors like temperature, humidity etc.

Determination of mortality with respect to age is very significant because reproductive age group contributes major role in economy of family and society.

We will also study the relation in between mortality, burn incidence and sex ratio. Women are playing important role in the family and also they have few special guidelines to tackle the medico legal problem related with female sex gender and burn incidence.

Along with sex ratio, marital status is also included in our study.

Almost all previous study shows a direct correlation with surface area of burn and mortality. In present study we will try to correlate surface area of burn with mortality in Udaipur region of Rajasthan state.

The correlation between surface area involved and duration of survival after the infliction of the injury till the death occurs will also be studied, so that the forensic expert can determine how much time the victim is allowing for pursuance of their duties; timely intimation to police, recording of statement, intimation about all possibilities to the relatives so that dissatisfaction and rage does not initiate after the death of the victim between treating doctor and patients relative.

In our study we will also determine the cause of death due to flame burn because it is a routine question asked by the police.

Similarly manner of incidence like homicide, accidental or suicidal will be determined.

Material & Methods

The present study is carried out in the department of Forensic Medicine & Toxicology, R N T Medical College & Maharana Bhopal Government Hospital, Udaipur, Rajasthan. This study was carried out from 1 January 2009 till 31 December 2009. 221 burn cases were notified to the Medical Jurist Department from burn & emergency department and also include patients on which post mortem examination was done.

Review of Literature

Burn injuries are a point of interest for study for vast majority of clinician and Forensic personal of India and abroad. There is generalized similarity about a direct correlation with the surface area involved and mortality. Extremes of age have poor prognosis as compared to adults. Incidence of newly married brides is in outstanding number as compared to others especially in India.

Olaitan P B and Jiburum B C[5] in studied 285 burn patients during 1996 to 2000, in which 57 (20%) patients died of whom 38 (66.7%) were male and 19 (33.3%) were female. Flame burn was responsible for 92.9 % death, followed by 5.3 % due to chemical burn and 1.8% due to scalding. The highest mortality was found in the age group of 71 -80 years age group and survival decreased with increase in surface area of burn. Mortality was more in males (20.8%) as compared to females (18.6%). In 24 (42.1%) cases the cause of death was renal failure, septicemia in 18 (31.6%) cases, acute respiratory syndrome in 5 (8.7%) cases, shock 4 (7%) cases and upper GIT bleeding in 1 (1.8%) case.

Herndon D N & Gore D[6] stated in their study that recent advancement in burn care has improved the survival rates of the victims with severe burn injuries. The total mortality rate in 1057 pediatric patients admitted was 2.7%. The presence of preadmission shock and inhalation injury were early determinants of mortality with secondary renal, pulmonary or cardiovascular collapse being the latter predictor of mortality.

Shrivastav A K & Arora P[4] conclude in their study that Deaths in newly married females due to various family problems constitute 5% of Total unnatural deaths. Most of the victims were young Hindu women between 18-26 years of age who died within three years of their marriage. Majority of the victims were poorly educated, non-working (housewives), belonging to middle or lower-middle socio-economic groups. Their marriage was arranged and they were living with their in-laws in joint family. Husbands were either unemployed or poor salaried and they were dependent on parents for most of the expenses. Family life of the victim was not happy in most of the cases. Pressure for more dowry, ill-treatment / torture by in-laws, rash & negligent behavior or extra-marital affairs of husband were the important reasons behind family unhappiness. Half of the deaths were suicidal. Homicidal & accidental cases shared equally the remaining half. As a whole, burning was the most common cause of death but hanging was the commonest in suicidal, strangulation in homicidal and burning in accidental deaths. Ill-treatment by the in-laws, excessive pressure for dowry and negligent behavior of husband were the main reasons behind suicidal deaths. Failure to fulfill dowry demands & opposing extra-marital affairs of husband were main reasons in homicidal deaths & wearing loose synthetic sari while cooking on unprotected flame in cases of accidental deaths.

Zanjad N & Godbole H V[7] stated that the burn autopsies form the major bulk of autopsies carried out at most of the hospitals in India. A medico–legal study of fatal burn cases was carried out at Nanded (India) during the period of 3 years. These constituted 18.2% of the total medico–legal autopsies carried out during the same period. The majority of burn deaths were observed in the age group of 11 – 40 yrs (83.11%), with peak incidence in 21 – 30 yrs (39.5%) of age group. Female preponderance was seen in all age groups with male to female ratio 1:2.5. Most of the cases were from rural area (76.3%). In 189 cases (41.4%), total body surface area involved was more than 80%. Majority of the subjects died as a result of flame burns (92.3%), followed by electric burns (5.3%) & scald (2.4%). In 406 cases (89%), Kerosene oil was involved leading to fatal burns. Accidental burns were most common (70.8%), followed by suicidal (18.2%) and homicidal burns (10.9%). The majority of deaths due to burns were observed within 1 week (66.2%).

Observation

Table 1: Distribution of cases according to sex and marital status:

a. Sex ratio and marital status in total cases: The sex ratio between 221 notified cases, female cases were outstandingly higher then male. The female cases were 121(54.75%) and 100(45.35%) cases were male. The male: female ratio is 1:1.21. Out of the total 100 male cases 70(70%) were married. In female 100 (82.6%) cases were married.
b. Sex ratio and marital status in expired cases: Total 112 patient expired during one year study. 44(39.28%) cases were male and 68(60.72%) were female. 35(50%) Married males expired where as 9(30%) unmarried males were not able to survive. 58(58%) married females were unable to survive and 10(47.61%) unmarried females died. Female in married as well as unmarried state are having higher mortality then their respective male counterpart.

Table 3: Pattern of mortality with reference to surface area burned:

In 0 to 20% surface area burned, total cases were 52(23.52%), male and female were equal in number 26 each with nil mortality. In 21 -40% surface area total cases involved were 39(17.39%) 18 were male and 21 female, 11 patients (4 male & 7 female) expired. In 41-60% surface area burned total cases were 37(16.74%), 17 cases were male of them 8(47.05%) expired and 21 cases were female of which 13(61.90%) expired. In 61-80% surface area involved total cases were 34(15.38%), males were 15 out of which 11(73.33%) expired, females were 18 of which 14(77.77%) expired. In 81-100% surface area burn total cases were 59(26.69%), male were 24 out of which 21(87.50%) expired and female cases were 35 out of which 34(97.14%) expired. The Mean survival period for surface area burn 21-40% was 5.65 days, for 41-40% burn it was 10 days, for 61-80 % burn it was 5.06 days, for 81-100% burn it was 3.75 days. As a whole the mean survival period of the expired patient was 5.41 days with SD 5.16

Conclusion

1. Predominance of female burn patients.
2. Accidental mode was observed in 95% of cases.
3. Mortality rate is higher in female.
4. Unmarried male are having least mortality
5. Married female form a major bulk of the total expired cases with highest mortality.
6. Age group 21-30 years had highest number of burn cases.
7. Higher number of female cases with high mortality in majority of age groups was observed.

Table 2: Distribution of cases according to age and mortality:

S.N	Age group	No of cases	Survived	Expired	Male	Male Mortality %	Female	Female Mortality %
1	0-10	18	12	3M+2F=5	9	33.33	9	22.22
2	11-20	40	18	7M+14F=21	20	35	20	70
3	21-30	86	37	16M+33F=49	39	41.02	47	70.21
4	31-40	51	30	11M+15F=26	18	61.11	33	45.45
5	41-50	14	10	2M+2F=4	8	25	6	33.33
6	51-60	5	2	2M+0F=2	2	100	3	0
7	61-70	6	1	3M+1F=4	4	75	2	50
8	71-80	1	-	1F	-	-	1	100

Table 4: Distribution of cases as per cause of death:

S.N	Cause of death	Number of cases
1	Shock	40 (35.71%)
2	Toxemia	5 (4.6%)
1	Septicemia	67 (59.82%)

8. As percentage of surface burn area increases mortality also increases constantly, similarly there is decrease in mean survival period as the percentage of surface burn area increases.
9. Septicemia is the major cause of death.
10. Mean surface area burned is 54.69% with SD 31.51 in 221 burn cases where as in 112 fatal cases mean surface area involved is 76.35% with SD 21.95 and in the 109 survived patients mean surface area involved is 31.50% with SD 24.42.
11. We state that more than 30% surface area burned can be labeled as grievous injury & endangering the life.

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Table 5: Distribution of cases as mode of incidence:

S.N	Mode of Incidence	Number of cases
1	Accidental	210 (95.02%)
2	Suicidal	8 (3.6%)
3	Homicidal	3 (1.37%)

Table 6: Quarterly distributions of cases:

S.N	Month	Cases
1	November to February	61
2	March to June	80
3	July to October	80

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India: A hot place for Medical Tourism

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Introduction

Medical tourism a term invented by travel agencies and mass media refers to growth of tourism industry due to medical and health care facilities in a country. People travel to international borders to get benefits of low medical treatment costs in a country. Sometimes even health care providers also travel abroad to provide facilities. India due to its low cost medical facilities and qualified professionals is emerging as a global hot spot for medical tourism especially among poor people of rich countries and among rich people of poor countries. The Indian medical tourism industry is presently at a nascent stage, but has an enormous potential for future growth and development. The reason India is a favourable destination is because of its infrastructure and technology in which is at par with those in USA, UK and Europe. Since it is also one of the most favourable tourist destinations in the world, Medication combined with tourism has come into effect, from which the concept of Medical Tourism is derived. It is also said that Medical Tourism will be a big Foreign Exchange earner for India in the near future.

Global Trend

Many countries across the globe are acting good places for many kind of surgeries like Mexico has long attracted American travellers looking for cut-rate cosmetic surgery or dental work, and countries like Malaysia, Thailand and the Philippines continue to lure medical tourists as well. In India, a heart bypass goes for $10,000 and a hip replacement for $9,000, compared with $130,000 and $43,000 respectively in the United States[2]. A heart-valve replacement that would cost $200,000 or more in the US, for example, goes for $10,000 in India--and that includes round-trip airfare and a brief vacation package. Similarly, a metal-free dental bridge worth $5,500 in the US costs $500 in India, a knee replacement in Thailand with six days of physical therapy costs about one-fifth of what it would in the States, and Lasik eye surgery worth $3,700 in the US is available in many other countries for only $730. Cosmetic surgery savings are even greater: A full facelift that would cost $20,000 in the US runs about $1,250 in South Africa[3].

Trends and Facilities in India

This research shows that India's share in the global medical tourism industry will climb to around 2.4% by the end of 2012. Moreover, the medical tourism is expected to generate revenue of US$ 2.4 Billion by 2012, growing at a CAGR of over 27% during 2009–2012. The number of medical tourists is anticipated to grow at a CAGR of over 19% in the forecast period to reach 1.1 Million by 2012[4]. Factors such as low cost, scale and range of treatments provided by India differentiate it from other medical tourism destinations.

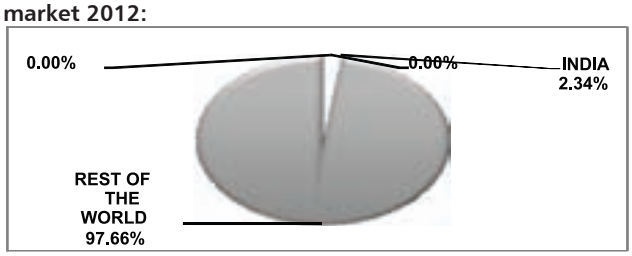
India's efforts to promote medical tourism took off in late 2002, when the Confederation of Indian Industry (CII) produced a study on the country's medical tourism sector, in collaboration with international management consultants, McKinsey & Company, which outlined immense potential for the sector.

The number of Americans heading abroad for medical procedures is surging as the country's 46 million people without health insurance look for treatment they can afford and cash-strapped U.S. companies struggle to find cheaper ways to provide high-quality medical care to their employees[5]. About 750,000 Americans travelled abroad for medical care in year 2007, and that figure is expected to jump to 6 million by 2010, according to a recent report from the consulting firm Deloitte Centre for Health Solutions.

Various Insurer companies are contracting with Indian hospitals to make profits and get their clients treated at that place. For example- Insurer Anthem Blue Cross and Blue Shield (WellPoint)[6] have signed a MoU with Apollo Hospitals, India for sending the employees of Serigraph, Inc., a corporate client of Anthem WellPoint, to Apollo Hospitals for certain elective procedures; the program will start with Delhi and Bangalore facilities and later expand to all JCI-accredited Apollo Hospitals. This program consists of 700 members. All financial details, including travel and medical arrangements, will be managed by Anthem WellPoint. India's medical tourism sector is expected to grow at an annual rate of 30 per cent to become a Rs 9,500-crore industry by 2015[7].

Apollo provides overnight computer services for U.S. insurance companies and hospitals as well as working with big pharmaceutical corporations with drug trials. Also, a big group, United Group is also contracting with Apollo Hospitals[8] to actively promote medical tourism to more than 200,000 individuals covered through self-funded health plans and fully insured, mini-med plans[9]. India, one of the leading countries promoting medical tourism is now moving into a new area called 'medical outsourcing' where subcontractors provide services to the overburdened medical care systems in western countries. India's top-rated education system is not only churning out computer programmers and engineers, but an estimated 20,000 to 30,000 doctors and nurses each year.

Forecast for India's share in the global Medical Tourism market 2012:



Why India is been chosen as a Hot spot?

Advantages for medical tourists include reduced costs, the availability of latest medical technologies and a growing compliance on international quality standards, as well as the fact

that foreigners are less likely to face a language barrier in India. The Indian government has taken steps to address infrastructure issues that hinder the country's growth in medical tourism.

Most estimates claim treatment costs in India start at around a tenth of the price of comparable treatment in America or Britain. For example, in April Madras Medical Mission, a Chennai-based hospital, successfully conducted a complex heart operation on an 87-year-old American patient at a reported cost of $8,000 (€7,000, £4,850) including the cost of his airfare and a month's stay in hospital. The patient claimed that a less complex operation in America had earlier cost him $40,000.

Advantages of medical tourism

- Massive potential for savings: treatment in a foreign country works out to be much cheaper than in the patient's home country. An article published in Chicago tribune, highlighted how an investment banker in U.S found India as a place for quick and cheap treatment.
- There is no waiting period for the treatment. As a result those who require treatment more urgently are benefited from medical tourism.
- Getting better and more personal care and medical tourism is being able to spend your recuperation in a relaxing and beautiful environment.

The Indian health sector can become the major service sector that can contribute to the GDP growth which will have a major impact on improving the quality of care in the country[10].

Surrogacy as a major factor in Medical Tourism

Surrogacy as defined in Black book Dictionary means The word 'surrogate' has its origin in Latin 'surrogatus', past participle of 'surrogare', meaning a substitute, that is, a person appointed to act in the place of another. A surrogate mother thus is a woman who bears of another man and wife either by from her own egg or from the implantation in her womb of a fertilized egg from other woman.

Where parents are unable to reproduce child by natural ways there come a role of surrogacy. These days another factor which has made surrogacy as a savior is legalization of gay marriages in some countries.

Surrogacy is a major factor for Medical tourism as there is no law in India which prohibits it. This trade's business volume is estimated to be around $ 500 million and the numbers of cases of surrogacy are believed to be increasing at galloping rate in India[11]. Because of infertility related issues these couples are not able to conceive a child of their own. In U.S. approx. six million of women are suffering from one or another form of infertility related issues[12]. The field of assisted reproductive technology (ART) has developed rapidly since the birth of The world's second and India's first IVF (in vitro fertilization) baby, Kanupriya alias Durga was born in Kolkata on October 3, 1978 about two months after the world's first IVF boy, Louise Joy Brown born in Great Britain on July 25, 1978.

In commercial surrogacy agreements, the surrogate mother enters into an agreement with the commissioning couple or a single parent to bear the burden of pregnancy. In return of her agreeing to carry the term of the pregnancy, she is paid by the commissioning agent or parents themselves for that[13]. The usual fee is around $25,000 to $30,000 in India which is around 1/3rd of that in developed countries like the USA. ART industry is now a 25,000 crore rupee pot of gold. Anand, a small town in Gujarat, has acquired a distinct reputation as a place for outsourcing commercial surrogacy. It seems that wombs in India are on rent which translates into babies for foreigners and dollars for Indian surrogate mothers[14].

Legal issues in Surrogacy: Surrogacy make a child as commodity interfering the bond developed between mother and child during the conception and growth of child inside womb. Many women sell their bodies for money to become surrogate mothers.

According to Human Rights Declaration[15] right to marry and have a family is a basic right of every man and woman. This is being confirmed in B. K. Parthasarthi v. Government of Andhra Pradesh[16], the Andhra Pradesh High Court upheld "the right of reproductive autonomy" of an individual as a facet of his "right to privacy" and agreed with the decision of the US Supreme Court in Jack T. Skinner v. State of Oklahoma[17], which characterized the right to reproduce as "one of the basic civil rights of man". In Javed vs State of Haryana[18], a strong argument was taken from Menaka Gandhi vs Union of India[19] that the fundamental right to life and personal liberty emanating from Article 21 of the Constitution should be allowed to stretch its span to its optimum so as to include in the compendious term of the Article all the varieties of rights which go to make up the personal liberty of man including the right to enjoy all the materialistic pleasures and to procreate as many children as one pleases.

So if law declares right to procreate as a fundamental right then surrogacy also becomes a constitutional valid procedure. But India has failed to enact any law on surrogacy till now.

Problem in surrogacy arises because the child have five people who could lay claim to parenthood – a genetic mother, a commissioning mother, a surrogate mother, a genetic father and a commissioning father. Different countries have taken different stands to address this issue. In UK, the surrogate mother is the legal mother; vide section 27(1) of the Human Fertilization and Embryology Act 1990. Section 30 of the said Act at the same time provides that if the surrogate mother consents to the child to be treated as the child of the commissioning parents the court may make a parental order to that effect[20]. This section also prohibits giving or taking of money or other benefit (other than expenses reasonably incurred) in consideration of the making of the order or handing over of the child.

In India, though homosexuality is a kind of "unnatural offence" and punishable under section 377 of IPC but gay couples can come to India and hire a surrogate mother to give birth to their child. The famous case of a gay couple Yonatan and Omer where Yonatan donated his sperms and got child in November 2008 motivated many gay couples to come to India for surrogacy as there is no bar to gay couples hiring a surrogate mother to deliver children for gay couples in India.

Lot of similar issues were reported where parents get divorced before child come into world or if in some country surrogacy is not recognized at all. So in all these cases, matters pertaining to child future remains in darkness and such problems can be addressed by making a law on surrogacy.

Disadvantages of Medical Tourism

In India, though medical facility is cheaper but it's not without problems. Malpractice laws are weaker, leaving patients who run into problems while being treated with little legal recourse. Patients may struggle to find U.S. doctors willing to take on after-surgery care once they return home. And the flight to India may be difficult—even in business class —for anyone with a serious medical problem.

Problems related to medical tourism

- Problem related to medical malpractice: Seeking damages

in case of negligence and incompetence in diagnosing and treatment become difficult although Laws of country might not be easier but citizen of a country probably enjoys greater and transparent guidelines and transparency.

- Difficulty in post treatments: In post treatment period sometimes patient needs to be in touch with the doctor as doctor needs to watch progress of health so that he can advice relevant medication from time to time. But for patients from other countries it becomes difficult as they leave country soon after treatment.
- Professional Licensing: Going to foreign country for medical treatment has its own risks as the country you go to may not regulate professional licensing and certification of the medical professionals.

Conclusion

Seven per cent of doctors in the US are Indians. India has the ability to provide the best of western and eastern health care systems. People are skilled in India and there is no waiting queue for the patients in the hospitals. India provides value for money and the cost of treatment is lower. However, India is considered the leading country promoting medical tourism-and now it is moving into a new area of "medical outsourcing", where subcontractors provide services to the overburdened medical care systems in western countries. Patients from around the world come to India for medical checkups. However, there are certain aspects that prevent the growth of medical tourism such as hygiene, connectivity, visa procedures, pollution and communal unrest. Medical tourism could account for three to five per cent of the total health care delivery market. India can become medical education destination with excellent teachers and wealth of clinical material and successful public health programs; medical tourism destination providing good quality health care at affordable cost to develop and developing country people; and R&D destination especially for clinical trials. There is still a long way for India to go.

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Variations in the Shape of Foramen Ovale in Male and Female Crania

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Abstract

Objective

Shape of the foramen ovale was studied in right and left side.

Methods

For this study 310 crania (155 male and 155 female) were taken.

Result

It was noted that maximum number of foramen ovale were ovale in shape. Circular, triangular, pear and kidney shaped foaremen ovale were also observed. Conclusion: Foramen ovale is important for great surgical and diagnostic procedures.

Introduction

The cerebral surface of the greater wing of sphenoid bone forms part of the middle cranial fossa of the skull. In the posterior part of the greater wing is the foramen ovale. The foramen ovale transmits mandibular nerve, the acessary meningeal artery, lessor petrosal nerve and an emissary vein. It opens into the infratemporal fossa through its other opening on the lateral surface of the greater wing[1].

Result

For the present study 310 human crania of known sex (155 male and 155 female) were studied from the different medical colleges of Western India. Different shapes of the foramen ovale were observed on right and left side in male and the female crania.

Following tables indicate the various shapes of the foramen ovale

Table 1: Shapes of foramen ovale in the male crania

Shapes	Right side	Left side
Ovale	150	149
Circular	3	4
Triangular	2	0
Pear shaped	0	1
Kidney shaped	0	1

The shape of the foramen ovale was ovale in 150 foramina of right side. 3 foramina having circular shape and 2 are pear shape on right side.

On left side 149 foramen ovale with ovale shape, 4 are circular in shape, 1 is pear shape and 1 is kidney shape

Table 2: Shapes of foramen ovale in the female crania

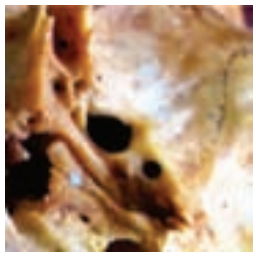
Shapes	Right side	Left side
Ovale	149	148
Circular	3	4
Triangular	2	3
Pear shaped	1	0
Kidney shaped	0	0

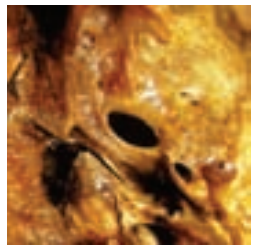
The shape of the foramen ovale was ovale in 149 foramina of right side. 3 foramina having circular shape and 2 are triangular shape and 1 is pear shape on right side.

On left side 148 foramen ovale with ovale shape, 4 are circular in shape and 3 are triangular in shape.

Discussion

Variations in the shape of the foramen ovale can be expalained by the developmental reasons. Foramen ovale is situated at the


Ovale shape


Circular shape


Triangular shape


Pear shape


Kidney shape

posterior border of the greater wing of sphenoid. At 22 weeks 3 days it is seen as discrete opening.[2]

Ossification takes place around the large mandibular nerve and other structures passing through the foramen ovale in later life. Foramen ovale of man is enclosed by membrane bone, derived from a medial process associated with the scaphoid fossa. The earliest perfect ring-shaped formation of this foramen is observed in the 7th foetal month and the latest in 3 years after birth.[3]

Ray B et al (2005) also studied the variations of the shape of foramen ovale in right and left side. 62.8 % on right and 60% on left side of the crania the shape was found to be ovale in shape. [4]

Conclusion

Foramen ovale is of great surgical importance in the neurosurgery. The knowledge of it is important in procedures like purcutaneous trigeminal rhizotomy for trigeminal neuralgia, transfacial needle aspiration technique in perinural sprea tumor and electroencephalographic analysis for seizure.

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Palatal Rugae - A tool in forensic odontology

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Abstract

Aim

To study the palatal rugae pattern among Indian, Tibetan and Malaysian males.

Objectives

- To classify the rugae pattern among different groups using Thomas and Kotze classification
- To find out the most common pattern in individual groups
- To compare palatal rugae among different groups

Methodology

Maxillary impressions of volunteers of various age groups ranging from 18 to 50 years was made with the help of alginate impression materials. Casts were prepared out of impression. The palatal rugae were assessed based on Thomas and Kotze classification of rugae pattern (1972). The results were statistically analyzed.

Results

This study demonstrates a significant variation in the rugae patterns of the study populations. Parameters like the length and shape of the rugae show racial differences.

Conclusion

Rugae patterns have great utility in population differentiation and should be examined in detail in large samples to further validate our findings.

Key Words

Rugae pattern, Forensic Odontology, Human Identification.

Introduction

Identification of humans is a prime requisite for certification of death and for personal social and legal reasons. Fingerprints, DNA analysis and dental record comparison are the most commonly used methods of forensic identification.[1]

Forensic odontology can be defined as a branch of dentistry which deals with proper handling and examination of dental evidence and with the proper evaluation and presentation of dental findings in the interest of dentist.

Palatal rugae are ridges on anterior part of the palatal mucosa on each side of the midpalatine raphe, behind the incisive papilla. As an entity they form the rugae pattern.Rugae have been shown to be highly individual and consistent in shape throughout life.[2]

Material and Methods

Three groups served as material for the study namely, Indian, Tibetan and Malaysian population. 30 male subjects in the age group of 17 to 30 years were taken from each group. After obtaining informed consent, Maxillary impressions of volunteers was made with the help of alginate impression materials. Casts were prepared out of impression and plaster of paris base was made.

The outline of the rugae was traced on these casts using a sharp graphite pencil. The rugae were highlighted by a black pen on the cast and a magnification lens was used for identification. Rugae length was recorded under magnification with slide calipers to an accuracy of 0.05 mm.

The palatal rugae were assessed based on Thomas and Kotze classification of rugae pattern (1972).[3]

Thomas and Kotze Classification

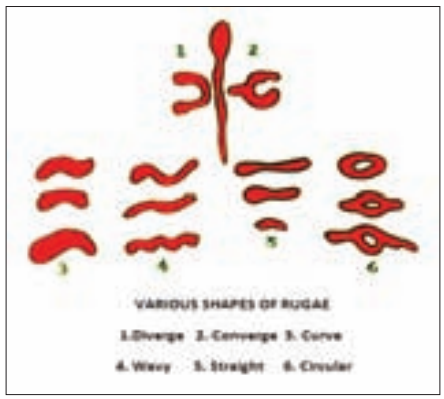
The Rugae pattern was classified based on their Length, Shape and Unification.

a. **Based on Length**
PRIMARY RUGAE – 5 mm or more.
SECONDARY RUGAE – 3 to 5 mm.
FRAGMENTARY RUGAE – 2 to 3 mm.
Rugae less than 2mm were disregarded.

B. Based on Shape
Rugae were divided into 4 types based on their shape as
CURVED – They had a crescent shape and curved gently.
WAVY – If there was a slight curve at the origin or termination of a curved rugae.
STRAIGHT – ran directly from their origin to termination.
CIRCULAR – Rugae that formed a definite continuous ring.

C. Based on Unification
Unification occurs when two rugae are joined at their origin

Fig. 1: Shows a pictorial representation of the classification.



Association between rugae were analyzed using CHI-SQUARE TEST.

Chart 1: Comparison of Palatal Rugae Patterns of Three Groups and Predominant Rugae Pattern in Each Individual Group.

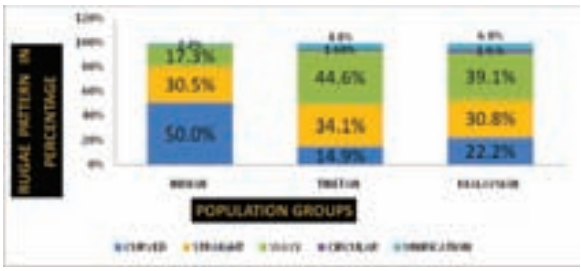
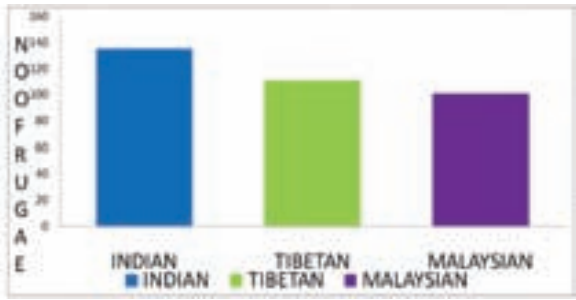


Chart 2: Comparison of Primary Rugae Patterns in Each Group



or termination.Rugae were considered diverging if 2 rugae had the same origin but immediately branched.Rugae with different origins, which joined on their lateral portions, were considered converging.

Results

In our study when the shape of rugae was analyzed curved pattern (50.0%) was most predominant pattern among Indians followed by Straight (30.5%), Wavy (17.3%) and Unification (2.2%).

In Tibetans wavy pattern (44.6%) was the most common pattern followed by Straight (34.1%), Curved (14.9%), Unification (4.8%) and Circular (1.6%).

Malaysian groups showed similar characteristics, Wavy pattern (39.1%) was the most common pattern followed by Straight (30.8%), Curved (22.2%),Unifications (6.0%) and Circular (1.9%). (CHART - 1)

Statistical analysis showed that there is a significant association between shapes and races. ($p < 0.05$)

Comparison of unification failed to show any characterstics.

The primary rugae pattern comparison showed that Indians had more primary rugae pattern than Tibetans and Malaysian groups. (CHART – 2)

Discussion

It is widely acknowledged fact that there are limitations in identification of an individual by fingerprints and dental records in some forensic situations,and the palatal rugae pattern of an individual may be considered as an alternative for identification purposes.

The classification put forward by Lyssel (1955) was modified by Thomas and Kotze in 1983 and it is considered to be the most accepted classification.

Palatal rugae have been studied for various reasons,the most important one being for personal identification in the field of forensic odontology.It has also been proven that rugae maintain a constant shape throughout life.

The present study was designed to evaluate ethnic variation of palatal rugae among the population.

In a study done by Kapali S et al (1996)[4] to study the palatal rugae patterns in Australian Aborigines and Caucasians. The most common shapes in Australian Aborigines and Caucasians were wavy and curved forms, whereas straight and circular types were the least common. The mean number of primary rugae in Aborigines was higher than in Caucasians. The most common shapes in both ethnic groups were wavy and curved forms, whereas straight and circular types were least common. There was a statistically significant association between rugae forms and ethnicity, straight forms being more common in Caucasians whereas wavy forms were more common in Aborigines.

In our study, we found that curved shape was common among Indians and wavy shape among Tibetans and Malaysians while circular pattern was the least common among all three population.

Shetty SK et al (2005)[5]compared the rugae pattern of Indian and Tibetan population and found Indian males had more primary rugae than Tibetan population.

In our study too, primary rugae patterns were more in Indian male population, when compared to Tibetan and Malaysian male population.

Trends in the number of primary rugae in different human population suggest a tendency for greater rugae development qualitatively and quantitatively n populations with broader palate.

Comparison of unification failed to show any systematic trends. Maybe these characterstics of the rugae lack discriminatory ability.

Summary and Conclusion

It is beyond doubt that rugae are unique to an individual and are sufficiently characterstic to distinguish between individuals. But a standardized method for analyzing the rugae and storing data does not exist.

Although researchers have confirmed the potential value of rugae in personal identification,it is important that exact reproduction of patterns either casts or photographs, are available.

The differences in palatal rugae pattern between the groups are subtle but definite and this indicates that the genes have originated from different quarters.

It would be beneficial to conduct further studies with larger samples in order to substantiate findings of the present study.

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Medico-Legal Study of Cases of Death Due to Electrocution in and Around GMC Aurangabad

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Abstract

A two year study from May 2007 to April 2009 was carried in Department of Forensic Medicine, Govt. Medical College, Aurangabad. The study contains 49 cases which were brought for post-mortem examination, out of which 41 cases were male and 8 cases were female. The visible electrical entry mark was found in 79.59% cases and visible electrical exit mark was seen in 12.24% cases. Manner of death among the cases were accidental in 95.92% whereas 4.08% were homicidal

Key Words

Electrocution, potential difference, burns

Introduction

Electricity is integral part of modern society and has access to nearly every house in city and most houses in village. Due to widespread increase in distribution of electricity in home, as well as in industry, whereby million of population has access to this dangerous source of power hence fatalities continue to increase. The total number of electric accident is difficult to ascertain since non-fatal accidents in home are not recorded and those which occur in industry may not come to notice unless the premises are subjected to the Factory Act.[1] Most fatalities occur at a tension of 220-250 volts that is usual household supply. In India almost 12 people die due to electrocution every day, 42% of total fires occur due to electrical sources and 8% deaths that occur in factories are due to electricity.[2]The fatalities due to electrocution are preventable by simple precautionary measures. Unfortunately in developing countries like India where awareness is less which leads to more fatal accidents.

Due to difficulty in diagnosis of cases in absence of typical marks this study would be helpful to most forensic pathologist and experts in future to ascertain cause and manner of death.

Aims and Objectives

This study is aimed at various conditions responsible for deaths due to electrocution brought to our tertiary care hospital.

The objectives of the study are:

1. To study the prevalence of electrocution deaths at our hospital.
2. To ascertain the various conditions associated with deaths due to electrocution.

Material and Methods

The present study was carried out from May 2007 to April 2009 in the Department of Forensic Medicine & Toxicology at a Govt. Medical College and hospital, Aurangabad. A standardized proforma specially designed for this purpose was used and filled in each case after detailed interviews with the investigating officials, the relatives/friends, hospital records etc. to gather information.

Observation

Table 1: Distribution of study cases according to age of the victims

Age in years	Cases (%)
<5	01 (2.041)
6 -10	04 (8.163)
11- 20	12 (24.490)
21 -30	16 (32.653)
31- 40	08 (16.327)
41-50	04 (8.163)
51-60	04 (8.163)
Total	49 (100)

Table 2: Distribution of study cases according to sex of the victims

Sex	Cases (%)
Male	41 (83.673)
Female	8 (16.327)
Total	49 (100)

Table 3: Distribution of study cases according to education status of the victims

Education	Cases (%)
Illiterate	1 (2.041)
Primary school	8 (16.327)
Middle school	18 (36.734)
Matriculation	17 (34.694)
Higher secondary school	5 (10.204)
Graduate	0 (0.000)
Post graduate	0 (0.000)
Total	49 (100)

Table 4: Distribution of study cases according to occupation of the victims

Occupation	Cases (%)
Clerk	2 (4.082)
Dependent	1 (2.041)
Electrician	15 (30.612)
Farmer	3 (6.122)
Housewife	7 (14.286)
Labourer	6 (12.244) (12.244)
Laundry man	1 (2.041)
Shopkeeper	1 (2.041)
Student	10 (20.408)
Technician	1 (2.041)
Watchman	2 (4.082)
Total	49 (100)

Table 5: Distribution of study cases according to manner of death

Manner of death	Males (%)	Female (%)	Total (%)
Accidental	40 (81.632)	7 (14.286)	47 (95.918)
Homicidal	1 (2.041)	1 (2.041)	2 (4.082)
Total	41 (83.673)	8 (16.327)	49 (100)

Table 6: Distribution of study cases according to entry wound

	Entry wound (%)			Total (%)
	Hand	Hand and thigh	No	
Yes	38 (77.55)	1 (2.04)	0 (0.00)	39 (79.59)
No	0 (0.00)	0 (0.00)	10 (20.41)	10 (20.41)
Total	38 (77.60)	1 (2.00)	10 (20.40)	49 (100.00)

Table 7: Distribution of study cases according to exit wound

	Exit wound (%)			Total (%)
	Foot	Gluteal	No	
Yes	5 (10.20)	1 (2.04)	0 (0.00)	6 (12.24)
No	0 (0.00)	0 (0.00)	43 (87.76)	43 (87.76)
Total	5 (10.20)	1 (2.04)	43 (87.76)	49 (100.00)

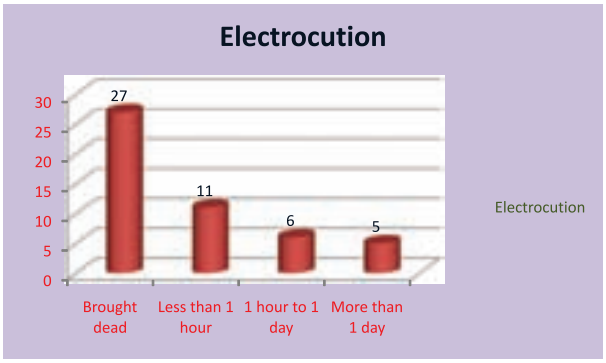
Table 8: Distribution of study cases according to potential difference and burns over the body

Burns	Potential Difference (P.D)		Total (%)
	Household (%)	Higher than household (%)	
Yes	7 (14.28)	8 (16.33)	15 (30.61)
No	25 (51.02)	9 (18.37)	34 (69.39)
Total	32 (65.30)	17 (34.70)	49 (100)

Discussion

In the present study 24 cases (48.98%) belong to age group of 21-40 whereas 16 cases (32.653%) belong to 21-30 age group followed by 12 cases (24.490%) from 11-20 age group. As the 21-40 years age group is the working class so these are commonly involved people who handle electrical appliances & live wires.

Fig. 1: Distribution of study cases according to survival period of the victims



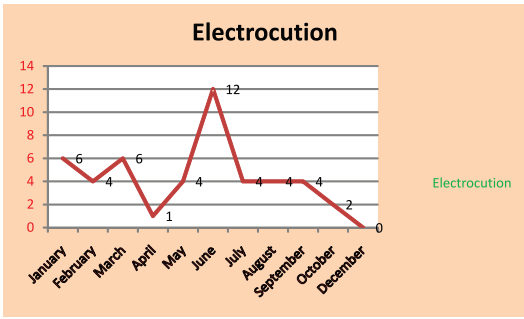
Hence electric accidents are most common in this age group. The next group 11-20 years which is most notorious for carrying out activities resembling to adults and many times land up in trouble.

More victims were male than female i.e. 41 cases (83.673%) whereas the male female ratio was 5.125:1. Similar findings were observed by Haberal M (1989)[3] who studied 137 patients with electrical burn and found 89.36% male incidence. Findings of present study are also consistent with Hussman et al (1995)[4] and Subrahmanyam (2004)[5] both reported an 85% incidence in males. Also Tirasci Y et al (2006)[6] found that 86 cases (69.9%) were males and the male to female ratio was 2.3:1. Males are injured more in number due to electrical injuries in general because they are the people who generally carry out electrical repair and have tendency to take risk with or without having proper knowledge and training.

We found 43 cases (87.755%) having education less than matriculation whereas only 5 (10.204%) were above matriculation, 1 (2.041%) was illiterate and the count of graduates and post-graduates was nil. From the above figure matriculates and under-matriculates are at more risk due to their adventurous behavior, careless attitude and incomplete knowledge whereas people who are more educated and know effects of electricity and illiterates who are totally unknown about it avoid playing with electricity.

In present study most vulnerable group was electricians i.e. 15 cases (30.612%) followed by 10 (20.408%) students, 7 (14.286%) were housewives and 6 (12.244%) were labourers. The findings of present study are consistent with Haberal M. et al (1989)[3] who found 42.3% electricians while Brandt et al (2002)[7] reported 81% as occupational injuries. Similar results were reported by Taylor A. J. et al (2002)[8] i.e. 38.2% cases were electricians. Also findings are consistent with T. Driscoll et al (1999)[9] found 53% of victims were electricians and lineperson. Study do not match with Subrahmanyam M (2004)[5] in who studied 40 electrical burn patients of which 14 were farmers and only 1 was an electrician. Study also differs with the findings of Shrigiriwar M. et al (2007)[10] which shows maximum cases were 18 (20.93%) labourer followed

Fig. 2: Distribution of study cases according to month of incidence



by 15 (17.44%) electricians. The probable reason is that being electrician by occupation, these people are over confident, take least precautions & safety measures despite of having knowledge & training.

Our study shows 27 cases (55.102%) were brought dead to the hospital followed by 11 (22.449%) died in less than one hour of admission, 6 (12.245%) died between 1 hour to 1 day and 5 (10.204%) died after 1 day. Findings of our study matches with Tirasci Y et al (2006)[6] who found that 101 cases (82.1%) were dead on arrival to the hospital. Shrigiriwar M. et al (2007)[10] studied of 86 cases out of which 15 cases were hospitalized whereas 71 individuals died on the spot. The probable reason is that after electrocution ventricular arrhythmias and respiratory paralysis are most common complication which is life threatening and needs immediate treatment.

The present study shows 12 cases (24.490%) were in the month of June followed by 6 (12.245%) each in January and March and 4 cases (8.163%) each during February, May, July, August and September. Maximum cases i.e. 23 (46.939%) were found during summer (March to June) followed 14 (28.571%) in rainy (July to October) and 12 (24.490%) in winter (November to February) season. Similar results were noted by A. J. Taylor et al (2002)[8] who found maximum cases in month of June, July and August. Tirasci Y et al (2006)[6] reported 38.2%, Fatovich (1992)[11] 62.7% and Rautji et al (2003)[12] 74% cases during summer. Probable reasons may be summer being hot & humid in Aurangabad heavy sweating decreases the skin resistance & helps in conduction of current.

We found 47 cases (95.918%) were accidental electrocution whereas 2 cases (4.082%) were homicidal. In accidental deaths 40 (81.632%) were male and 7 (14.286%) were female. In homicidal death male and female were 1 case (2.041%) each and the electrocution mark was postmortem which was confirmed by Acro reaction. Similar results were noted by Shrigiriwar M. et al (2007)[10] i.e. 84 (97.67%) cases of accidental death comprising 69 (80.23%) males and 15 (17.44%) females and 2 (2.32%) cases of homicides, both were females and not a single case of suicide. Tirasci Y et al (2006)[6] found that all the cases were accidental. Byard et al (2003)[13] reported 1 out of 153 whereas Rautji et al (2003)[12] reported 1 out of 16 cases as suicide and the remaining were accidental. Karger et al. (2002)[14] studied 37 cases and found 27% were suicidal and 73% were accidental. Electrocution is accidental unless proved otherwise.

Our study shows entry wound in 39 cases (79.59%), 38 cases (77.55%) had wound of entry on either hand and 1 case (2.04%) had wound of entry on both hand and thigh whereas 10 cases (20.40%) do not have entry wound. These results are consistent to study of Tirasci Y et al (2006)[6] which states that upper extremity was involved in 96 deaths (48%), entry (contact) wounds were present in 93 cases (75.6%) and no electrical burn marks in 14 cases (11.4%). Similar results were noted by Pointer S and Harrison J (2007)[15] that the majority (65%) of electrical injuries was on the wrist and hand. According to Shrigiriwar M. et al (2007)[10] the injury with electric contact in 39 cases (45.34%), contact and heat in 27 cases (31.39%) and flash burns in 8 cases (9.30%), hands were involved in 43 cases. This is due to most of the time electrical equipments are operated, repaired, worked upon by hands. Thus is most vulnerable for getting electrical injury.

We noted, 5 cases (10.20%) had exit wound over foot, 1 (2.04%) had exit wound over gluteal area whereas 43 cases (87.76%) did not show exit wound. Similar results were found by Shrigiriwar M. et al (2007)[10] that out of 86 cases, only 6 exhibit exit wound in form of laceration, of which 5 lesions were located at foot and ankle and one at right gluteal region. Tirasci Y et al (2006)[6] found both entry and exit (grounding) wounds in 16 (13%). This is the part which provides earthing is usually feet.

In the present study, flash burns in electrocution i.e. 8 cases (16.33) were due to potential difference higher than household and 7 (14.28%) were due to household potential, whereas 9 cases (18.37%) of potential difference higher than household and 25 (51.02%) of household potential do not show flash burn injuries. NIOSH[16] reported of the 221 electrocutions, 74 (33%) involved less than 600 volts and 147 (66%) involved 600 volts or more. Arcing is the more in high voltage, leading to more cases of burn.

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Medico-Legal Study of Homicide in and Around GMC Aurangabad

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Abstract

A five year study from January 2004 to December 2008 was carried in Department of Forensic Medicine, Govt. Medical College, Aurangabad. The study contains 163 cases which were brought for post-mortem examination, out of which 130 (79.8%) were male whereas 33 (20.2%) were females and male female ratio was 3.94:1. Head (57.7%) was most common site of injury. Hard and blunt weapon was used in 107 cases (65.7%).

Key Words

Homicide, head injury, defense wounds.

Introduction

Homicide means killing of one human being as a conduct of another.[1] Homicide is one of the oldest crimes in human civilization. The most common methods of homicide worldwide are stabbing, mechanical asphyxia, blunt head injury and firearm injuries. There has been a global increase in homicide and it causes over 500,000 deaths per year worldwide.[2] It may be a result of arguments between acquaintances, domestic violence, robberies, drug addiction and terrorism. Taking into consideration the increasing incidence of homicides and its various medico-legal aspects study on this topic will be very helpful.

Material and Methods

The present study was carried out from January 2004 to December 2008 in the Department of Forensic Medicine & Toxicology at a Govt. Medical College and hospital, Aurangabad. A standardized proforma specially designed for this purpose was used and filled in each case after detailed interviews with the investigating officials, the relatives/friends, hospital records etc. to gather information.

Results

During the period of 5 years (i.e., January 2004 to December 2008) 163 out of 8523 cases were confirmed to be of homicide thus comprising of 1.912 %.

Graph 1: Distribution of cases according to age groups and sex.

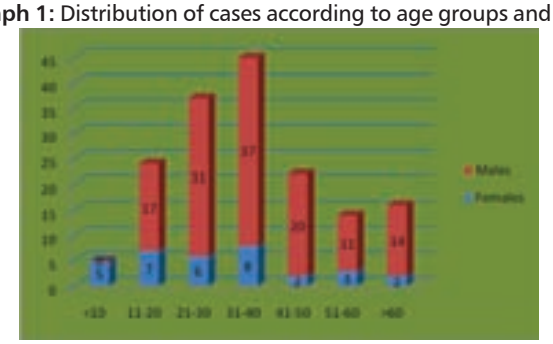


Table 2: Distribution of cases according to marital status

	Number of victims	Percentage
Married	128	78.5
Not known	3	1.8
Unmarried	32	19.6
Total	163	100.0

Table 6: Distribution of cases according to site of injury

Site of injury	Number of victims	Percentage
Head	94	57.7
Neck	11	6.7
Chest	14	8.6
Abdomen	14	8.6
Multiple injuries over body	30	18.4
Total	163	100.0

Table 7: Distribution of cases according to weapon used

Weapon	Number of victims	Percentage
Hard and blunt	107	65.7
Sharp cutting and pointed	40	24.6
Ligature material	7	4.3
Burns	6	3.7
Cloth piece	1	0.6
Poison	1	0.6
Multiple	1	0.6
Total	163	100.0

Table 8: Distribution of cases according to motive

Motive	Number of victims	Percentage
Previous enmity	132	81.0
Robbery	21	12.9
Dowry	10	6.1
Total	163	100.0

Table 9: Distribution of cases according to education status

Education	Cases	Percentage
Illiterate	33	20.2
Primary School	42	25.8
Middle School	43	26.4
Matriculation	8	4.9
Higher Secondary	32	19.6
Graduate	2	1.2
Not known	3	1.8
Total	163	100

Table 10: Distribution of cases according to defense wounds

Defense wounds	Cases	Percentage
Upper limbs	57	35.0
Upper and lower limbs	8	4.9
Nil	98	60.1
Total	163	100

Table 11: Distribution of cases according to survival period

Survival period	Cases	Percentage
Brought dead	78	47.8
Within 1 hour	12	7.4
1 hour to 1 day	60	36.8
More than 1 day	13	8.0
Total	163	100

Table 12: Distribution of cases according to time of incidence

Time of incidence (Hours)	Cases	Percentage
0000 – 0600	50	30.7
0601 – 1200	29	17.8
1201 – 1800	30	18.4
1801 – 2400	54	33.1
Total	163	100

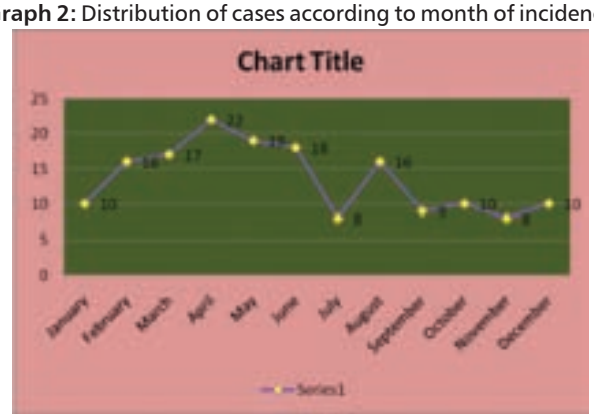
Discussion

In the present study we found that 82 (50.3%) cases were from 21-40 age among which 45 (27.6%) belong to 31-40 age. The mean age was 36.638 years with standard deviation of 16.518 years. Similar findings were noted by Marri M Z et al (2006)[3] who found 62.1% were from 20-39 years and extreme of ages were the least vulnerable. Hussain Z et al (2006)[4] reported 64.3% cases in 16-45 years age group. Edirisinge P A S and Kitulwatte I G D (2010)[5] also noted 71% victims were from 20 to 40 years and mean age was 33 years. Hassan Q et al (2005)[6] noted 40% from 20-29 years. Virendra Kumar et al (2005)[7] noted 63.6% victims belong to 20-39 years. Shah M M et al (2008)[8] found 47.3% of the victims were from 15-25 years and mean age was 29.61 ±11.17 years. Humayun M et al (2009)[9] found 47% were from 16-30 years and 35.94% were from 31-45 years. Bashir M Z et al (2004)[10] reported 28.2% cases in third decade and 25.5% in the fourth decade. The probable reason for more incidence in second and third decade is that these are the person who are more active, violent and more vulnerable to disputes and rivalry.

Most cases 130 (79.8) were male whereas females were 33 (20.2%) and male female ratio was 3.94:1. Findings of our study are consistent with Marri M Z et al (2006)[3] who reported that were males 86.15% and male to female ratio was 6.2:1 Edirisinge P A S and Kitulwatte I G D (2010)[5] noted male were 98% and male to female ratio was 41:1. Nwosu S O and Odesanmi W O (1998)[11] found that the male female ratio was 4.6:1 whereas Hussain Z et al (2006)[4] reported it to be 4.6:1. Shah M M et al (2008)[8] found 67 cases (90.5%) were males. But Humayun M et al (2009)[9] reported that all the cases were males. The probable reason is that we are mostly male dominant society and they handle most of the disputes between the families.

We found128 cases (78.5%) were married, 32 cases (19.6%) were unmarried and the unknown marital status was in 3 cases (1.8%). Similar findings were noted by Virendra Kumar et al (2005)[7] that maximum victims (47%) were married. The probable reason for this is that after second decade most people get married in our region.

Graph 2: Distribution of cases according to month of incidence



We 76 cases (46.6%) during summer followed by 44 (27.0%) during winter and 43 (26.4%) during rainy season. Findings of our study are consistent with Hassan Q et al (2005) who found most cases during summer season. Bashir M Z et al (2004)[3] also reported that most cases were found during hot summer months. Findings of our study are not consistent with Mohanty M K et al (2005)[12] who found winter to be the most common season for homicide.

Our study shows 94 cases (57.1%) have injury over head alone followed 30 (18.4%) have injury over multiple parts of the body, 14 (8.6%) each either over chest or abdomen whereas 11 cases (6.7%) have injury over neck. Similar findings were noted by Prajapati P et al (2010)[13] who reported head in 22.65%, Edirisinge P A S and Kitulwatte I G D (2010)[5] also noted head in 36%, Humayun M et al (2009)[9] found head, neck and face in 32.90% and Hussain Z et al (2006)[4] also found head, neck and face in 26.9%. Our findings do not match with Shah M M et al (2008)[14] who found most common region as the abdomen including pelvis (33, 44.6%), Marri M Z et al (2006)[3] found chest in 36.37% and Bashir M Z et al (2004)[10] reported chest in 34.1%. In the homicide the assailant targets the most vital region of the body and also makes sure that the victim is dead and never recovers afterwards.

Maximum 107 cases (65.7%) cases suffered injuries by hard and blunt weapon followed by 40 cases (24.6%) by sharp cutting and pointed. Similar findings were noted by Prajapati P et al (2010)[13] who reported 48.19% by hard & blunt weapons/ objects. Findings of our study do not matches with Marri M Z et al (2006)[3] who documented firearms in 85.96%, Hussain Z et al (2006)[4] recorded that firearms in 91.87%, Virendra Kumar et al (2005)[7] found sharp weapons in 41%, Mohanty M K et al (2005)[12] noted sharp weapon in 37.7%, Bashir M Z et al (2004)[10] found that firearm weapon in 49.4%, Nwosu S O and Odessanmi W O (1998)[11] reported firearms in 37 % whereas Hassan Q et al (2005)[6] reported firearms to be major weapon of offence. People moves into heat of passion at any point and finds the hard and blunt objects like stick, stone, etc. at hand easily without any preparation.

In the present study 137 cases (81%) have history of previous enmity followed by 21 cases (12.9%) of robbery and 10 cases (6.1%) of dowry. Similar results were noted by Edirisinge P A S and Kitulwatte I G D (2010)[5] who studied 83 cases of firearm homicides in which 39 (47%) were due to previous enmity, while 27 (33%) were war-related, romantic entanglement was the motive for 1 case (1%) while robbery was the reason for 2 cases.

Most of the cases i.e. 118 (72.4%) were educated below matriculation whereas only 45 (27.6%) were either matriculated

and above. Chu L D and Sorenson S B (1996)[15] also reported that high school dropouts are at the highest risk of homicide whereas person with some college or a college degree are at a substantially lower risk of homicide. Similar results were published by Pridemore W A and Shkolnikov V M (2004)[16] who stated that there is higher risk of homicide in less educated. The probable reason might be due to lower intelligent quotient.

Out of 65 cases (39.9%) of defense wounds, upper limbs were seen in 57 (35.0%) followed by both upper and lower limbs in 8 (4.9) however 98 (60.1%) cases do not show any defense wound. Similar results were published by Prajapati P et al (2010)[13] who reported 54 cases (32.53%) showed defense injuries over upper limbs. Rachette S et al (2008)[17] also found defense wounds were more widely distributed on the upper limbs. Sheikh M I et al (2009)[18] reported 27.98% cases showed defense wounds. The probable reason is that in the attempt to ward off or seize the weapon by hand most defense wounds are caused.

We found 78 (47.8%) cases were brought dead and did not receive any treatment, followed by 60 (36.8%) which died in between one hour to one day, 13 (8.0%) died after one day and 12 (7.4) died within one hour of hospitalization. Hassan Q et al (2005)[6] reported similarly that most victims died before reaching the hospital. The most probable reason is that most assailant injuries the victim on the vital part and the victim often die on the spot.

In the present study we found 104 cases (63.8%) occurred during 1801 to 0600 hours whereas 59 (36.2%) during 0601 to 1200 hours. Similar findings were noted by Marri M Z et al (2006)[3] who reported 51.15% of victims died during 6 pm to 6 am. Mohanty M K et al (2005)[12] similarly found most of the crimes occurred during the evening and night hours (52.4%). Findings of our study do not match with Edirisinge P A S and Kitulwatte I G D (2010)[5] who found 45 deaths occurred during the daytime with 38 during night. Hassan Q et al (2005)[6] also reported that most of the victims died during the day time. It is well known that most of the illegal and unlawful works are done in the dark.

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Newer Bio-indicators in Forensic Odontology

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Abstract

Forensic odontology is a branch of forensic medicine which, deals with the proper examination, handling and presentation of dental evidence in court of law. Forensic odontology has very crucial role in the identification of those individuals who cannot be identified visually or by any other means. Palatal rugae pattern, DNA analysis are the newer bioindicators in forensic odontology that have been employed successfully in positive human identification now a days. In this article the clinical usefulness of palantine rugae and DNA analysis in determining the identity of humans has been discussed.

Key Words

Palatine rugae; forensic dentistry, forensic dentist, odontology, postmortem,

Introduction

Identification is an establishment of individuality of a person either dead or living. Identification may be required in living persons in the case of absconding criminals, soldiers, missing persons, impostors, escaped prisoners, lunatics, etc. Identification may be essential where unclaimed dead bodies are found, bodies which are decomposed beyond recognition and in cases where highly mutilated bodies or skeletal remains are found.

Forensic Odontology, or forensic dentistry, was defined by Keiser-Neilson[1] in 19701 as "that branch of forensic medicine which in the interest of justice deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of the dental findings". The forensic odontologist deal with: identification of bite marks on the victims of attack, comparison of bite marks with the teeth of a suspect and, identification of unknown bodies through dental records, age estimation of skeletal remnant.

The first treatise on forensic odontology as a subject in its own right was written in 1898 by Dr. Oscar Amoeda, who is generally recognized as the father of Forensic Odontology. In 1770's Paul Revere, a practicing dentist in US, identified the remains of his friend, Dr. Joseph Warren from the silver bridge made by him.[2]

It is a well-established fact that the rugae pattern is as unique to a human as are his or her fingerprints, and it retains its shape throughout life. The anatomical position of the rugae inside the mouth—surrounded by cheeks, lips, tongue, buccal pad of fat, teeth and bone—keeps them well-protected from trauma and high temperatures. Thus, they can be used reliably as a reference landmark during forensic identification.

DNA analysis has recently been introduced to forensic odontology and is now frequently used in identifying individuals or determining the origin of certain tissues.. Teeth are resistant against extreme circumstances such as temperature, humidity and acidity, which is an important advantage in DNA analysis. Furthermore, an abundance of DNA can be extracted from teeth.

The purpose of this article is to discuss the importance of palatine rugae (Ruguscopy) and DNA analysis in the dental profession.

Discussion

For centuries, anatomists have shown interest in the evolutionary development of the folds of tissue found in the roof of the human mouth—the palatine rugae.[3] The earliest references to the palatine rugae are found in various books about general anatomy. Winslow[4] was the first to describe them, and the earliest illustration of them probably is by Santorini,[5] a drawing depicting continuous lines that cross the midline of the palate. (figure no-1)

The palatine rugae are ridges situated in the anterior part of the palatal mucosa on each side of the medial palatal raphae and behind the incisive papilla (IP). At birth, the palatine rugae are well-formed, and the pattern of orientation typical for the person is present.

When traffic accidents, acts of terrorism or mass disasters occur in which it is difficult to identify a person according to fingerprints or dental records, palatine rugae may be an alternative method of identification The palatine rugae are permanent and unique to each person and can establish identity through discrimination (via casts, tracings or digitized rugae patterns).

Review of literature

Thomas and Van Wyk [6]described the identification of a severely charred edentulous body with the help of dentures in the victim's mouth that were compared with another set found in the person's home. The investigators delineated and photographed the rugae and midpalatal raphae.

Muthusubramanian and colleagues [7]examined the extent of palatine rugae preservation for use as an identification tool in burn victims and cadavers, thus simulating forensic cases of incineration and decomposition. They concluded that the palatine rugae could be used reliably as a reference landmark during forensic identification.

Limson and Julian [8]used a computer software program to evaluate the use of palatine rugae patterns for forensic identification.

Fig. 1: Division of groups

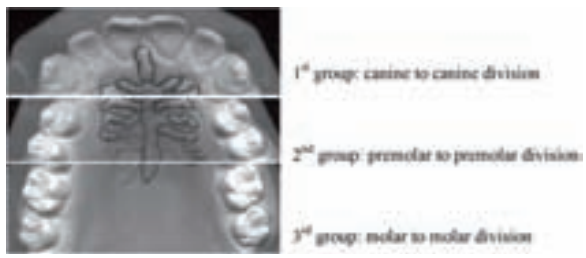
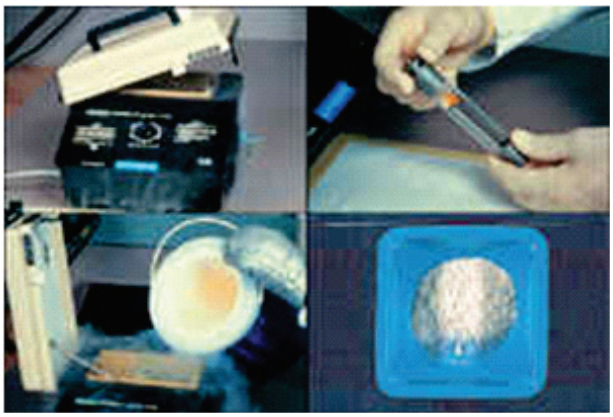


Fig. 2: Isolation of human teeth DNA by cryogenic grinding



Role of DNA in dental identifications

Teeth represent an excellent source of DNA material, because they are resistant to environmental assaults. DNA can provide the necessary link to prove identity, when a conventional method of dental identification fails. DNA preserved in an extracted from the teeth of an unidentified individual is compared with DNA of antemortem sample i.e. stored blood, biopsy, cervical smears, hairbrush and clothing, to parents or sibling.

Genomic DNA is present in the nucleus of each cell (except RBC) and represents the DNA source for most forensic applications. After decomposition of body tissues the, structures of the dental tissue (enamel, dentine and pulp) complex persist. DNA can be extracted from these calcified tissues. Thus teeth represent an excellent source of genomic DNA. PCR-based analysis produces a DNA profile that can be compared with known antemortem samples or paternal DNA. Mitochondrial DNA can be sourced from dentine powder obtained via cryogenic grinding(figure no-2), and also via dentine in the case of root-filled tooth.

Conclusion

The unique nature and structure of dental tissues play an important role in body identification when body is decomposed and cannot be identified.Located in the anterior half of the roof of the mouth, the palatine rugae have much to offer the dental profession. Palatine rugae can be used as a reliable guide in forensic identification.However, postmortem identification is not possible without the antemortem records. Also,the complex rugae patterns (patterns that cannot be classified under one particular group) can cause intra or interobserver errors.

Although DNA profiling is accurate method in forensic odontology, it is expensive and time-consuming for use in large populations. Also though the DNA analysis has proven its value in forensic dentistry, but ethical and juridical considerations are still a matter of debate and criticism.

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Newer Method to Improve the Bond Strength of Silicone Based Denture Liner- An in vitro study

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Abstract

Silicone based denture liners are superior to acrylic based denture liners but it has a problem of failure of adhesion with the denture base. So study was performed to evaluate the effect on the tensile bond strength of silicone based liner when the denture base resin was treated with different chemical etchants prior to the application of the resilient liner. It was concluded that chemical treatment of denture base resin improves the bond strength of denture liner.

Key Words

Denture liners, tensile strength, denture base.

Introduction

Soft denture liners are often used for the management of painful or atrophied mucosa, bony undercuts or ulceration of the denture bearing areas associated with wearing of the dentures. Denture liners provide comfort to the patient, may reduce residual ridge resorption by reducing the impact forces in the load bearing areas during function and also provide even distribution of functional load (El-Hadary et al., 2000). One of the first synthetic resins developed in 1945 as a soft liner was plasticized polyvinyl resin, followed by the introduction of silicones in 1958 (El-Hadary et al.,2000;Mack et al., 1989; Qudah et al 1999; Sarac et al., 2004). Contemporary soft lining materials can be divided into two main groups: acrylic based and silicone based. Silicone based liners were found to have better compliance and rupture resistance, low sorption and solubility in saliva as compared to plasticized acrylic based denture liners. However, the main problem with silicone based denture liners is the loss of adhesion at the interface with the denture base resin. Acrylic based soft denture liners form a chemical bond with the denture base resin. Hence, the adhesion of acrylic based soft liners to denture base resin is higher than silicone based soft denture liners (Eick et al., 1962). It is in this context that the present study "Newer method to improve the bond strength of silicone based denture liner-An in vitro study" was undertaken to examine and assess the effect of denture base resin treatment with different chemical etchants prior to the application of silicone based denture liner on the tensile bond strength of the resilient liner.

Material and Method

An in vitro study was conducted in the Department of Prosthodontics, Govt Dental College, Amritsar to evaluate the effect of various surface treatments of one commercially available heat cured denture base resin on the tensile bond strength of commercially available autopolymerizing silicone based soft denture liner.

The chemicals used for the surface treatment of specimens were (figure no 2)

1. Acetone
2. MMA monomer
3. Methylene chloride

One brass die(figure no3) were used to prepare specimens for measuring tensile bond strength. Die was used to make specimens of PMMA of dimensions 10x10x40mm each, with 3mm thick removable brass spacer, for measuring tensile bond strength.

60 specimens of heat cured PMMA denture base resin(Figure no4) were prepared for tensile bond. Each group was further divided into 4 sub groups (A, B, C and D) of 15 specimens each.

Group I-A: Specimens served as control,
Group I-B: Specimens subjected to 30 seconds of acetone treatment.
Group I-C: Specimens subjected to 180 seconds of MMA monomer treatment.
Group I-D: Specimens subjected to 15 seconds of methylene chloride treatment.

The bonding surfaces of the specimens were then given surface treatments with different chemical etchant used in the study according to their group. The blocks were then placed back in the die and the spacer was removed. The base and catalyst pastes of UfiGel P were then mixed in the recommended ratio of 1:1 and the material was placed in the space created by spacer. The die was closed and bench-pressed for 10 minutes. All the specimens were thermocycled (5°C-55°C) in two water baths for 500 cycles with a dwell period of 30 seconds in each bath.

All the samples were then deformed in a Lloyds, Universal Testing Machine at the rate of 5 mm/min, to determine the tensile strength.

Result and Discussion

The failure of adhesion between a silicone based resilient liner and an acrylic denture base material is a significant clinical problem.Adhesive failure between the liner and the denture base resin creates a potential interface for microleakage leading to an environment for potential bacterial growth and accelerated breakdown of soft liner resulting in deteriorating prosthesis(Eick et al., 1962; Sarac et al., 2006).To achieve better bonding between denture lining materials and denture base resin, several

The materials used in this study were (Figure :1)

Material	Manufacturer	Type	Adhesive	Polymerization
UfiGel P	Voco, Germany	Silicone based soft denture liner	UfiGel P Adhesive 2076	Autopolymerization
Trevalon	Dentsply USA	Heat cured PMMA denture base resin		Heat cure polymerization

Table 1: Basic Statistics for Tensile Bond Strength of the Study Groups (Group I)

Statistical measures		Tensile bond strength (kgf/cm²)			
		Group IA	Group IB	Group IC	Group ID
No. of observations		15	15	15	15
Mean		8.40	12.53	16.81	12.70
S.D		0.584	0.663	0.600	0.553
C.V (%)		7.0	5.3	3.6	4.4
SE_m		0.16	0.18	0.16	0.15
95% of confidence interval		8.07-8.74	12.15-12.91	16.46-17.15	12.38-13.02
Range	Maximum	9.23	13.58	17.92	13.85
	Minimum	7.45	11.25	15.93	11.52
	Range	1.78	2.33	1.99	2.33

Fig. 1: Autopolymerizing silicone based denture liner-Ufigel P

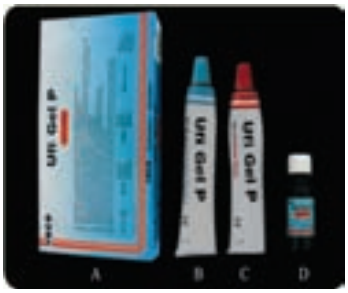
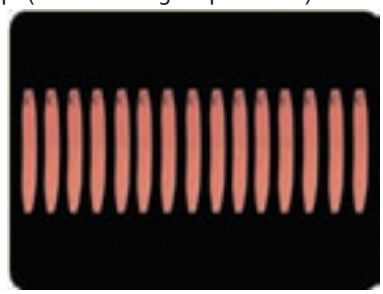


Fig. 2: Chemical etchant used for the surface treatment of denture base resin

Fig. 3: Dies for the fabrication of specimens

Fig. 4: Group I(Tensile strength specimens)



experimental procedures have been conducted such as mechanical surface preparation i.e. roughening of denture base resin, effect of polymerization stage at which resilient liner is packed against the acrylic resin and chemical surface treatment of denture base resin (Jacobsen et al., 1997; Jagger et al.,2002). In the present study, the tensile bond strength values of the lining material (UfiGel P) to denture base resin obtained after testing were statistically analyzed using Student's t test (Table no 1). After analysis, it was found that the application of different chemical etchants on denture base resin increased the bond strength of silicone based lining material, UfiGel P, to denture base resin, compared to the control group (8.40 kg/cm²). The mean measured tensile bond strength of the resilient liner in descending order according to the type of chemical etchant applied was as follows; MMA for 180 seconds (16.81kg/cm²), methylene chloride for 15 seconds (12.70kg/cm²) and acetone for 30 seconds (12.53 kg/cm²). Sarac et al .,(2004) reported that wetting the denture base resin with 180 seconds of MMA monomer was an effective method for reducing microleakage between lining material and denture base resin when using silicone based lining materials.

Conclusion

In the present study it was observed that:

1. Surface treatment of denture base resin with chemical etchants increased the tensile bond strength of silicone based liner to denture base resin.
2. The increase in tensile bond strength value was highest with specimens subjected to 180 seconds of MMA surface treatment and lowest with control group specimens.

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Profile of Medico Legal Cases in Shimla (June 2008- December 2008)

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Abstract

Profiling of medico legal cases is an important aspect for the prevention of preventable casualties in future and to study the genuine crime in the area. Today the maximum number of casualties occurs due to road traffic accidents in which many precious lives are lost.

Objectives

The primary objective of this study was to establish the profile of medico legal cases in Shimla city.

Design: Retrospective observational study.

Setting: Deptt of Forensic Medicine, IGMC Shimla.

Study period: June 2008 – December 2008.

Statistical analysis –Percentages and Proportions.

Introduction

We come across various types of problems in our day to day life. While some of us are able to take up the pressures of life others are not able to face it hence end up their lives, making lives miserable for the family members.

While some of us are responsible for our plights others have machinery to blame for state of injuries causing disability and deaths.

Some others are unfortunate to earn the wrath of others and their lives end with a gunshot wound, with strangulation or with burns. In some cases there are other contributory factors -poisons such as organophosphorus, alcohol etc.

There is a dearth of information as to what are the leading causes of unnatural deaths in our society. The present study aims to set up a profile of deaths due to unnatural causes so that we can direct rigorous efforts to curb their incidence.

Material and Methods

The cases which were brought to the department of Forensic medicine from June 2008 to December 2008 were included in the study. The post-mortems were conducted in the department when the police gave the relevant papers. In the present study the emphasis has been put on to find the total number of cases , the sex of the individuals, the month wise distribution and the cause of death in the cases which were brought to the Department of Forensic Medicine in the specified period of time.

Result and Observations

Table showing the number of cases reported from June 2008 to December 2008

June	29
July	25
august	19
September	24
October	27
November	66
December	21

The maximum number of cases was in the month of November which were 66 in number followed by June with 29 in number. There were 27 cases in the month of October, followed by July with 25 and September in which there were 24cases.

2.

Sex	Number	Percentage
male	149	70.6
female	48	22.7
Male child	9	4.3
Female child	5	2.4

Total number of cases during the period was 211 in number out of which males contributed the maximum number that was 149 followed by females whose number was 48; male children 9 in number and female children were 5 in number.

3 For June

Cause of death	Number	Percentage
Natural	6	2.8
Blunt trauma with alcohol poisoning	2	0.9
Not ascertained	3	1.4
Blunt trauma, in RTA	4	1.9
Aspiration asphyxia	1	0.5
Suicidal hanging	1	0.5
Accident blunt trauma	1	0.5
poisoning	5	2.4
Burns	2	0.9
Homicidal strangulation	1	0.5
Homicidal blunt trauma	2	0.9
Homicidal gunshot	1	0.5
Total	29	13.7 of 211 cases

For the month of July

Cause of death	Number	Percentage
Natural	8	3.8
Blunt trauma with alcohol	1	0.5
poisoning	1	0.5
Not ascertained	2	0.9
Blunt trauma, in RTA	6	2.8
Suicidal hanging	1	0.5
Accidental blunt trauma	5	2.4
Homicidal stabbing	1	0.5
Total	25	11.8 of 211 cases

For the month of august

Cause of death	number	percentage
natural	5	2.4
Blunt trauma with alcohol	2	0.9
poisoning	2	0.9
Not ascertained	2	0.9
Blunt trauma, in RTA	4	1.9
Aspiration asphyxia	1	0.5
Suicidal hanging	1	0.5
Traumatic asphyxia	1	0.5
electrocution	1	0.5
Total	19	9 of 211 cases

For the month of September

Cause of death	Number	percentage
natural	5	2.4
Poisoning	2	0.9
Not ascertained	3	1.4
Blunt trauma, in RTA	2	0.9
Accidental blunt trauma	4	1.9
Traumatic asphyxia	7	3.3
Homicidal strangulation	1	0.5
Total	24	11.4 of 211 cases

For the month of October

Cause of death	Number	Percentage
Blunt trauma with alcohol	2	0.9
Poisoning	6	2.8
Not ascertained	1	0.5
Blunt trauma, in RTA	6	2.8
Aspiration asphyxia	1	0.5
Accidental blunt trauma	4	1.9
burns	1	0.5
electrocution	2	0.9
Homicidal stabbing	1	0.5
Homicidal gunshot	3	1.4
Total	27	12.8 of 211 cases

For the month of November

Cause of death	number	percentage
Blunt trauma with alcohol	2	0.9
Not ascertained	1	0.5
Blunt trauma, in RTA	53	25.1
Aspiration asphyxia	1	0.5
Suicidal hanging	2	0.9
natural	5	2.4
burns	2	0.9
Total	66	31.3

For the month of December

Cause of death	number	percentage
natural	9	4.3
Blunt trauma, in RTA	6	2.8
Hanging	1	0.5
poisoning	1	0.5
burns	2	0.9
Blunt trauma with alcohol consumption	2	0.9
Total	21	10 of 211 cases

In the month of June maximum cases were from natural deaths, and the deaths due to poisoning followed it. In the month of July 8 cases were due to natural deaths followed by cases of blunt trauma in road traffic accident. In the month of august again the maximum number of case was of natural deaths. In the month of September maximum cases were in the category of traumatic asphyxia followed by the cases of natural deaths. In the month of October deaths due to poisoning and due to blunt trauma in RTA were equal in number, while in the month of November cause of death as blunt trauma in a road traffic accident was highest. In the month of December there were 9 cases of natural deaths followed by 6 cases of road traffic accident and 2 cases of blunt trauma with alcohol consumption and burns each.

4. Sex wise distribution of cases based on causes of death
Male

Cause of death	number	Percentage
natural	37	17.5
Blunt trauma with alcohol	10	4.7
poisoning	10	4.7
Not ascertained	4	1.9
Blunt trauma, with RTA	56	26.5
Aspiration asphyxia	3	1.4
Suicidal hanging	1	0.5
Accidental blunt trauma	12	5.7
Traumatic asphyxia	6	2.8
Homicidal hanging	1	0.5
Burns due to electrocution	3	1.4
Homicidal stabbing	2	.9
Homicidal gunshots	2	.9
Homicidal blunt trauma	2	.9

There were maximum deaths due to blunt trauma in road traffic accidents, followed by cases of natural deaths, accidental blunt trauma, blunt trauma with alcohol and poisoning in males.

Females

Cause of death	number	Percentage
natural	1	0.5
Blunt trauma with alcohol	1	0.5
poisoning	5	2.4
Not ascertained	5	2.4
Blunt trauma, with RTA	19	9.0
Suicidal hanging	3	1.4
Accidental blunt trauma	2	0.9
Traumatic asphyxia	1	0.5
Homicidal hanging	1	0.5
Burns	6	2.8
Homicidal gunshots	2	0.9
Homicidal strangulation	2	0.9

Maximum number of cases was due to blunt trauma in road traffic accidents, followed by burns and equal number of poisoning cases and cases in which cause of death was not ascertained. There was 1 case of death due to natural cause, accidental blunt trauma, traumatic asphyxia and homicidal hanging each.

Male children

Cause of death	Number	Percentage
poisoning	1	0.5
Not ascertained	1	0.5
Blunt trauma, with RTA	5	2.4
Traumatic asphyxia	1	0.5
burns	1	0.5

Maximum number was contributed by blunt trauma in road traffic accident and equal number of cases was due to poisoning, not ascertained, traumatic asphyxia and burns.

Female children

Cause of death	Number	Percentage
poisoning	1	0.5
Not ascertained	2	0.9
Blunt trauma, with RTA	1	0.5
Traumatic asphyxia	1	0.5

5.Cause of death in total number of cases

Cause of death	number	Percentage
natural	38	18
Blunt trauma with alcohol	11	5.2
poisoning	17	8.1
Not ascertained	12	5.7
Blunt trauma, with RTA	81	38.4
Aspiration asphyxia	3	1.4
Suicidal hanging	4	1.9
Accidental blunt trauma	14	6.6
Traumatic asphyxia	9	4.3
Homicidal hanging	2	0.9
hypothermia	1	0.9
burns	7	3.3
Burns due to electrocution	3	1.4
Homicidal stabbing	2	0.9
Homicidal gunshots	4	1.9
Homicidal strangulation	2	0.9
Homicidal blunt trauma	2	0.9
total	211	100

In the total list maximum number of cases was due to blunt trauma in road traffic accidents, followed by natural death and then followed by poisoning further followed by accidental blunt trauma. All the cases of poisoning were due to consumption of organophosphorus poisoning.

Discussion

Road traffic accident is a preventable feature and it is in fact sad to see that maximum number of deaths occur due to this reason. The traffic rules and traffic sense needs to be taught right from the junior level and laws should be strictly implemented. The terrain of the area being hilly, road safety should be ensured every where so as to prevent the vehicles from rolling down. Natural deaths are the next cause of death in which coronary insufficiency has been found out to be the main reason. Poisoning has been the third commonest cause of death and that too predominantly organophosphorus poisoning. The majority of the state population is dependent on agriculture as the main source of income and therefore there is a possibility of easy availability individuals accessibility of agricultural poisons. Such cases can be prevented by counselling them personally. On line counselling should be started along with online help for poison treatment provided for at least the commonly used poisons. Accidental blunt trauma is the next cause followed by cases where cause could not be ascertained and further followed by blunt trauma after consumption of alcohol which in all probabilities is preventable. Of the total 211 cases homicidal cases contributed 12 cases which show our intolerance towards each other, negativism and highlights criminal bent of minds.

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Medico-Legal Cases Across Various Hospitals - A review & Understanding of Procedures

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Abstract

Medico legal case is a case of injury or illness resulting out of sexual assault, poisoning or any suspicious circumstances, where the attending doctor, after eliciting history of the patient and on medical examination, decides that an investigation by law enforcement agencies is essential to understand establish and fix the criminal responsibility for the case in accordance with the law of the land in the interest of truth and justice of victim/patient and state. However it is crucial to assess what factors aid a Health care provider in determining which case becomes medico legal and whether this is a uniform practice across hospitals in India.

Objective

The main purpose of undertaking this exercise of documenting various ways of deciding a medico legal case was to understand the mechanism employed by the hospitals/attending doctors for determining a medico legal case and understand the commonalities and differences in registering those cases across Private, Municipal and State Government hospitals.

Rationale

The centre for enquiry in to health and allied themes, CEHAT has been engaging with the health system with the aim of making the health services accessible and accountable to underprivileged people. Our first-hand experience through the Dilaasa project has demonstrated[1] that HCP's continue to feel apprehensive about dealing with medico legal issues. This was seen on a daily basis when all kinds of cases were termed MLC such as pregnant women who report fall, delivery of women in rickshaws and falls of patients in hospital wards. We were unclear about the rationale for these complaints being registered as medico legal. In our attempt to get clarity on the prerequisite for making a medico legal case, (MLC) we referred to the relevant literature taught to the medical students as a part of their curriculum. While the text book on medical jurisprudence by Dr Parikh defined medical evidence as having three components namely a) medical certificates i.e. death/ sickness and birth b) medico legal report such as injury report / post mortem report or c) dying declaration. The emphasis on such medical evidence is clearly stated to be in the context of criminal procedures where by such documentation is expected to be done by a doctor. (Parikh CK, Text book of medical jurisprudence and toxicology, 5th edition). The literature demonstrated that the government of India had set up an Advisory Committee in 1958 to monitor medico legal cases across the country. This committee submitted its report in 1964, in its report stated that the medico legal practices throughout the country have been found to be in most deplorable condition because of shortage of trained personnel in the profession, absence of even ordinary facilities i.e. transportation, cold storage, mortuary as well as the required instruments for the practice of the profession. Beyond this report there is no available literature on the functioning of this committee or whether their recommendations were taken up by the government of India. In the light of the limitations of literature we decided to conduct a systematic documentation pertaining to registering of a medico legal case across various hospitals in Mumbai.

Methodology

2 Municipal, 2 Government and 2 Private Hospitals were chosen to conduct such documentation in the city of Mumbai. We conducted interviews as well as guided discussions with groups of Casualty medical officers, senior medical officers, Medical Superintendents, Matrons, and Nurses as well as the Medical records officers. We used a set of questions to conduct these discussions. Themes for the guided discussions were pertaining to understanding the definition of medico legal cases from the participants, procedures pertaining to the MLC, roles of HCP's such as Doctors and nurses while responding to MLC cases, perceptions of HCP's about these MLC's, method of inducting new Doctors in to medico legal roles and dilemmas faced as a HCP while performing this role.

Data Analysis

Define a medico legal case

Experience of Municipal and Government Hospitals - Doctors stated that the system of recording Medico legal case, (MLC) was introduced in the hospitals 50 years back with the objective that a certain health complaint reported by the patient may have legal implications, this meant that such a case needs police investigation. Some Doctors classified medico legal cases in to three types, viz accidental, suicidal and homicidal.

Homicide cases were classified as those where the patients reported injuries arising out of assaults or sexual assaults against women and children. Other medico legal cases included alcohol intoxication, injuries due to burns, as well as inmates brought for medical examination from the prison or other government institutions. In one of the hospitals, at least 15 such patients from a prison were brought on a daily basis for examination. When probed about the nature of health complaints reported by the prison inmates, it was told that sometimes these inmates were assaulted by the police and subsequently brought for treatment of injuries. One Doctor was of the opinion that the hospital ought to cooperate with the police, as the inmates are criminals, so the police are not left with too much of a choice and have to resort to such tactics in order to extricate information from them. In instances of reporting related to sexual assault cases, one hospital had a protocol where in the patients reporting sexual assault are sent to the police station and only after an FIR is filed, a medical

[1]Dilaasa is a hospital based crisis centre aimed at responding to women facing Domestic violence. The rationale for setting this department was that health care providers are the first contact for women reporting health consequences out of Domestic Violence; therefore if HCP's are trained adequately they would be in the nest position to reach out to women facing DV.

examination is conducted. This is because they said that true Rape cases are brought only by the police and those reporting on their own need not always be true.

The second category was pertaining to motor vehicular accidents. The third category was pertaining to the Suicide cases, where in the patients were brought to the hospital after consumption of poison/unknown substance or had self inflicted injuries. This is because attempt to end one's life has been considered as an offence. However doctors also mentioned that most of the times they don't register it as suicide, because the family promises to take care of the patient, and patient is also traumatised, therefore they don't involve the police.

A senior medical practioner explained that even senior Doctors are unclear about the nature of cases that are MLC. He defined such cases as medical matters that have legal implication. He said that a prevalent myth amongst Doctors is that each medico legal case becomes a police case, which is incorrect. He provided an example of a patient needing age certification from a Doctor in a situation where a person is asked to retire compulsorily, in such instances referral could directly come from the court to the hospital to estimate age; therefore the police don't have any role to play. Another example provided by the doctor was that of disputed paternity. While in cases of disability where the person demands compensation through a civil suit, doctor's certification is adequate to determine the percentage of disability the person has.

But there are some MLC's, which are done in order to protect the hospital and the Doctors. They told us that on the face of it, some cases don't seem to have legal implications. But patients reporting such health complaints have reported to the police station in the past , when the police investigated the case and found out that the underlying causes were attempt to murder, they blamed the hospital for not making a medico legal case and informing them in time. He also said that if the police dispatch a directive, then the hospital is bound to make an MLC, whether it is warranted or not. One of the Doctors stated clearly that they did not want to get in to trouble for not consulting the family while providing abortion services; therefore either a woman should get her partner to sign the document stating that she wishes an abortion or else she becomes a medico legal case.

Experience of Private Hospitals

The scene in private hospital was different, both senior nursing staff and senior medical officers from private hospitals listed cases of medical negligence as the only MLC cases reported in their hospitals. Examples such as patient going in to coma few hours after surgery, or patient diagnosed with a foreign body left inside the body after going through a surgery or wrong medicine prescribed by a doctor that has caused danger to the patient's life were termed as MLC. Senior health professionals were of the opinion that there have been cases of allegations put by the patients after their discharge, regarding the quality of treatment, this reflects badly on the hospital; therefore making an MLC secures the position of the hospital by asking the police to investigate the matter. They clearly stated that complaints such as assaults, rape, and murder, are not reported in the class that they cater to.

Nurses defining medico legal cases

When we spoke to nurses across different hospitals to understand how they perceived medico legal cases, they said that they had to take care of the patient in their duty hours irrespective of the kind of case. Therefore they did not see MLC cases as different from other health complaints reported in the hospital. the role of nurses in MLC cases is restricted to informing the CMO if the patient disappears from the ward or becomes unconscious. But they were not able to explain the rationale for it. One matron said "There have been instances where the doctors had put the blame on the nurses for such cases. Therefore we have to inform the casualty medical officers and an MLC is registered".

Role of Police Constables in MLC

Both government and municipal hospitals had police constables stationed outside the casualty department where as private hospitals did not have this provision. The police constable stated that his role was to determine the under- sections and charges to be pressed for a specific medico legal case. He stated that the doctors determine whether the injury is serious or simple. He was of the opinion that attempted suicides should not be called as such as this ruins the family. He admitted that torture cases by police are brought to the hospital but was of the opinion that no crime can be investigated in the absence of torture.

Protocol for filing an MLC

A Doctor who occupies the post of a casualty medical officer (CM0) records a medico legal case in Government, Municipal and Private Hospitals. But in reality a Medical superintendent or a Medical Director in case of private hospital also record an MLC. Recording an MLC includes seeking history from the patient and conducting a general examination, after which the CMO send a calls to the specialist doctor such as gynaecologist/ paediatrician/ surgeon or orthopaedic specialist. The patient is then taken in to examination by the specialist doctor. An in-depth examination is done and treatment is provided. In case of serious medical condition, patients are admitted as there is a need for clinical management in the hospital itself. When patients are admitted to the hospital, the police from the respective jurisdiction are called to record the statement from the patient. We enquired as to whether consent forms a component of the protocol of registering a medico legal case .Most Doctors told us that they have to seek a valid consent for conducting a medical procedure. In case of patients under 18, it is sought from the guardian or parents. However most were of the opinion that patients come to the casualty because they want to get their complaint registered as an MLC, further because this is a legal requirement on the part of the doctor, even if a patient doesn't want an MLC, they have to make it because it is mandated by the law. One of the doctor also stated that if they strongly refuse it, then patients have to give it in writing with their signature on it.

Though the protocol is that only a senior medical officer should attend court calls, this doesn't translate in reality. This is because the cases for hearing come after several years, hence the same doctors may not even be available. In those situations, other doctors have to appear in the court. This causes discomfort amongst the Doctors, because they are often unaware about the case but are expected to go to the court based on the documentation of other doctors.

III Dilemmas faced by Health Professionals vis a vis registering Medico legal cases

- A dilemma raised by Casualty medical officers, (CMO) in one of the public hospitals was that their hospital has a casualty department, but they lack the basic infrastructure to run the casualty. So the CMO does an administrative job by documenting the case as MLC in the register and refers the case to another hospital. He was of the opinion that only those hospitals consisting of major departments such as radiology,

orthopaedics, surgery; intensive care units should have a casualty department. But given the circumstances, they cannot refuse recording an MLC, neither are they able to provide the required holistic medical assistance.

- Another dilemma voiced by some of the CMO's was pertaining to the pressure they face from the higher authorities for recording an MLC, even when the health complaint doesn't fit the MLC requirement. However they cannot challenge the authority and often succumb to such pressure. An example was given of a patient who was admitted to the hospital, in the course of her hospital stay she became unconscious, the CMO was pressurised to make an MLC, however the CMO's stand was that if the patient was not brought unconscious to the hospital, an MLC should not be filed, if he has become unconscious in the course of his hospital stay, the examining doctor should know the reason for it. But he had to make an MLC.

IV Mechanism of induction in Medico legal role

None of the hospitals have a formal induction process for a new CMO to take on the Medico legal role. Therefore often CMO's did not have the space to raise their dilemmas and concerns. The only way to learn is by putting the fresh casualty medical officer with a senior CMO for a period of six days. In this time frame, the new CMO is expected to learn the procedure and understand what are an MLC case as well as the process of registering it. Most Doctors felt that determining as well as documenting and treating medico legal cases should be the role of the forensic doctors, but because there were fewer forensic doctors, this work was being shouldered by other doctors as well. The senior personnel from private hospitals stated that they do not receive cases of Rape, assaults, suicides and homicides; so it isnot a feasible option to train their doctors in medico legal cases beyond what is taught in the MBBS. Further because there is a huge turnover, it is difficult to develop an induction process as this requires a long time.

The nursing staff clearly voiced their concerns about the gap in their academic curriculum vis a vis Medico legal cases. A senior nursing professional stated that because nurses are in the ward and responsible for the smooth functioning of the ward, Doctors often blame the nurses for misinforming or delay in informing when it comes to medico legal cases. One nurse narrated an incident where in the patient died on the operation table, she was blamed by the doctor for not providing sterilised equipment. As nurses are unaware of the medico legal aspects of a case , they are unable to defend their actions

Discussion

This exercise has clearly demonstrated that Doctors register medico legal cases whenever they are in doubt, however not much analysis goes in to probing for further history pertaining to a specific health complaint and then determining whether it has medico legal implications, this has led to a rampant MLC registration for all women seeking MTP, those reporting epilepsy as well as falls in the hospital. Added to this unnecessary registration, most doctors feel that this is not a part of their role at all, and that this should be done by the forensic doctors, leading to a very skewed understanding of their role as clinical management. This contradicts their MBBS qualification, which provides them with knowledge about basic medico legal issues, therefore their role is dual where in they are expected to provide treatment as well as fulfil their medico legal role.

Their understanding via a vis their medico legal role is limited to activating the police machinery. they believe that determining whether a particular health complaint is accidental or suicidal is the role of the police and not a health professional. This in spite of the fact that health system has been identified as a key sector in identifying reasons for a certain health complaint as well as documenting good quality evidence in cases of medico legal issues such as suicides , homicides, sexual assault/ domestic violence and child sexual abuse. In the current scenario, the nursing cadre plays an insignificant role in handling the medico legal cases. Though they play a crucial role in caring for the patient, they have no powers in the medical hierarchy. This has led to them becoming puppets in the hands of the doctors. Not having the in-depth information regarding medico legal case often leaves them in a powerless state.

As most MLC cases are looked at with suspicion on the part of HCP's, they fail to understand the concept of seeking informed consent. In fact HCP's are of the opinion that there is no question of consent while registering an MLC. We can clearly see that HCP's at this point are unable to understand the finer nuances between ethics and the law and their responsibilities towards the patient. The minute a medico legal case is registered, the patient is enmeshed in to the administrative rigmarole of the hospital with little importance given to the care required by the patient. Added to the current problems, is the fact that all the hospitals lack a formal induction process; therefore the current system is unable to address the problems and obstacles faced by HCP's in addressing the issues pertaining to medico legal cases.

Conclusion and Recommendations

Due to the ambiguity in the understanding related to the registering of medico legal cases, more and more HCP's are looking at medico legal work as a burden; this has led to an increase in practice of defensive medicine. Therefore there is a need to increase awareness on the role of clinicians with respect to their ethical responsibilities as providers. There is also a need to formulate standard operating procedure (SOP) in the context of Doctors, nurses and police and their respective medico legal roles.

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Evaluation of Surface Roughness of Periodontally Healthy Fluorotic and Non-Fluorotic Teeth Subsequent to the use of Various Types of Brushes- A SEM study

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Abstract

Background

Roughened tooth surface facilitates the accumulation of plaque which can be removed by mechanical and chemical methods. Mechanical methods like tooth brushing and conditions like fluorosis may bring about surface changes in teeth. The purpose of the present study was to evaluate the surface roughness changes induced by tooth brushing with different toothbrushes in fluorotic and nonfluorotic teeth and the effect of fluorosis on the surface roughness changes of teeth.

Methods

Both fluorotic and nonfluorotic periodontally healthy extracted teeth were included in this study. Each of them were grouped into Manual Brush (MB) group, Electric Brush (EB) group and Ultrasonic Brush (UB) group and the surface roughness was determined using scanning electron microscopy and non-contact profilometry.

Results

Results showed that there was significant increase in surface roughness value in cementum with Manual Brush and Ultrasonic Brush groups. Intergroup comparisons showed a significant difference in surface roughness for enamel and cementum in the ultrasonic brush group. Increased surface roughness values were noted in fluorotic teeth when compared to nonfluorotic teeth.

Conclusion

Results confirmed that tooth brushing bring about surface roughness changes and fluorosis also has effect on surface roughness.

Key Words

Tooth brushing; surface roughness; Fluorotic enamel and cementum; Nonfluorotic enamel and cementum; periodontally healthy teeth, SEM.

Introduction

Dental plaque plays a major role in caries and periodontal disease, which can be removed by mechanical and chemical methods. The mechanical method of plaque control is considered more effective as compared to chemical methods.[1] Regular tooth brushing with toothpaste has been considered as etiologic factor in gingival recession and tooth wear[2]. The fluorotic enamel does exhibit surface roughness beyond the reach of naked eye.

The surface roughness is of clinical significance from the point of plaque accumulation which initiates the periodontal disease. The surface roughness changes in nonfluorotic enamel and cementum are scanty and the fluorotic enamel and cementum are never dealt in the literature. The surface roughness of cementum which is the main anchor of periodontal ligament is worth studying.

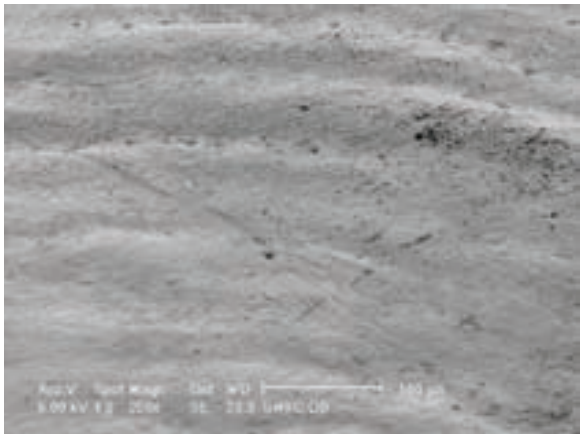
Hence, the purpose of the present study is to measure the surface roughness of enamel and cementum of periodontally healthy fluorotic and nonfluorotic teeth, with and without experimental brushing using Scanning Electron Microscopy (SEM) and 3D non contact Profilometer.

Material and Methods

Study teeth consisted of periodontally healthy fluorotic and non-fluorotic teeth that were atraumatically extracted due to orthodontic reasons from subjects aged 18 to 25 years. All patients from whom teeth were obtained gave written informed consent and the study was conducted in accordance with the guidelines of Rajiv Gandhi University of Health Sciences, INDIA, similar to World Medical Association Declaration of Helsinki. Fluorotic teeth were confirmed by the presence of enamel fluorosis and a patient history of having been born and raised in geographic areas in and around Davangere, India that have naturally occurring high water fluoride concentrations (> 1.5 ppm). For brush category, subjects brushing with soft brush, twice daily for 2 minutes were confirmed by history taking prior to extraction. Teeth with intrinsic stains caused by other reasons such as porphyria, erythroblastosis fetalis, tetracycline therapy, etc., or those with enamel or root caries were excluded from the study.

The selected teeth were mounted on a metal jaw and brushed with Manual, Electric and Ultrasonic toothbrush along with intermittent use of water. The total time of brushing of three teeth was 30 minutes, in horizontal direction near CEJ to cover 1/3rd of

Fig. 1: Untreated control from fluorotic tooth group. Note roughness of enamel and cementum at the CEJ. Bar = 2 mm at an original magnification of 15x.



cervical root and enamel. All the procedures were done by the main investigator. Following the experimentation, the teeth were sectioned in mesio-distal direction longitudinally. All the SEM and profilometric measurements were done by single experienced author who was blinded regarding the type of brushes used. For purposes of statistical analysis, the Roughness Loss of Tooth Substance Index as described by Lie and Leknes [3] was modified and expanded to a 5 point ordinal scale

Statistical Analysis

Descriptive data that included Mean and Standard Deviation were found for each group and used for analysis. Mann-Whitney test was used to compare the two groups. A p-value of 0.05 or less was considered for statistical significance.

Results

A total of eighty four fluorotic and nonfluorotic enamel and cementum specimens were studied. The treated specimens had its own control group. The surface roughness values of enamel and cementum specimens of different brush groups are shown in Table1. The fluorotic cementum showed significant surface roughness values following manual brush and ultrasonic brush usage. The nonfluorotic cementum showed significant surface roughness only in ultrasonic brush group. However, the fluorotic enamel and cementum specimens showed significant surface roughness values as compared to nonfluorotic cementum specimens after the ultrasonic brush usage. (Table 1, Fig 4). The Total Control (TC) specimens (n = 30) of fluorotic enamel category, the difference between the untreated control specimens in fluorotic Vs nonfluorotic category was significant.

Discussion

Roughness of tooth has been studied for its biological significance on periodontal tissue healing, however, the significance of roughness or smoothness of a root surface remains controversial. A smooth root surface may be advantageous near the gingival margin because it is less likely to accumulate plaque than a rough surface. Root surface roughness could influence sub gingival plaque accumulation and resultant soft tissue inflammation by providing an increased surface area or by sheltering bacteria from mechanical displacement.[4]

Fig. 2: Fluorotic tooth treated by manual brush at the CEJ showing scratches enamel and increased surface roughness towards root surface. Bar = 2 mm at an original magnification of 15x.

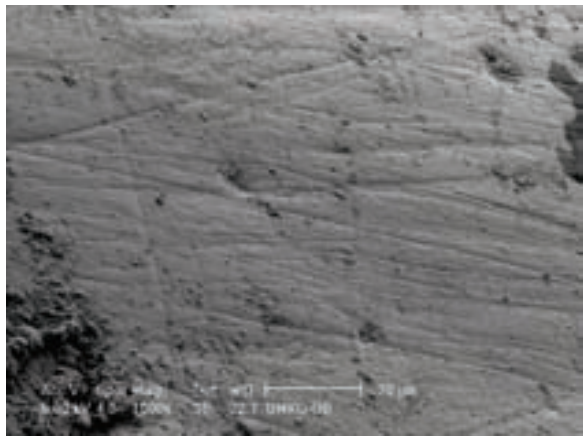


Table 1: Showing Average Surface Roughness (Ra) of Enamel and cementum after brushing

		FLUOROTIC							NONFLUOROTIC							FLUOROTIC Vs NON FLUOROTIC			
ENAMEL	Ra (μm)	C (n=6)	MB (n=8)	C (n=6)	EB (n=8)	C (n=6)	UB (n=8)	TC (n=30)	C (n=6)	MB (n=8)	C (n=6)	EB (n=8)	C (n=6)	UB (n=8)	TC (n=30)	TC Vs TC	MB Vs MB	EB Vs EB	UB Vs UB
	avg SR	3.44 ± 2.58	3.35 ± 1.44	5.09 ± 2.72	4.61 ± 2.65	2.46 ± 0.82	3.36 ± 1.09	5.06 ± 2.88	2.69 ± 1.43	2.67 ± 1.09	3.08 ± 3.06	2.92 ± 1.58	1.63 ± 0.43	1.75 ± 0.74	2.77 ± 1.69	p= 0.01 S	p= 0.34 NS	p= 0.15 NS	p= 0.05 S
		C Vs MB	C Vs EB	C Vs UB	MB Vs EB	MB Vs UB	EB Vs UB		C Vs MB	C Vs EB	C Vs UB	MB Vs EB	MB Vs UB	EB Vs UB					
		p= 0.80 NS	p= 0.65 NS	p= 0.14 NS	p= 0.40 NS	p= 0.79 NS	p= 0.64 NS		p=1.0 NS	p= 0.75 NS	p= 0.85 NS	p= 0.92 NS	p= 0.07 NS	p= 0.16 NS					

	Ra (μm)	C (n=6)	MB (n=8)	C (n=6)	EB (n=8)	C (n=6)	UB (n=8)	TC (n=30)	C (n=6)	MB (n=8)	C (n=6)	EB (n=8)	C (n=6)	UB (n=8)	TC (n=30)	TC Vs TC	MB Vs MB	EB Vs EB	UB Vs UB
CEMENTUM	avg SR	2.77 ± 0.57	3.77 ± 1.04	3.42 ± 1.89	3.78 ± 1.89	2.76 ± 0.39	3.58 ± 0.75	3.80 ± 1.72	3.90 ± 1.93	4.07 ± 1.18	4.03 ± 2.97	3.90 ± 1.45	2.77 ± 061	2.93 ± 0.38	3.93 ± 2.14	p= 0.91 NS	p= 0.63 NS	p= 0.75 NS	p= 0.05 S
		C Vs MB	C Vs EB	C Vs UB	MB Vs EB	MB Vs UB	EB Vs UB		C Vs MB	C Vs EB	C Vs UB	MB Vs EB	MB Vs UB	EB Vs UB					
		P< 0.05 S	p= 0.56 NS	P< 0.05 S	p= 0.49 NS	p= 0.96 NS	p= 0.71 NS		p= 0.40 NS	p= 0.56 NS	p= 0.30 NS	p= 0.53 NS	P< 0.05 S	p= 0.23 NS					

C= Control, MB=Manual Brush, EB= Electric Brush, UB= Ultrasonic Brush, TC= Total Control
avg SR (Ra) = Average Surface Roughness (Ra) in μm.

(p>0.05) - Not significant
(p≤0.05) - Significant

Fig. 3: Fluorotic tooth specimen treated by electric brush at the CEJ showing increased roughness with cracks on cementum. Bar = 1 mm at an original magnification of 28x.

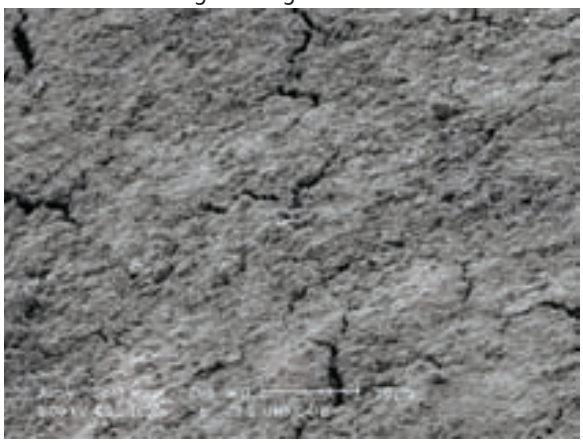


Fig. 4: Fluorotic tooth specimen treated by ultrasonic brush at the CEJ showing greater surface roughness of cementum compared with enamel. Bar = 500 μm at an original magnification of 50x.

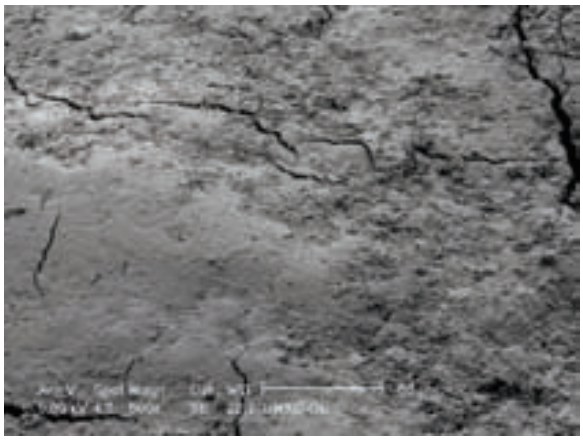


Fig. 5: Comparison of mean surface roughness (Ra) of enamel of both fluorotic and nonfluorotic category

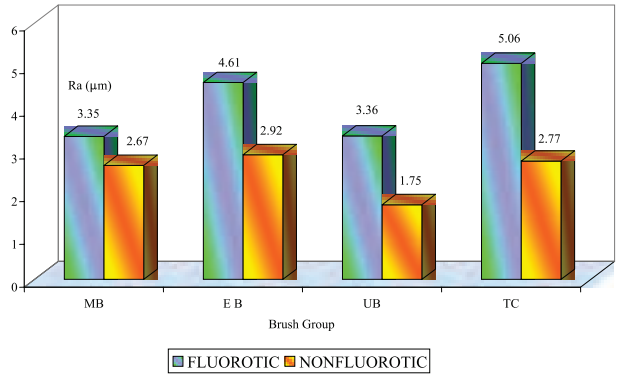
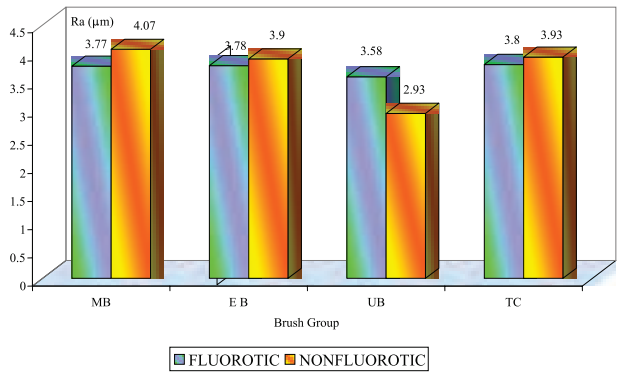


Fig. 6: Comparison of mean surface roughness (Ra) of cementum of both fluorotic and nonfluorotic category



The present in vitro study attempted to objectively measure surface roughness. The use of periodontally healthy teeth reduced the possibility of pre-existing root surface roughness as periodontal disease tends to create abnormal cementum topography resulting from accretions, mineralization changes, resorption cavitations, etc. Fluorosis is likely to induce changes in enamel and cementum mineralization that may manifest as a surface roughness. Since the lingual surface of each specimen served as the control and the facial/buccal surface served as the test surface, the variation in surface roughness prior to instrumentation was minimized. In addition, the periodontal literature has relatively little information regarding enamel and root surface roughness of periodontally healthy teeth, more specifically as related to fluorotic and nonfluorotic teeth.

For the discussion related to brush category, scratches or micro-abrasion patterns tend to cover the entire surface of intact enamel when the brushing has been performed with an abrasive containing dentifrice (Mannerberg 1960)[5]. Kuroiwa et al. (1993)[6] have suggested that even slight abrasion or micro-abrasion patterns may contribute to colonization and maturation of dental biofilms. In addition, toothpaste abrasivity is likely a major variable influencing, at least in part, abrasion of dentine (Davis 1978)[7].

Both in vivo and in vitro studies have been used to assess surface roughness induced by toothbrushing (Noordmans 1991, Nekrashevych 2004, Turssi 2005)[8,9,10]. In pure clinical studies, objective criteria for evaluation of the results are difficult to establish and always open to debate (Meyer & Lie 1977)[11]. Loss of tooth substance is difficult to quantify in an objective and reproducible way using the in vivo approach. On the other hand, the results of in vitro studies generally cannot be directly related to the clinical situation. The act of toothbrushing is extremely complex and involves numerous variables, e.g., brushing technique, frequency, duration, force of brushing, type of brush, use and type of dentifrice, and filament stiffness (Sangnes 1976; Dyer et al. 2000)[12,13]. The presence of so many confounding variables renders in vivo study designs impractical (Sangnes 1976, Niemi et al. 1984)[12,14].

The present in vitro study attempted to objectively measure surface roughness following standardized brushing technique and time by single investigator. Harte & Manly (1976)[15] reported that brushing with a mechanical (electric) brush produced about 2/3 the amount of tooth structure micro-abrasion as brushing with a manual brush for the same duration. A study by McConell & Conroy (1967)[16] also reported that an electric brush produced less abrasion than simulated manual toothbrushing. Phaneuf et al. (1962)[17] conducted in vitro abrasion tests to compare simulated manual vs. power brushing. They reported that manual toothbrushing resulted in 2 to 4 times greater weight loss than the simulated power brushing. The literature comparing manual vs. power brushing is not consistent in regards to loss of tooth structure due to abrasion. In tooth brushing abrasion, the tooth brush itself is merely the delivery vehicle, since brushing without paste has no effect on enamel and clinically miniscule effects in dentine (Absi et al. 1992)[18]. Toothbrushing wear is time dependant and appears to be influenced by many factors including frequency, duration and force. The observations in this study can't be of correlated with the data for the reason that

the type of teeth (fluorotic and non fluorotic) not known and the methodologic - measure of abrasion varies. In the present study, the lack of surface roughness in both fluorotic and nonfluorotic enamel, as determined by profilometry, may have resulted from the soft bristle texture of the three brush types (manual, electric, and ultrasonic). In contrast to the enamel specimens, use of the ultrasonic brush did result in significant surface roughness in fluorotic and nonfluorotic cementum (Table 1; Fig.4). The continuous surface contact, hyperactivity of the brush bristles (i.e., 30,000 to 40,000 cycles/min.), and lower mineral content of cementum compared to that of enamel, undoubtedly contributed to the micro-abrasion effect. The non fluorotic cementum showed significant surface roughness in ultrasonic group may be attributed to lower mineral content of cementum than enamel.

A recent report indicates that ultrasonic brush producing a 1.6 MHz ultrasonic wave at 18000 cycles/min can achieve an antibacterial action 5 mm beyond the gingival margin. The results of this study demonstrated a higher/significant surface roughness induced by the ultrasonic brush on fluorotic enamel, cementum and non fluorotic cementum. The possibility for the observed micro abrasion may be come from the ultrasonic wave phenomenon (Rautiainen 2003)[19]. The functional effect of ultrasonic cleaning is derived from the collapse of microscopic bubbles which, at a microscopic level, produce a severe 'chopping' effect.

The inherent property of surface roughness was seen in the Total Control (TC) specimens of enamel and cementum. Significant surface roughness was seen in fluorotic enamel which could be attributed to factors such as fluorosis and to the mechanical wear it was subjected in the oral cavity. Where as the cementum of the periodontally healthy tooth in this study were not exposed to the oral environment and has not shown significant change.

Conclusion

Considering the limitations of the study, the fluorotic enamel and cementum exhibit more tooth roughness than nonfluorotic teeth. The preliminary report on ultrasonic brush effect needs to be carefully evaluated using sensitive methods of surface roughness measurement in larger sample size.

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Verbal Autopsy: A blessing in disguise for countries with poor registration of deaths

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Background

About 46 million of the estimated 60 million deaths worldwide occur in developing countries[1]. Over 75% of deaths in India occur in the home; more than half of these do not have a certified cause. India and other developing countries urgently need reliable methods to ascertain the cause of death. They also need better epidemiological evidence about the relevance of physical (e.g. blood pressure and obesity), behavioural (e.g. smoking, alcohol, HIV-1 risks and immunization history), and biological (e.g. blood lipids and gene polymorphisms) measurements to the development of disease in individuals or disease rates in populations.

However, there is a scarcity of reliable and accurate information on the causes and distribution of mortality in these countries. The classification of causes of death is always difficult exercise, difficult in developed countries where registration of all deaths is nearly complete, necessitating 10 revisions of the International Classification of Diseases[6], more difficult in developing countries where often less than half of all deaths are registered. The deceased patients often received no medical attention, either because they live too far from the health facility or the esblishment of the cause was of no interest to anyone. A number of different methods can be used for identifying deaths in the general population, including vital registration systems, population-based reporting systems, and demographic surveys.

Vital registration systems often do not have sufficient coverage to provide accurate data in developing countries, although they can be used in developed countries to identify deaths for verbal autopsy follow-up interviews.

Demographic surveillance, where all deaths are reported on a regular basis throughout the year (often once every two weeks) have been used for identifying deaths in some developing countries[8]. However, demographic surveillance systems are expensive to set up and to maintain and therefore they exist in only a limited number of countries.

To meet these modern challenges of mortality measurement, the world's largest prospective study of the causes and correlates of mortality in India is being undertaken by the Registrar General of India (RGI)'s Sample Registration System (SRS). The study, called the RGI Million Death Study in India, is implemented in close collaboration with the Centre for Global Health Research at the University of Toronto, leading Indian and overseas academic institutions and the Indian Council of Medical Research. The study has several innovations that are relevant to other developing countries considering the measurement of mortality, and to recent calls for improved health statistics[2-5].

In countries with incomplete statistics, Yves Biraud recommended, in 1956, the use of information supplied by the relatives of a deceased person in order to establish the cause of death. The term verbal autopsy was first proposed by Arnold Kielman and coworkers in 1983[7], although the term is not used by Garenne & Fontainne in their article, it can be considered that they are among the fathers of this new technique[8]. Very little scientifically based information is available on cause-specific mortality rates for many developing countries. What information does exist is often out of date, applicable only to major urban areas, and not sufficiently disaggregated to differentiate between important population sub-groups. Yet such information is needed for targeting of scarce health resources, especially as high mortality tends to be clustered in particular geographical locations and segments of the population.

Verbal Autopsy

A verbal autopsy is a method of finding out the cause of a death based on an interview with next of kin or other caregivers[9]. This method is the one of the best feasible options where there are no doctors at the time of death but there are trained interviewers where as the physicians need only read in the form of stories and interpret the results and infer the probable cause of death. In order for verbal autopsies to be comparable, they need to be based on similar interviews, and the cause of death needs to be arrived at in the same way in all cases. In recent years, verbal autopsies have been used more widely to provide information on cause of death in areas where civil registration and death certification systems are weak, and where most people die at home without having had contact with the health system. This type of interview is often the only way to find out about the cause of death. An underlying assumption of the verbal autopsy method is that each cause of death investigated has a set of observable features that can be recalled during a verbal autopsy interview. Furthermore, it is assumed that the features of one cause of death can be distinguished from those of any other cause of death. Many verbal autopsy studies allow only one cause for each death - usually the underlying cause of death.

Advantages

Verbal autopsy has been used for a variety of purposes, all of which require arriving at a diagnosis for the cause of death: To provide data on mortality by cause. To evaluate health interventions aimed at reducing mortality from specific causes of death, when these interventions are being introduced into a limited geographic area on a trial basis. To identify ways to reduce unnecessary deaths eg. combining a verbal autopsy questionnaire with a household questionnaire asking about steps taken by the family and by the health services during the illness preceding death can make it possible to identify problems relating both to health-seeking behaviour and health service provision. To facilitate research into factors associated with mortality from specific causes.

Verbal autopsy has been used not only to gather data on the cause-of-death structure of certain populations, but also in investigations of infectious disease outbreaks and risk factors for certain diseases, and in measuring the effect of public health interventions[11-12].

Disadvantages

Many verbal autopsy studies allow only one cause for each

death - usually the underlying cause of death. On the other hand, it commonly happens that the death of a child is the result of more than one cause.

The use of a standard questionnaire also avoids the situation where the definition of a disease or cause of death affects the definitions of other diseases or causes of death.

The standardized method has been recommended by World health organization in area of Infant and child deaths[9], whereas in the field of maternal health, verbal autopsy is formally placed as one of the options to review maternal deaths in settings where hospital based audits and confidential enquires are not possible[10].

Conclusion

Although attaining good quality vital registration data should be a long-term goal, alternative methods of ascertaining and estimating cause-of death distributions at the population level must be used in the interim and verbal autopsy thus appears to be a blessing- in- disguise.

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Ancient Neurilemmoma with Deceptive Clinico-Pathological Presentation – A case report

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Abstract

Neurilemmomas are uncommon tumors of parotid gland. They have a varied clinical presentation and are often misdiagnosed as other common benign salivary gland tumors. In this article a case is described which clinically presented itself as a Pleomorphic adenoma and wherein the histopathology revealed it to be an Neurilemmoma. The innocuous degenerative changes seen within the tumor thus being referred as "Ancient" could have been easily mistaken for malignancy and hence the emphasis made here to recognize this tumor for its deceptive appearance both clinically and histopathologically.

Key Words

Ancient Neurilemmoma; Benign Salivary gland tumors; Neurilemmoma; Sarcomas; Schwannoma.

Introduction

Neurilemmomas, otherwise referred to as Schwannoma, are benign well encapsulated neoplasms. These benign tumors are of neuroectodermal origin, arising from the Schwann cells.[1,2] Approximately 25% of Neurilemmoma occur in the head and neck region[3,4] and the evidence of intraparotid facial nerve Neurilemmoma is around 9%.[5]

Neurilemmomas of the parotid gland are rare, with very few cases being reported. 79 cases have been reported in the published English literature till the year 2008.[6]

Among the various histological variants, "ancient" Neurilemmoma of the parotid gland is an even more unusual finding. Prior to the realization that the observed atypia was a regressive phenomenon, many of these lesions were erroneously diagnosed as sarcomas.[3] The term ''ancient'' Neurilemmoma was proposed by Ackermann and Taylor for a group of neural tumors showing such degenerative changes and marked nuclear atypia.[7] This histological variant is characterized by areas of hyalinization, hypocellularity, and fatty degeneration.

The present case was provisionally diagnosed as a pleomorphic adenoma / lymphoma because of the clinical presentation of the lesion. Histologically it was diagnosed as an Ancient Neurilemmoma.

Case Report

A fifteen year old female reported to the institute with a complaint of swelling on the left side of the face in the parotid gland region since 8 months (Fig 1). The only associated symptom given was discomfort while sleeping on the left side due to radiating pain upon impingement. On extra oral examination, a solitary well defined swelling measuring around 4 cm in diameter was seen on the left side of the face extending behind the ear lobe (Fig 2). A mild weakness of the facial nerve branch was evident on smiling. On palpation, the swelling was firm and not fixed to underlying tissues. The left submandibular lymph nodes were palpable and non tender. The salivary flow was slightly reduced on the left side but the patency of the duct was clear. The complete blood count was normal. An FNAC was suggestive of a benign salivary gland tumor whereas CT scan studies revealed a hypodense mass in the left parotid region.

The patient underwent a total parotidectomy with sparing of the facial nerve. The skin flap was raised by a lazy 'S' incision [8] and superficial parotidectomy was done and pedicled on to the deep lobe. The facial nerve was identified by a centrifugal approach wherein the facial nerve trunk and the two main divisions, frontozygomatic and cervicomandibular branches were dissected out from the tumor mass. Multiple fine nerve connections were noticed between the upper and lower buccal branches and above with the cervical branches which were adherent to the mass, requiring a sharp dissection. The deep lobe was finally mobilized beneath the facial nerve plane and delivered from between the marginal mandibular and cervical nerve branches.

Fig. 1: Clinical picture showing swelling in the left side of the face.

Fig. 2: Clinical picture showing extension of the swelling behind the ear.

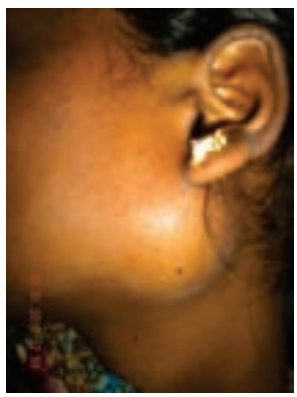


Fig. 3: Gross appearance of the tumor showing well encapsulation.

Fig. 4: Cut surface showing areas of hemorrhage.

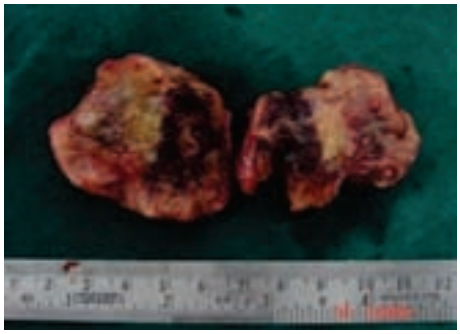
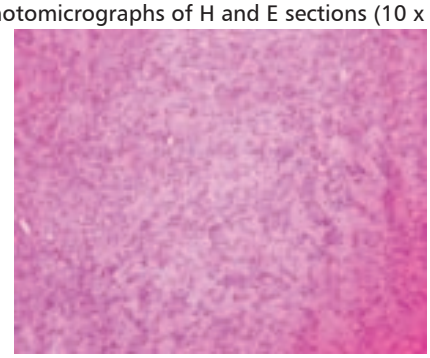


Fig. 5: Photomicrographs of H and E sections (10 x)



Gross Findings

The excised specimen which was received for histopathological examination was oval, well encapsulated, firm and appeared whitish brown (Fig 3). The cut surface showed extensive areas of haemorrhage (Fig.4)

Microscopic Features

The histopathology revealed Antoni A areas which were made up of streaming fascicles of spindle shaped cells with elongated nuclei arranged in a palisaded pattern around acellular eosinophilic bodies, the 'Verocay bodies' (Fig 6). These were interspersed with less cellular areas which were loosely organized representing the Antoni B areas. Degenerative changes like areas of hyalinization and thrombosed blood vessels were also noted (Fig 7). Based on these findings it was diagnosed as Ancient Neurilemmoma. Immunohistochemical analysis with S100 protein showed a strong expression (Fig 8).

Post operatively, the patient had a mild paresis of the peripheral branches of the facial nerve which subsided over a period of 5 months.

Fig. 6: Photomicrographs of H and E sections (40 x) showing Antoni type A areas.

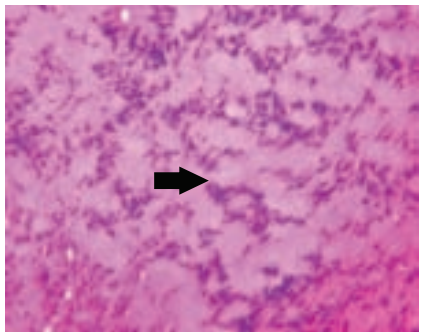
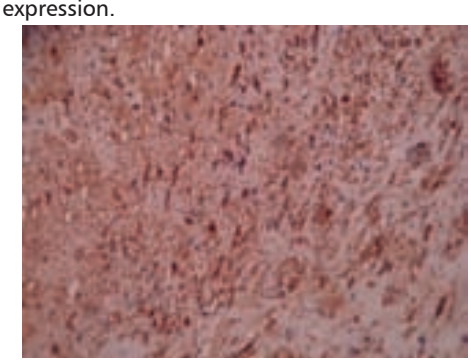


Fig. 7: Photomicrographs of H and E sections (10 x) showing degenerative areas

Fig. 8: Photomicrographs of S100 stain (40 x) showing diffuse strong expression.



Discussion

Neurilemmomas (Schwannomas) are benign neurogenic tumors that arise from the Schwann cells of the neural sheath. They were first described by Verocay in 1908 who termed them as neurinomas.[9] Stout proposed the term Schwannoma, believing this type of tumor contains no neural elements other than schwann cells from which it arises. These tumors tend to arise in association with small to medium sized nerves and account for 25% in the head and neck region.[3] Most head and neck Neurilemmoma involve the VIIIth cranial nerve.[10] Involvement of VII cranial nerve is uncommon and its occurrence in parotid gland a even more rare condition.[11]

Facial nerve Neurilemmoma are slow-growing neoplasms, and only 9 % of cases are intraparotid. The first case reported of intraparotid facial nerve Neurilemmoma was by Ibarz in 1927, containing some pathologic findings with no other information about the patient.[6] The estimated incidence of parotid tumors of facial nerve origin ranges from 0.2%-1.5%.[5,6]

They can occur at any age but more often encountered in third to fourth decade of life. Their clinical presentation is subtle depending on the size and extent of the lesion.[11,12] Such cases have been reported to cause progressive facial paralysis, hearing loss and vestibular dysfunction. Thus the pre-operative diagnosis of intraparotid Neurilemmoma is often difficult and the fine needle aspiration cytology often being non contributory.[13,14]

In contrast to the varied clinical presentation, the histological pattern is characteristic. The substance of the tumor is composed of a mixture of two cellular patterns, namely Antoni type A & B. Antoni A areas are composed of compact spindle cells with twisted nuclei arranged in fascicles.[15] In highly differentiated areas there may be nuclear palisading and formation of Verocay bodies, the latter being formed by alignment of two rows of nuclei and cell processes which assume an oval shape[16,17].

Antoni B areas are far less cellular, representing degenerated Antoni A areas, and are composed of haphazardly arranged spindle or oval cells within a myxoid, loosely-textured, hypocellular matrix, punctuated by microcysts, inflammatory cells and delicate collagen fibers.[4,11]

Five histological variants have been described in the literature-classic, cellular, epitheloid, plexiform and ancient.[16] The classic type consists of alternating Antoni A and Antoni B areas. The cellular type is made up of predominantly of Antoni type A areas which may display long sweeping fascicles of Schwann cells sometimes arranged in a herring bone pattern. The plexiform variety does not have the level of atypia commensurate with the mitotic activity. The epitheloid type consists of predominantly of epitheloid Schwann cells, arranged singly or in small aggregates.

Ancient Neurilemmoma is a rare histologic variant of Neurilemmoma with a course typical of a slow growing benign tumor.[18] It was first described by Ackerman and Taylor in 1951 in a review of 48 neurogenic tumors of the thorax.[3] They begin with diffuse cellular growth with increased vascularity with resulting hyalinization. They typically enlarge slowly with minimal symptoms, varying from firm solid masses to fluctuant cysts. Their characteristic histological appearance consists degenerative changes dominated by large cystic, myxoid areas, with bizarre spindle cells and even occasional mitosis[1] which can be mistaken for sarcomas.[19]

Expression of S 100 protein is diagnostically useful where there is degeneration in the Neurilemmomas to distinguish them from deep seated lesions such as leiomyosarcomas. Though it is known that Sl00 acidic protein cross reacts with various tissues and tumors not associated with nerves it is useful to confirm the diagnosis of Neurilemmoma and distinguish it from other neural lesions.[10] Neurilemmoma also shows positive expression for epithelial membrane antigen, CD 34 and Leu 7.[20]

The treatment, for all Neurilemmomas is complete surgical excision, sparing the associated nerve if possible and the prognosis is excellent. The recurrence and malignant transformation of this tumor is very rare.[19]

Though relatively uncommon, Neurilemmoma should be considered as one of the differential diagnosis of parotid tumors due to their deceptive clinical appearance and behavior.

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Study on Postmortem Artefacts

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Def

Postmortem Artefacts are due to any change caused or features introduced in a body at the time of death or after death, which can cause misinterpretation of medico legally significant ante mortem findings.

Introduction

Forensic medicine is best learned by a judicious combination of theoretical and practical knowledge. Most of the time due to lack of experience and skills many doctors may misinterpret artefacts as ante mortem injuries and give wrong opinion. There is a quotation in English "Our eyes see only what our brain knows".

If the doctor misinterprets the artefacts, he will have a tough time in the court during cross-examination, a defense lawyer aware of these pitfalls may attempt to discredit medical evidence.

A good forensic expert is one who has not merely a vast experience in conducting autopsies, but one who has trained himself to make precise and correct interpretation of the findings.

Ignorance and misinterpretation of such postmortem artefacts can lead to following:

- Wrong cause of death,
- Wrong manner of death,
- Undue suspicion of criminal offence,
- A halt in the investigation of criminal offence,
- Unnecessary spending of time and effort as a result of misleading findings,
- Miscarriage of injustice.

The main Aim of the study is to explain various types of artefacts, how to identify them and suggest various measures to prevent them.

Review of Literature

Artefacts introduced in the body:
At the time of death.(Agonal period)
During post mortem interval.
While conducting Autopsy.

I. Artefacts at the time of Death

- **Agonal period:** During agonal period aspiration of gastric contents due to vomiting can occur, it is due to stimulation of CTZ centre by medullary hypoxia that causes vomiting. The respiratory passages are filled with food material, there is every possibility of an autopsy surgeon misinterpreting this event as choking. In death due to choking the inhaled particles reach up to bronchioles and are stick to the mucosa of bronchioles, in case of aspiration the food is forced up the esophagus and enters in to the Larynx.
- **Therapeutic Artefacts:** These artifacts occur due to emergency treatment and resuscitation during terminal event.
  - The stab wound surgically repaired by debridement and suturing may cause difficulty to explain the nature of weapon.
  - Surgical intervention of Firearm wound makes it difficult to explain whether it is entry or exit wound, and the size of the bullet. (Kennedy phenomenon).
  - Multiple Blood transfusion to the victim cause difficulty in typing the blood.
  - Intra cardiac injection during terminal event, heart shows contusion and haemo pericardium.
  - Defibrillator applied to the chest produces ring like contusion.
  - External cardiac massage may cause bruising of anterior chest wall, fracture ribs and fracture sternum sometimes.
  - Intravenous injection over the external jugular vein mimic like abrasion over the neck.
  - Damage to the mouth, palate, pharynx and Larynx can occur while introducing Laryngoscope.
  - Mouth to mouth breathing may cause contusions over the inner mucosa of lips and gums.
  - Tracheostomy wound may be mistaken as cutthroat wound, chest tube drain may be mistaken as stab injury chest, if hospital records are not available to the autopsy surgeon.

II. Artefacts during postmortem interval

- **Artefacts due to handling of the body**
  - Fracture ribs, cervical spine or long bones of extremities may occur by rough handling during transportation.
  - Contusion of the occipital region may occur if the head is dropped on a hard surface.
  - Abrasions may be produced over the body due to dragging, lacerated injuries can occur while transporting in a vehicle can occur.
- **Artefacts due to rigor mortis.**
  - Conditions simulating rigor mortis like cold stiffening and heat stiffening cause difficulty in assessment of rigor mortis.
  - Rigor affecting the heart may simulate concentric hypertrophy of the heart.
  - Rigor of pylorus causes it unduly firm and contracted.
  - The onset and duration of rigor mortis can be altered by atmospheric conditions causing difficulty in estimating time since death.
  - Handling of the body while shifting from crime scene area may cause breaking of rigors, which makes it difficult in estimating time since death.
- **Artefacts related to postmortem lividity**
  - Certain poisons may change the colour of the hypostatic area Bright red in cyanide poisoning, cherry red in CO poisoning, Brown or chocolate colour in nitrites and potassium chlorate poisoning.
  - A bruise in hypostatic area may be mistaken as postmortem staining.
  - Body recovered in running water (river) may not show post mortem staining.
  - Body kept in cold storage shows pink colour staining.
  - In asphyxial deaths, there is delay of fixation of postmortem staining due to increase of fibrinolysin levels causing difficulty in estimating time since death.

- **Artefacts due to Burns**
  - Heat rupture may resemble lacerated wound.
  - Heat haematoma may simulate extra dural hemorrhage.
  - Unburnt groove over the neck due to tight collar shirt may resemble ligature mark of strangulation.
  - In severely burnt bodies, fat bodies may be found in the pulmonary vessels that may be mistaken as fat embolism.
- **Artefacts due to decomposition**
  - During Decomposition process skin become dark in color causing difficulty in identification,
  - Gases collecting in the soft tissues and cavities may cause false impression of obesity
  - Bloody fluid discharge from the mouth and nostrils due to decomposition may be mistaken as hemorrhage,
  - Blood becomes darker in decomposition, which may be mistaken for Asphyxia.
  - Gastric juice in the stomach causes perforation after the death, which may be mistaken as ante mortem perforation.
  - Air in the right side of the heart due to decomposition may be mistaken as Air embolism.
  - Postmortem autolysis of pancreas mimics hemorrhagic pancreatitis.
  - Decomposition fluid in the plural cavity may be mistaken as drowning.
  - Sutural separation in children during decomposition may be mistaken as skull fractures.
  - Skin blebs due to gaseous distension may be mistaken as burns.
  - In decomposition, there may be peeling of skin and loss of gunpowder, which causes difficulty in differentiating entrance from exit wound.
- **Artefact related to Hair**
  - Beard appears to grow after death, due to shrinkage of the skin.
- **Exhumation artefacts**
  - In exhumation, growth of fungus is usually seen at body orifices, eyes and at the sites of injuries; the skin under the growth resembles bruising.
  - Gravediggers can produce post mortem injuries over the body while digging,
  - Embalming artefacts:
  - The trocar wound may simulate a stab wound.
- **Toxicological artefacts**
  - Ethyl alcohol and co produced during decomposition may be mistaken as poisoning.
  - Anti coagulants like heparin EDTA give a positive test for methanol.
  - Faulty storage, preservatives and contamination of viscera may give wrong results.
- **Artefacts due to Animal and Insect bites**
  - Insect bites marks are dry, brown usually seen over moist part of the body resemble abrasion.

III. Artefacts while conducting Autopsy

- While opening abdomen and chest, viscera and intestine may be injured.
- Opening of skull may cause fracture skull.
- While dissecting and pulling the dura blood vessel may be injured causing extravasations of blood, simulating sub dural hemorrhage.
- While dissecting neck structures may injure the blood vessels causing extravasations of blood giving false impression of pressure over the Neck.
- Pulling the liver instead of careful dissection may cause liver laceration.

Characteristic features of Post mortem injuries

- Post mortem, injuries are usually seen over the bony prominence,
- They are yellowish, translucent, parchment like.
- There is No inflammatory reaction.
- Edges of the wound do not gape, closely approximated, slightly bleed, usually venous, no clotting of blood seen.
- Histochemistry shows diminished or no enzyme activity.

Discussion

Autopsies conducted and observed at Osmania General Hospital mortuary from 2002, the following observations were made.

A male body brought to the mortuary shows injuries around the mouth and nose and a ligature mark over the neck, IO suspect the case as homicidal, on examination we found that the ligature mark was due to hanging (suicidal), the injuries around the mouth and nose are post mortem in nature caused by rodent bites, multiple bite marks are seen over the injuries.

A decomposed body recovered from water brought to the mortuary, body swollen due to decomposition gases accumulated in the tissues, deceased wore a tight-collared T-shirt, which produced a false impression of a ligature mark over the neck.

In another case, female committed suicide by burning herself due to some family problems and women died in the spot, on examination dermo epidermal burns present all over the body, a lacerated wound found over the back of chest and back of thighs, on careful examination of autopsy revealed that they are postmortem injuries caused by heat rupture.

In several cases of hospital deaths, while conducting autopsy therapeutic injuries like defibrillator mark over the chest, injection mark over the external jugular vein, incised wound over the chest for chest tube drainage, Tracheostomy wound etc. may be usually mistaken as ante mortem injuries. Careful examination and detailed information of hospital records can easily explain these therapeutic injuries.

Gaseous distension in sub cutaneous tissue due to decomposition producing epidermal blebs is an usual finding in mortuary, police misinterpret this as burns wound, Gas filled blebs and no inflammatory reaction explain this as decomposition change.

Ant bite marks over the body is another common finding in the mortuary, inadequate cold storage facility and lack of regular insecticidal spray allows the insects specially Ants to attack the body producing injuries which mimicked Abrasions.

Conclusion

- Various types of artifacts observed and explained in this study signify the importance of the Forensic medicine in the society.
- A careful, skillful and experienced autopsy can only explain artifacts, several artefacts produced at the time of Autopsy, while opening the chest the scalpel blade may cut the thoracic viscera, while opening abdomen may cut liver and intestines, during opening of skull a fracture may produce, while removing the dura and while doing neck dissection extravasations of blood can occur, these artifacts can be misinterpreted during second autopsy.
- In majority of hospitals the least important area is mortuary, meager facilities are available at mortuary, most of the autopsies are conducted by the basic MBBS doctors without much experience of autopsy causing difficulty in identifying the Artefacts.
- Strengthening of Forensic medicine at under graduate level and compulsory mortuary facility for every teaching hospital is essential. In medico legal cases, misinterpretation may cause disastrous effect on justice.

- To avoid or minimize the errors every doctor must attend Periodical training in medico legal autopsy.
- Every Police officer must train in basic knowledge of forensic medicine with special attention on postmortem artifacts.
- Doctors must go through all relevant documents and crime scene photographs before commencing autopsy procedure, if require doctor must visit the crime scene.
- When ever require we must send the relevant tissues for chemical and histo-pathological examination.

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Malignant Myoepithelioma of Palate – A case report

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Abstract

A malignant myoepithelioma is one of the rarest salivary gland neoplasms which may either arise de novo or develop within a preexisting pleomorphic adenoma or benign myoepithelioma. The parotid gland is the most common primary site and the palate the most common intra-oral site of occurrence. We present a case of a malignant myoepithelioma arising in the hard palate of a 45-year-old man. The patient underwent a wide local tumor resection. Examination of the resected specimen showed the characteristic histopathological features of a malignant myoepithelioma. Six months after the operation, the patient was well without evidence of recurrence or metastasis.

Key Words

Malignant myoepithelioma, palate, spindle cell.

Introduction

Salivary gland tumors displaying exclusively myoepithelial differentiation are referred to as myoepitheliomas. Myoepitheliomas are rare tumors that account for less than 1% of all salivary gland tumors.[1,2] There seems to be a range of differentiation among the myoepitheliomas, with both benign and malignant variants represented. The majority of myoepitheliomas reported in the literature have been benign, and approximately 50 malignant myoepithelioma cases have been reported in the English literature, mostly as single case reports.[3] The rarity contrasts with the active role of myoepithelial cells in the histogenesis of several types of salivary gland tumors.[4] A malignant myoepithelioma may arise de novo or develop within a preexisting pleomorphic adenoma or benign myoepithelioma.[1,5,6] For benign myoepitheliomas, the parotid gland is the most common primary site and palate is the most common intra-oral site of occurrence.[3,7] In this report, a case of a malignant myoepithelioma in a 45 year-old man is presented, and the clinicopathological aspects of such tumors are discussed.

Fig. 1: Frontal view of the patient.

Case Report

A 45 year-old man presented with a 4-month history of a painless swelling in the middle third of the face (Fig-1). Patient had the history of extraction of the upper right back tooth and lower left back tooth five months back. There was generalized grade two mobility of teeth. Intra oral examination revealed a 5×3 cm firm, painless, submucosal mass located in the right side of the hard palate (Fig -2). There was no regional lymphadenopathy. The remainder of his physical examination was otherwise normal and laboratory studies showed no abnormalities. The Orthopantomogram (OPG) shows the radio opacity with irregular margins extending from right upper canine to third molar region (Fig–3). Axial computed tomography of the head and neck region revealed a solid mass in the right side of the hard palate (Fig-4). The tumor was removed using a subtotal maxillectomy with temporalis myofascial flap reconstruction under general anesthesia (Fig-5). The postoperative course of the patient was uncomplicated, and he was discharged after eight days (Fig-6). Six months after the operation, the patient is well without evidence of recurrence or metastasis.

Macroscopically, the tumor specimen was 5×3 cm in size and unencapsulated. The specimen was light brown to creamish in colour. Microscopically, the tumor was composed of a spindle shaped cells with eosinophilic cytoplasm arranged in sheets and showing cellular pleomorphism. The nuclei were generally large, hyperchromatic and contained prominent nucleoli. Increased mitotic activity was seen (Fig-7).

Discussion

Malignant myoepithelioma is one of the rarest salivary gland neoplasms. Approximately 50 cases have subsequently been reported in the English literature.[3] Patients with malignant myoepithelioma are generally aged over 50 years[1,3] and the majority presents with a painless mass as the primary complaint.[3] The parotid gland is the most common primary site,[1,3] followed by the submandibular gland and minor salivary glands.[8] The palate is the most common intraoral site of occurrence.[3,7] Grossly, these

Fig. 2: Intraoral view of the tumor mass.

Fig. 3: OPG of the patient.

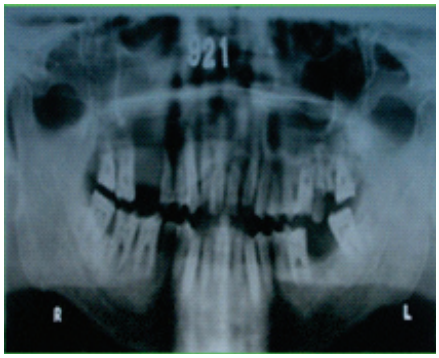


Fig. 4: Axial computed tomography view.

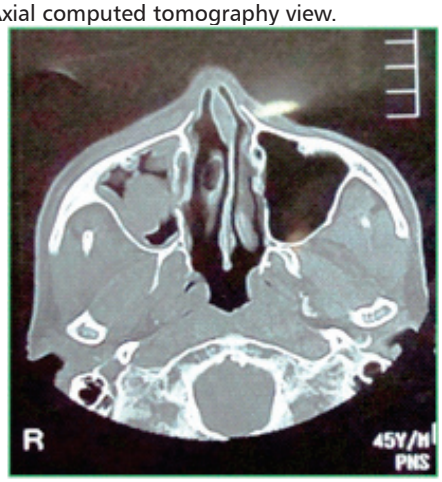
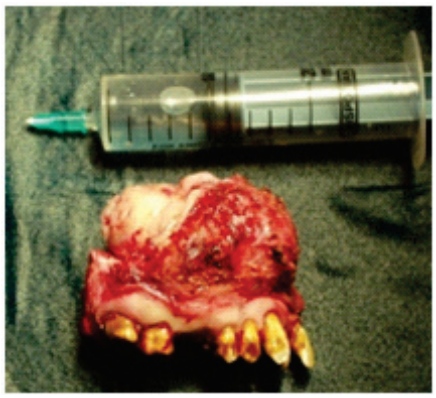


Fig. 5: Resected tumor mass.



tumors are generally soft to slightly firm and unencapsulated. They have infiltrative tumor borders with destructive tumor extensions into the adjacent salivary gland or surrounding tissues.[3] The tumor cells in malignant myoepithelioma patients show a wide variety of morphology, comprising of spindle, plasmacytoid (hyaline), epithelioid and clear cell subtypes and combinations of these cell types may be present within the same tumor. In malignant myoepitheliomas, two different tumor-related matrices have been described: myxoid and hyalinized. In some malignant myoepithelioma cases metaplastic changes have been noted[1,3] including squamous, chondroid and sebaceous metaplasia.

To establish the diagnosis of a malignant myoepithelioma, two histologic criteria must be satisfied: the neoplastic cells must show exclusively myoepithelial differentiation and the tumor must exhibit malignant features.[5,8] In this case the lack of ductal and acinar differentiation also supported the diagnosis of a myoepithelial tumor. Increased mitotic activity, cellular pleomorphism favored

Fig. 6: Intra oral post operative view.

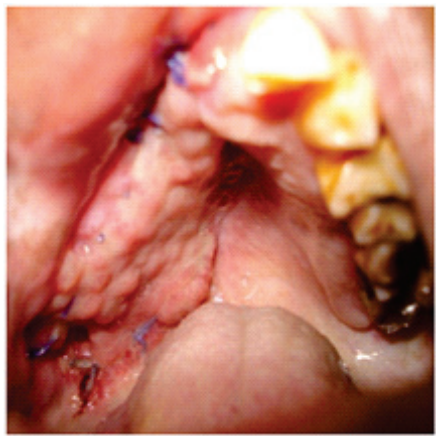
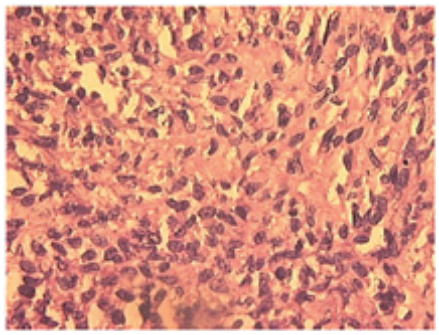


Fig. 7: Spindle shaped tumor cells showing cellular pleomorphism (40x).



the diagnosis of malignancy. The differential diagnosis of a malignant myoepithelioma depends on the predominant cell type. Plasmacytoid cell type malignant myoepitheliomas should be distinguish from a plasmacytoma, malignant melanoma and large cell lymphoma. For the spindle cell type, the differential diagnosis includes hemangiopericytoma, schwannoma, fibrosarcoma, leiomyosarcoma and malignant peripheral nerve sheath tumor. The histological features considered helpful in discriminating benign and malignant myoepitheliomas include cytological atypia, mitotic activity, infiltrative growth pattern and necrosis.[1,9] Savera, et al.[3] emphasized that the minimum requirement for the diagnosis of a malignant myoepithelioma is the presence of tumor infiltration into the adjacent tissues. The clinical and biological behavior of these tumors is variable. There are no definite histological features that correlate clearly with their behavior. The influence of various parameters (tumor size, site, cell type, cytologic grade, presence of underlying benign tumor, mitotic rate, necrosis, perineural and vascular invasion) on the prognosis was studied by Savera, et al.[3] and they found cytologic atypia correlated weakly with a poor outcome, but none of the other factors showed a significant correlation. Similarly, Nagao, et al.[1] observed no apparent association between the cell types and clinical behavior of malignant myoepitheliomas. The prognostic implication of the histogenesis of malignant myoepitheliomas is controversial. Nagao, et al.[1] found no differences in the outcome with regard to the presence or absence of a pre-existing pleomorphic adenoma, while Di Palma and Guzzo[9] considered a malignant myoepithelioma as a low grade malignancy, characterized by multiple recurrences and a long clinical history when arising from a pleomorphic adenoma, but tend to be more aggressive and have a short clinical history when arising de novo.

There is little information about the treatment of these tumors to date; however, wide surgical excision is accepted as the appropriate treatment modality. Therapeutic neck dissection

is indicated when there are clinically or radiologically apparent metastases in the cervical lymph nodes.[4]

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A Case of Non Fatal Suicidal Stab Injury

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Abstract

A case of stab injury was admitted to emergency (causality) department of Mamata General Hospital Khammam. There was history of self inflicted injury. One stab wound and another contusion were found on left anterior abdominal wall. Patient was kept under conservative management under department of surgery and was discharged being cured after 5 days. The weapon of offence was also examined and it was confirmed that the weapon had penetrated up to the muscle depth and continued horizontally in the abdominal wall measuring 2.5x0.5x7cm. Fortunate for the victim was that the direction of thrust was horizontal rather than vertical or oblique resulting in a non fatal wound.

Introduction

Stab wounds are caused by elongated narrow weapons with more or less pointed tips with a thrust along the long axis of the weapon[1, 2]. the same weapon can cause a variety of wounds as regards to shape, size, depth of penetration, direction of track etc depending on different factors. The fatality of the wound would change if it was inflicted in erect posture than in supine posture which occurred exactly in this particular case. The direction of the wound is indicated by track of the wound but evidence of undercutting beneath external wound or tailing of wound if present, will also give idea about direction[3].

Case Report

A Hindu married male of 30 years age attempted suicide by inflicting stab wound on his abdomen on 14.7.06 at 4pm at his residence. .He was a father of two children; a 6 year old daughter and; a two years old son. He as well as his wife worked as daily wage manual labor. Due to mental stress (as he was arrested recently in connection to a kidnap case and released on bail) he attempted suicide in his residence and it was immediately noticed by the family members who shifted him to District Head quarter Hospital .After first aid he was immediately referred to Mamata General Hospital which is a teaching hospital attached to Mamata Medical College Khammam.

The patient was examined by the author in the department of causality as a routine Medico legal case and the following was observed.

A stab wound measuring 2.5cmx0.5cmxmuscle deep placed almost vertically on anterior abdominal wall 2 cm to the left of upper margin of umbilicus. It was more or less spindle shaped. On close inspection the upper angle appeared to be curved with inward concavity and the lower angle was acute. Both the margins look clean cut. On approximating the margins the length of the wound was found to be 2.5 cm long. The depth of the wound was muscle deep over its upper 2cm length and skin deep over lower 0.5cm of the length.

An irregular, red colored small contusion of 0.4cmx0.2cm size was situated on left anterior abdominal wall 7 cm to the left of upper angle of injury no 1.

Examination of the weapon of offence

The following weapon of offence was also examined after it was produced by the relatives of the patient.

It was a single edged not very sharp iron knife with iron handle. Length of the weapon from base of handle to the tip was 19 cm. The length of the blade was 13 cm. The breadth of blade was 2cm at the middle portion (7cm from the tip) which increase on gradually towards base up to 3cm which was the maximum.

Follow up: The patient was shifted to surgery department where he was conservatively managed and discharged on 19.7.06 being cured. Ultrasound examination of abdomen was normal. Clinical examination did not reveal any sign of peritoneal irritation or deep abdominal injury. Only complaint the patient had was local pain solely confined in between the two external injuries.

The patient was asked to demonstrate how he held the knife before stabbing. (Picture-below)

Discussion

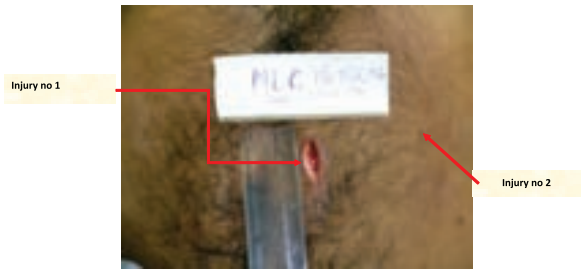
Suicidal manner of the wound could be confirmed from the patient's history, direction of the track, superficial nature of the wound and lack of any other wounds.

Two findings need discussion here.

1. Presence of a contusion
2. Tailing

The contusion found in this case was due to the tip of the knife hitting the skin from underneath, resulting in bleeding which infiltrated in to subcutaneous area adjacent to point of contact. Here the direction of the wound was horizontal from right to left and slightly from below upwards .Thus instead of penetrating into peritoneum the knife remained under the skin confined to the anterior abdominal wall.

The tailing seen at the lower angle is due to the cutting edge of the blade of the knife as it entered it caused some drawing effect at the lower angle. We can opine that the portion of knife which entered the body is that length of it from the tip up to a point where its breadth is 2cm (corresponding to the length of main wound). This length of the knife was found to be 7 cm. This was consistent with the finding that distance between the two wounds externally was 7cm.The tail(the portion where depth was only skin deep) portion of 0.5cm length at the lower angle is thus due to contact of the that portion of knife where the width was



in between 2cm to 2.5cm combined with some drawing force. We can also opine from this tailing that a) the sharp edge of this single edged weapon was touching the lower angle and b) the direction of the thrust was from below upwards as we observed effects of drawing at the lower angle. Had the thrust been from above down wards the upper angle would have come in contact with the blunt edge ruling out production of a sharp cut .Possibility of production of this superficial cut at lower angle due to withdrawal cannot be ruled out completely in spite of observing that a) the sharp edge is not that sharp to cut with slight touch.

Conclusion

1. It is always advisable to note all the minor injuries around and near stab wounds as it may help to identify the track as it is seen in this case.
2. Apparent tailing may be the result of the same thrust owing to contact with increasing width of the blade combined with effect of drawing.

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Estimation of Stature from Percutaneous Ulna Length

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Abstract

Estimation of stature is a prime work of Forensic Expert, which helps in identification. It is well known that estimation of stature from measurements of long bones of upper limb is accurate. In this study 107 students (55 males and 52 females) of M. R. Medical College, Gulbarga hailing from Hyderabad-Karnataka region of Karnataka are included. Ulna length (distance between most proximal point of the olecranon process and tip of styloid process of Ulna) of both right and left upper limb, height and weight of each student is measured. This study describes an equation devised for estimation of stature based on percutaneous Ulna length.

Key Words

Stature estimation, Ulna length.

Introduction

Identification of individuality is a prime work of Forensic Experts. In identification, estimation of the stature is a primary characteristic along with age and sex.

Assessment of body height from different parts of body by anthropometric study of skeleton is an area of interest to Forensic Experts, Anatomists and Anthropologists.

In ancient time physician and surgeon like Charaka and Sushruta were well acquainted with the relation of different parts of body and height. According to Charaka, the height of an average man should be 84 anguls, thigh - 21 anguls, leg - 19 anguls, forearm- 15 anguls and arm- 16 anguls[1].

In past many authors have studied on Stature estimation based on measurements of Ulna and other long bones. Several authors have offered regression equations based on the length of long bones; however it is well known that formulae that apply to one population do not always give accurate results for other population. Pearson[2] stated that a regression formula derived for one population should be applied to other groups with caution. In 1929, Stevenson[3] confirmed the existence of inter population differences with respect to stature estimation.

Most of the studies have stressed that regression formula for stature estimation should be population specific. So there is a need to develop a separate regression formula for stature estimation from long bone measurement for a particular population. Since olecranon process and styloid process are easily felt through the skin, it is easy to measure the length of the Ulna bone. So the present study "Estimation of Stature from Percutaneous Ulna Length" is taken up.

Material and Methods

The present study is carried out in M. R. Medical Gulbarga, Karnataka. Total 107 students (55 males and 52 females) between the age group of 19 – 26 years belonging to Hyderabad-Karnataka region are selected. The height and length of both right and left Ulna of each student is measured by the same observer and with the same instrument.

The Ulna length is measured with the help of spreading caliper as a straight distance from the most proximal point of the olecranon process to the most distal point of the styloid process, with the forearm flexed 90^0 angles at the elbow joint. Height of the students is measured in standing erect position with barefoot.

After collection of data, it is subjected to statistical analysis. Mean standard deviation and range for height, right Ulna length and left Ulna length are calculated separately for male and female. Correlation of height with right Ulna length and with left Ulna length is calculated. Standard error of estimate is also calculated for male and female separately.

Results

The statistical data which are extracted from calculation are tabulated in Table-1 and Table-2.

Mean, Standard deviation and Range for Height, Right Ulna length and Left Ulna Length are shown in Table-1.

Table -2 shows correlation co-efficient of Height with Right Ulna and Left Ulna Length separately for male and female. For male, correlation co-efficient of Height with Right and left Ulna length is 0.79 and 0.77 respectively and show significant positive correlation. Similarly in female, correlation co-efficient of Height with Right and left Ulna length is 0.74 and 0.83 respectively and also shows significant positive correlation.

Regression formulae for estimation of height;

In males

Height from Right Ulna Length; $Y_1 = 80.70 + 3.20X_1$

Height from Left Ulna Length; $Y_2 = 67.79 + 3.73X_2$

Table 1:

All in centimeters	Mean		Standard Deviation		Range	
	Male	Female	Male	Female	Male	Female
Height	172.03	160	± 7.42	± 6.34	158-189	147-176
Rt Ulna Length	27.77	24.78	± 1.22	± 1.47	24.5-31	21-28
Lt Ulna Length	27.51	24.72	± 1.24	± 1.40	24.5-30.5	21-28

Table 2:

	Male	Female
Correlation Co-efficient of Height with Right Ulna length	0.79	0.74
Correlation Co-efficient of Height with Left Ulna length	0.77	.83

Fig. 1:

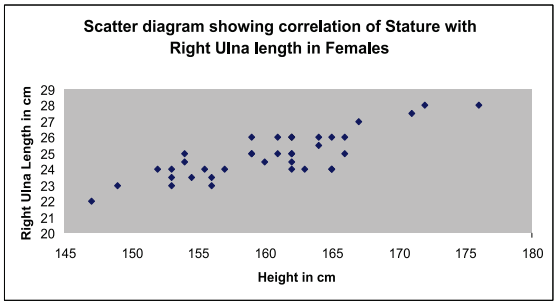
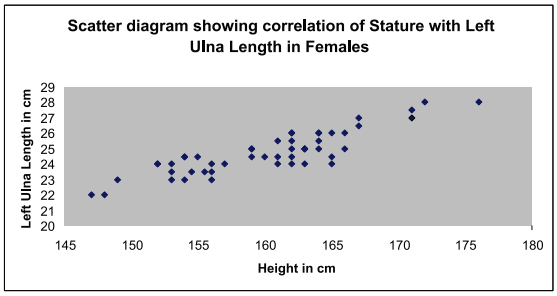


Fig. 2:



In Females

Height from Right Ulna Length; $Y_3 = 38.18 + 4.82X_3$

Height from Left Ulna Length; $Y_4 = 46.03 + 4.58X_4$

X_1 denotes right ulna length of male

X_2 denotes left ulna length of male

X_3 denotes right ulna length of female

X_4 denotes left ulna length of female

The standard error of estimate works out to be 5.59 for right ulna length and 5.23 for left ulna length in males, 5.38 for right ulna length and 4.68 for left ulna length in females.

Thus at 95% confidence level the estimated height of male and female are as follows:

In males

Height from Right Ulna Length; $Y_1 = 80.70 + 3.20X_1 \pm 10.96$

Height from Left Ulna Length; $Y_2 = 67.79 + 3.73X_2 \pm 10.25$

In Females

Height from Right Ulna Length; $Y_3 = 38.18 + 4.82X_3 \pm 10.54$

Height from Left Ulna Length; $Y_4 = 46.03 + 4.58X_4 \pm 9.17$

Discussion

Results of present study are in excellent agreement with study done by Mondal MK[1] et al (in his study correlation co-efficient (R) of Height with Right Ulna length and Left Ulna Length are 0.78 and 0.68 respectively which are almost similar to the present study) and Sorojini Devi et al[4] (R = 0.619 for male and R = 0.584 for female).

Duyar I[5] et al mentioned in his study, a need for separate regression equation to estimate stature depending upon length of Ulna (short, medium and tall) to have accurate results. Agnihotri A[6] et al are of the opinion that there is no need of separate

Fig. 3:

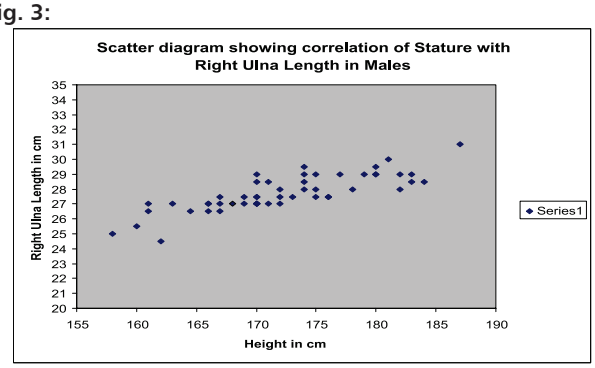
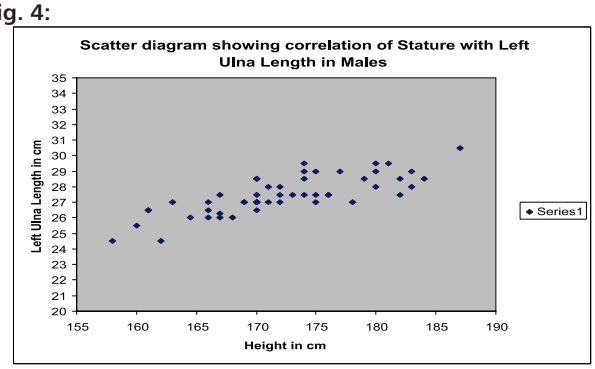


Fig. 4:



regression formulae for right and left ulna and also no separate equation for male and female, but Mohanty[7] suggested a need for gender based different regression equations to predict the height.

Allbrook D[8] derived regression equation formulae for height estimation from ulna length as, Stature = 88.94 + 3.06 (ulna length) ± 4.4 (S.E.). He has not derived regression equation separately for male and female.

Athawale MC[9] showed that there is definite correlation between stature of an individual and length of forearm bones. The regression equation derived for stature estimation from ulna length is; Stature = 56.97 + 3.96 x Length of ulna ± 3.64. The author has taken average length of right and left ulna length for estimation of stature.

Lal and Lala[10] estimated height from surface anatomy of long bones like tibia & ulna. The ulnar multiplication factor was comparable in all series. They have claimed that ulnar multiplication factor is better guide for calculation of height, when definitely it is not known to which part of the country the individual belongs.

In this study we have derived separate regression equations for both right and left Ulna Length for male and female separately to estimate accurate stature of individual.

Conclusion

The result of the present study indicates that the percutaneous length of ulna can be efficiently used for estimation of stature.

There is a strong correlation between the ulna length (right and left) and the stature of the individual.

Most authors have underlined the need for population-specific stature estimation formulae. The main reason for this is, the ratio of various body parts differ from one population to another. In addition to ethnic differences, secular trend[11] and even environmental factors such as socioeconomic and nutritional status can influence body proportion[12]. So in this study we have derived a separate regression equation to estimate stature from

ulna length for the students of Hyderabad-Karnataka region and also there is a need to develop separate population-specific stature estimation formulae for other regions.

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PNDT Act – A review

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Abstract

India being a developing country still faces the challenge of large-scale female foeticide and infanticide as evident by Census 2001 data, that shows an alarming decline in female to male ratio. This reduced female sex ratio contributes to domestic, social and sexual violence on women. In order to check female foeticide, the Prenatal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994 was enacted and became operational from 1st January 1996. Due to certain inadequacies, practical difficulties in its implementation and due to scientific advances to select sex of a child before conception, the Act has been amended, with effect from February 2003 with motives of preventing the misuse of pre-natal diagnostic techniques for Sex selective abortions. This article is an attempt to throw light on important features of PNDT act and the need of active participation of the people for its successful implementation.

Introduction

Denial to a girl child of her right to live is one of the heinous violations of the right to life committed by the society. It is well established that in the Indian society, female child is not welcomed and discrimination against girl child still prevails. It is thought to be due to various religious myths, uncontrolled dowry system despite the Dowry Prohibition Act and lack of education of the society[1]. The misuse of modern science and technology by preventing the birth of a girl child by sex determination before birth and abortion thereafter is evident from the 2001 census figures, which reveal greater decline in sex ratio in the 0-6 age group in several states of India[2].

Sex ratio at birth (SRB) is an indirect measure of female foeticide. There has been a decline in the sex ratio (number of males per 100 females) during the present century with substantial differences between states in sex ratio at birth. The observed sex ratio of 110 is much higher than the internationally accepted ratio of 1063. The key factors responsible for SRB are female infanticide, sex determination and selective female foeticide.

In developing countries like India, many could be blamed for the increasing trend of female foeticide that include her/ his parents, the in-laws, husband, woman herself, medical professionals and the society as a whole. The antiquated legal system and the lack of education also contribute either directly or indirectly.

In order to curb this social evil the Government of India enacted this act from 01-01-1996, further amended and came into existence from 14-02-2003. The Prenatal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994 renamed after amendment as "The Pre-conception and Pre-natal Diagnostic Techniques (Prohibition of Sex Selection) Act" referred to as PNDT Act thus came into force.

Determinants for Declining Female Sex Ratio

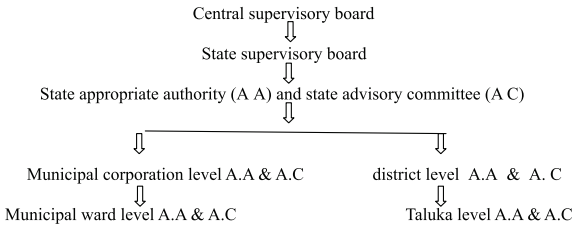
a. Unchecked Pre-natal Sex Determination
b. Selective Abortions
c. Female Foeticide
d. Misuse of MTP Act 1971
e. Non-priority of PNDT Act 1994
f. Govt. Failure (Legislature and Executive)

Definition

"An Act to provide for the prohibition of sex selection, before or after conception, and for regulation of prenatal diagnostic techniques, for the purposes of detecting genetic abnormalities, or metabolic disorders, or chromosomal abnormalities, or certain congenital malformations or sex-linked disorders and for the prevention of their misuse for sex determination leading to female foeticide; and for many matters connected therewith or incidental thereto".

Features of PC & PNDT Act 1994[4]

Code of conduct:



Regulation of Prenatal Diagnostic Techniques

1. No prenatal diagnostic techniques shall be conducted, except for the purposes of detection of any of the following abnormalities, namely: Chromosomal abnormalities, Genetic metabolic diseases, Haemoglobinopathies, Sex-linked genetic diseases, Congenital anomalies, and any other abnormalities /or diseases as may be specified by the Central Supervisory Board
2. No prenatal diagnostic technique shall be used or conducted unless the person qualified to do so is satisfied, that any of the following conditions are fulfilled, namely:

- Age of the pregnant woman is above 35 years
- The pregnant woman has undergone two or more spontaneous abortions or foetal losses.
- The pregnant woman exposed to potentially teratogenic agents such as drugs, radiation, infection or chemicals.
- The pregnant woman or her spouse has a family history of mental retardation or physical deformities such as spasticity or any other genetic disease.
- Any other condition as may be specified by the Central Supervisory Board

3. No person including a relative, or husband of the pregnant woman shall seek or encourage, the conduct of any prenatal diagnostic test on her, except for the purpose mentioned in the indications.
4. Written consent of pregnant woman and prohibition of communicating the sex of the foetus
5. No person shall conduct the prenatal diagnostic procedures unless he has explained all known side and after effects of

such procedure to the pregnant woman concerned.

6. He has obtained in the prescribed form her written consent to undergo such procedure in the written language, which she understands.
7. A copy of her consent obtained given back to the pregnant woman.
8. No person conducting prenatal diagnostic procedure shall communicate to the pregnant woman concerned, or her relative, the sex of the foetus by words, signs or in any other manner.

Various procedures under PC & PNDT Act[5]

- Registration: It is done by State's Appropriate Authority after application and paying fees of Rs. 3000/- for genetic counseling centre, genetic laboratory, genetic clinic, ultrasound clinic or imaging centre and Rs. 4000/- for an institute, hospital, nursing home.
- Minimum requirements for registration: registration certificate is not issued unless all requirements as to qualification and prescriptions regarding the place person and equipments specified as per PC & PNDT Act are fulfilled. Documentary proof of all employers is must, Equipment for dry and wet sterilization for genetic laboratories.
- Procedure of certification: The appropriate authority first conducts inspection of the place followed by regarding adequacy, quality and qualification of working staff. After consulting advisory committee, the registration is granted.
- A copy of the registration certificate has to be displayed in the machine room and other in the waiting room.
- Grant of certificate of, registration or rejection of application is done within 90 days from the date of receipt of application. No fee is collected for re submission if it is within 90 days of rejection. In the event of change of ownership / change of management of the centre, a fresh application for registration certificate is mandatory.
- Certificate of registration is valid for a period of five years from the date of its issue.
- Renewal of registration has to be done thirty days before the date of expiry, by paying one-half of the original fees.

Maintenance of Records[5]

- All records, charts, reports, consent letters, and all other documents required to be maintained under this Act, and the rules shall be preserved for a period of two years or for such period as may be prescribed.
- If any criminal or other proceedings are instituted, the records and all other documents shall be preserved until the final disposal of such proceedings.
- Even if a non pregnant woman or man undergoes any such procedure, still the record should be maintained but only to the extent of taking name, address of the person concerned, name of the referring doctor, purpose for which the procedure is carried out.
- Every genetic counseling centre, genetic laboratory, genetic clinic, ultrasound clinic or imaging centre should send a complete report in respect of all pre-conception or pregnancy related procedures/ techniques/ tests conducted by them in each month by 5th day of the following month to the concerned Appropriate Authority.

Cancellation/suspension of registration

- Even after registration has been validly granted to a faculty, the same can be suspended and/or cancelled the, if facility is found to violate any provisions of the act or it subsequently falls short of any requirement as to place, equipments and persons employed. Cancellation should be done only after giving show cause notice and giving an opportunity of hearing to the offending party and consideration of the facts and circumstances of the case.

Offences and Penalties[5,6,7]

- According to section 22 PNDT Act, advertisement in any manner including internet, regarding facilities of prenatal determination of sex available at any genetic centre, clinic or laboratory, shall be punishable with imprisonment for a term, which may extend up to three years, and fine which may extend up to Rs.10, 000 for first offence and 5 years imprisonment and 50000 fine for subsequent offence. In addition, his/her name will be reported to state medical council. His/ her medical council registration will be suspended when charges are framed by court, till the case is disposed off and on conviction his/her name will be removed for 5 years for first offence and permanently for subsequent offence.[Advertisement" includes any notice, circular, label, wrapper or any other document including advertisement through internet or any other media in electronic or print form and also includes any visible representation made by means of hoarding, wall-painting, signal, light, sound, smoke or gas].
- Any geneticist, gynecologist, pediatrician or any other person contravenes any of the provisions of this Act or rules made there under shall be punishable with imprisonment for a term which may extend to three years and fine of Rs.10,000/-. On any subsequent conviction, imprisonment may extend to five years and fine may extend to Rs.50, 000/-.
- Presumption in the case of conduct of prenatal diagnostic techniques: Not withstanding anything contained in the Indian Evidence Act, 1872, the court shall presume unless the contrary is proved that her husband or any other relative compelled the pregnant woman, to undergo prenatal diagnostic technique. Such a person shall be liable for abatement of offence with imprisonment up to 3 years and fine of Rs.10, 000/-.
- According to section 29 of PNDT Act non-maintenance of records is considered as the violation of PNDT Act and punished accordingly.
- According to section 27 of PNDT Act all offences are cognizable, non-bailable and non-compoundable.

Discussion

"Girl child is equally welcome" in the society and particularly in the family so as to establish social and familial harmony and reduce crimes related to reduced female population. Sex selection in the present context is a complex issue with several stakeholders - doctors, the government machinery looking after the implementation of the Act, health and women's groups and civil society. It is the responsibility of each citizen of the country to contribute in the prevention of injustice to a female child both before and after birth. Each has to play their part to deal with it at various levels. Our challenge today is to initiate a vibrant, effective campaign against female foeticide. Only if we are all committed can we reach out to the hearts and minds of our people.

Various steps to be taken to prevent female foeticide include

- Social awareness for changing public mind- set.
- Strict implementation of PC & PNDT and MTP Acts uniformly in all states and union territories.
- Sensitization of doctors, NGO'S, Government machinery, Panchayat leaders, Appropriate Authority, Advisory Committee.
- Protect unborn girl child.
- Educating /sensitizing male members of family about gender equality.
- Equal treatment, dignity and respect for girl child.
- Fight against social evils, religious myths.
- Women empowerment: to make it a reality.

Role of Forensic Medicine Specialist

In the present situation role of forensic medicine expert is not

only confined to four walls of the mortuary but also extends to the betterment of the society and this can be rendered by

- Holding seminars to medical and paramedical professionals on the crime of female foeticide and implementation of the PC & PNDT Act at various levels.
- Take active participation in public meetings and religious gatherings and creating social awareness among people regarding equality of both sexes.
- Forensic medicine specialists should be appointed as members of State and District Supervisory Committees on female foeticide and PC & PNDT Act.
- In order to create awareness in budding doctors Chapter on female foeticide should be included in text-books of Forensic Medicine and Toxicology.

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Comparisons in the Toxicities of Various Inorganic Salts like Copper Sulphate, Cadmium Sulphate & Lead Acetate on the Various Organs of Adult Female Rats (Rattus Norvegicus)

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Abstract

Heavy metal toxicity is a serious worldwide problem which adversely affects the growth, health, reproductive performance and life span of all living organisms. In my previous work[1-2] I (Dhir) worked on the physicochemical interactions in between the biomolecules (eccrine) with series of cations and also studied the importance of hydrophobic character of big biomolecules. Therefore; in this project I studied the effect of toxic cations like Cu^{2+}, Pb^{2+} & Cd^{2+} on the various biological aspects. Copper (copper sulphate), Leads (lead acetate) and cadmium(cadmium sulphate) being a toxic cumulative poison and an environmental pollutant, experiments were conducted at an oral chronic dose of (60 mg/kg/day) for 90 days on adult female rats (Rattus Norvegicus) and its effect on the reproductive functions in relation to the biochemical effects was studied. It was observed that the chronic dose of copper, lead & cadmium caused an elevation in the level of proteins, acid phosphatase, alkaline phosphatase, alanine aminotransferase and aspartate aminotransferase in all the soft tissues studied indicating tissue damage, whereas it was observed be me the effects were received in the following order:

$$Cu^{2+} > Pb^{2+} > Cd^{2+} \text{ (in terms of toxicity)}$$

However no literature was available so far as to compare the toxicity level of copper, cadmium with lead (because the cadmium ions or compounds are available in trace amount but I cannot rule out the possibility of cadmium pollution). Therefore it is necessary to compare copper and lead with cadmium. But the effect of lead is more important as compared to cadmium and copper because lead is released in our environment as the major pollutant. Like lead, copper and cadmium also inhibited the level of acetylcholinesterase in all the tissues. Fertility tests by pairing treated females with males showed that lead and cadmium treated female showed irregular oestrous cycle and the fertility rate dropped to 35% (in case of copper), 40 %(in case of lead) and 50 % (in case of cadmium) as female pups of lead treated mothers showed loss in weight, high mortality rate, poor growth rate and late vaginal opening. Histological studies of ovary showed atresia (figures 1-4) in all the stages of folliculogenesis sustaining the poor fertility observations. Since the absorption of lead indicated toxicity in humans is great due to the intake through food, air, and water, it became imperative to carry out a systematic study on the effect of chronic oral dose of lead on female reproductive functions and also to record the various enzymatic changes in rats. These findings would be useful in understanding the various effects on sensitive species and also extrapolating, with care the results for humans.

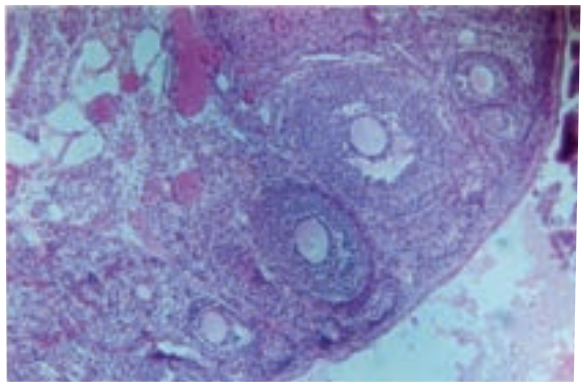
Introduction

Lead, copper and cadmium have no known biological function and any lead absorbed by man or animals may be potentially toxic. All spheres which are affected by lead can causes 33% increased absorption of lead which interferes with blood forming processes, vitamin D metabolism and other kidney and neurological processes[3]. The toxic effects are many, ranging from morphological tissues damage at higher concentration to lesser biochemical effects at lower concentrations[4]. Lead is known to be toxic when present in traces and enters human body as a result of environmental pollution[3]. Occupational hazards due to lead exposure produce reversible changes in mood and personality as fatigue, irritability, depression, deficits in vascular motor functioning, memory and verbal ability[3-4]. Lead has high affinity for various complexing groups such as imidazole, cysteine sulfhydryls and amino group of lysine. By complexing with these moieties lead, copper and cadmium may interfere with biochemical processors through alterations of structural integrity of enzyme or by disruption of substrate binding. Children exposed to lead are reported to have adverse effects on central nervous system and kidneys[4]. Maternal blood lead level as an environmental factor is an apparent predictor of low birth weight and child body mass ratio[5] and low to moderate environmental exposure increases the risk for spontaneous abortion[3] Anaemia which is frequently observed in lead poisoning was a result of decrease lifetime of erythrocytes and synthesis of heme[2-6]. Mating involving one lead toxic parent have recorded significant decrease in litter size, birth weight and survival rate[4-6]. A variation in the time of vaginal opening and a significant disturbed oestrous cycle was also observed in lead toxicity[6]. In Ludhiana (Punjab, India), the analysis of water samples of Budha Nallah after the input of effluents by dying industries and pesticide manufacturing units indicate that the concentration of lead has increased manifold[2] and the mean daily intake of lead was 162.32 ± 19.1 μg/day.

Material and Methods

Disease free albino rats 2-3 months were maintained on rat feed (Ashirwad Industries, Chandigarh-India) and black gram. Water was provided ad libitum. Blood samples were drawn into heparinised tubes and plasma was separated after centrifugation at 3000 rpm for 5 minutes at room temperature. The plasma was diluted in the ratio of 1:10. The tissue samples were homogenized in the homogenizer in potassium phosphate buffer in the ratio of 1:10. The effect of lead and cadmium on aspartate aminotransferase, alanine aminotransferase, acid phosphate and

Fig. 1: Various stages of follicles undergoing atrsia (HE stain) 100X(Lead).



alkaline phosphatise was estimated by the method of Wootton (1964). The cholinesterase activity was determined according to the method of Voss and Sachsse (1970) and total proteins were determined by Lowry et al. (1951). Statical significance of biochemical parameters was obtained by students t- tests at 1% level ($P<0.01$) and at the 5% level ($P<0.05$).

State of the estrous cycle of each animal was determined by taking vaginal smears [7] daily between 9:30 a.m. to 10:30 a.m. In order to take vaginal smears, the vaginal was washed with physiological saline (0.9 per cent) by injecting a drop of solution with a dropper.

For histopathological study, a piece of ovary was fixed for twenty four hours in alcoholic bouins fluid. The animals were sacrificed at 30, 60, 90 days after dose administration and ovaries were removed, cleaned of adjoining tissues and fixed in alcoholic bouins solution. The tissue was then processed for histological studies. Further serial paraffin sections were cut at 7μm. These sections were stained with haematoxylin eosin and stained serial sections of ovaries were examined under light microscope and morphological characteristics of normal and arteric follicles observed. The vaginal smears were examined immediately under the microscope while still wet and the cellular components were judged to determine the various stages of oestrous cycle with the help of following criteria: Diestrus : leucocytes only; Proestrus: epithelial cells with nuclei; Oestrus: vaginal cornification with total absence of leucocytes; and Metoestrus: leucocytes with few cornified epithelial cells. Fertility tests were conducted by treating female rats continuously for three months with copper (@35 mg/kg/day), lead (@ 60mg/kg/day) and cadmium (@ 40mg/kg/day) and housed with mature normal untreated males. The males were separated from females after formation of vaginal plug. The female were observed for entire gestation period of 28 days and the parameters of birth rate, litter size, morphological alterations, survival rate of pups, body weight from birth to 60 days, and vaginal opening in female pups for the litter were recorded. The surviving pups were then administrated copper @35 mg/kg/day, lead @ 60 mg/kg body and cadmium @ 50 mg/kg body weight, respectively after weighing up to 60 days of age.

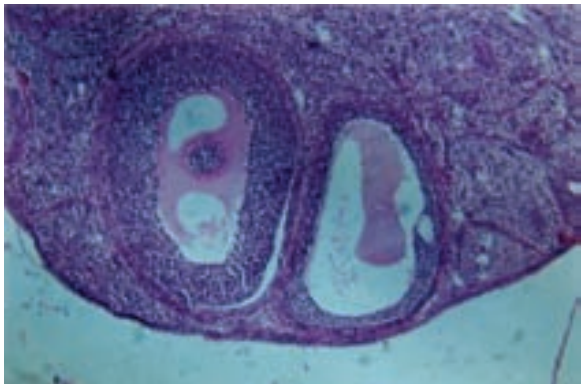
Results and Discussions; Biochemical parameters

Daily oral administration of copper (@35 mg/kg/day), lead (@ 60 mg/kg body) and cadmium (@ 50 mg/kg) for 90 days produced

Table 1: Effect of copper, lead and cadmium on tissue phosphatases.

Organ	Control	Treatment					
		15 Days	30 Days	45 Days	60 Days	75 Days	90 Days
Acid phosphatase (n mol phenol liberated / min/ml) (Mean S.D.)							
Plasma (copper)	118.93 ±2.95	0.699 ±1.43	0.701 ±3.32	0.711 ±1.95	0.723 ±2.95	0.715 ±1.22	0.750 ±2.22
Plasma (lead)	118.932.95	0.622±0.092	0.656±0.061	0.670±0.273	0.699±0.158	0.715±0.099	0.729±0.043
Plasma (cadmium)	118.93±2.95	0.7789±0.052	0.795±0.045	0.82140.353	0.8344±0.556	0.856±0.194	0.877±0.267
Liver (copper)	118.93±2.95	120.22 ± 2.22	121.22 ± 1.23	134.33 ± 1.55^{ab}	136.20±1.43^{a}	143.22 ± 1.20^{ab}	198.23 ± 1.24^{ab}
Liver (lead)	118.93±2.95	119.41 ± 1.92	116.43 ± 2.48	130.72 ± 0.97^{ab}	125.30±2.69^{a}	147.92 ± 2.40^{ab}	196.52 ± 3.69^{ab}
Liver (cadmium)	118.93±2.95	118.34 ± 3.88	119.56 ± 3.45	132.56 ± 0.88^{ab}	134.55±4.88^{a}	138.99 ± 4.40^{ab}	178.58 ± 4.45^{ab}
Kidney (copper)	9.315±0.258	9.234 ± 1.30	16.23 ± 1.23^{ab}	27.36 ± 2.34^{ab}	28.021 ± 1.78^{ab}	29.350 ± 0.928^{ab}	30.023 ± 2.102^{ab}
Kidney (lead)	9.315±0.258	9.000 ± 2.240	15.590 ± 3.120^{ab}	26.326 ± 1.77^{ab}	26.058 ± 2.880^{ab}	25.550 ± 0.938^{ab}	29.055 1.301^{ab}
Kidney (cadmium)	9.315±0.258	11.245 ± 1.35	11.345± 4.24^{ab}	28.453 ± 4.66^{ab}	28.994 ± 3.670^{ab}	30.657 ± 0.787^{ab}	31.567 ± 2.454^{ab}
Ovary (copper)	4.069±0.65	4.644±0.089	4.342 ± 0.123	4.55 0.234	5.88 ±0.234	9.99 ± 0.234^{ab}	23.124 ±0.539^{ab}
Ovary (lead)	4.069±0.65	4.527±0.078	4.222 ± 0.056	4.54 0.403	5.73 ±0.698	9.71 ± 0.146^{ab}	21.934 ±0.639^{ab}
Ovary (cadmium)	4.069±0.65	4.543±0.178	4.768 ± 0.248	6.765 ± 0.243	7.789 0.897	18.675 ± 0.344^{ab}	29.657 ±0.874^{ab}
Alkaline Phosphatase (n mol phenol liberated / min/ml) (Mean ± S.D.)							
Plasma (copper)	13.81±0.215	13.621 ± 0.845^{a}	18.999±0.234^{ab}	23.183 ±1.230^{ab}	25.121 ± 1.232^{ab}	30.245 ± 0.234^{ab}	43.234 ± 0.234
Plasma (lead)	13.81±0.215	12.609 ± 0.880^{a}	18.487±0.955^{ab}	22.214 ±1.090^{ab}	24.535 ± 1.190^{ab}	29.54 ± 0.455^{ab}	40.912 ± 0.346
Plasma (cadmium)	13.81±0.215	15.775 ± 0.678^{a}	17.298±0.788^{ab}	22.564 ±2.676^{ab}	26.534 ± 1.34^{ab}	37.57 ± 0.679^{ab}	47.881 ± 0.789
Liver (copper)	27.15 ± 0.786	28.230 ± 0.563	29.332 0.332^{ab}	36.231 ± 2.22^{ab}	32.223 ±0.787^{ab}	36.734 ± 2.123^{ab}	43.234 ± 1.235^{ab}
Liver (lead)	27.15 ± 0.786	27.950 ± 0.673	29.530 0.600^{ab}	35.091 ± 1.630^{ab}	30.630 ±0.304^{ab}	35.841 ± 1.013^{ab}	42.349 ± 1.960^{ab}
Liver (cadmium)	27.15 ± 0.786	30.567 ± 0.883	28.490 0.597^{ab}	39.247 ± 3.645^{ab}	39.989 ±0.456^{ab}	42.689 ± 2.345^{ab}	44.897 ± 2.978^{ab}
Kidney (copper)	1630.03±12.930	1855.345±26.234^{ab}	1859.897±21.232^{ab}	1811.521±18.234^{ab}	1875.457±22.320^{ab}	1966.122±22.320^{ab}	28422.50±19.330^{ab}
Kidney (lead)	1630.03±12.930	1846.310±24.140^{ab}	1857.760±20.980^{ab}	1801.551±18.490^{ab}	1874.277±39.950^{ab}	1964.194±21.380^{ab}	2846.251012.330^{ab}
Kidney (cadmium)	1630.03±12.930	1956.7 ±34.367^{ab}	2089.9 ± 18.967^{ab}	1999.01 ± 34.678^{ab}	2078.9 ± 43.123^{ab}	1999.78 ± 22.675^{ab}	2789.7 ± 2.378^{ab}
Ovary (coppe)	12.193 ± 3.050	15.223 ± 0.243	22.124 ± 3.430	24.123 ± 1.234^{ab}	27.323 ± 4.321^{ab}	35.343 ± 0.234^{ab}	47.342 ± 4.501^{ab}
Ovary (lead)	12.193 ± 3.050	14.280 ± 0.495	21.550 ± 7.690	22.261 ± 2.480^{ab}	26.998 ± 2.970^{ab}	31.460 ± 0.500^{ab}	45.260 ± 9.900^{ab}
Ovary (cadmium)	12.193 ± 3.050	15.338 ± 0.345	22.586 ± 8.560	23.1246 3.568^{ab}	27.998 ± 3.560^{ab}	33.680 ± 0.2430^{ab}	47.356 ± 9.879^{ab}

Fig. 2: Incipient antral stage follicle undergoing atresia (HE stain) 100X(Cadmium).



a significant rise in the levels of acid phophatase in lever, kidney and ovary and a non-significant increase of enzyme in plasma following daily exposure of lead. Acid phosphatase is a lysosomal enzyme and is stimulated in cases of tissue damage[4]. Increase in level of acid phosphatase in liver and kidney might be suggestive of increase physiological phagocytosis[3] and the moderate amount of acid phosphatase activity in regressing luteal cells of the ovary indicated lysosomal activity in luteolysis[4]. The increase in acid phosphatase activity estimated biochemically would therefore mean a destruction of the luteal cells which is in support of the fact that absence of acetylecholinesterase activity in ovary also causes lack of steroidogenesis. It has been further suggested that in follicle cells, lysosomal enzymes affects estrogen receptor by dephosphorylation which led to atresia and also the enzyme acid phosphatase is an excellent indicator of atrophy[4]. Copper, lead and cadmium caused a significant increase in alkaline phosphatase level (Table 1) in plasma, liver, kidney and ovary. While the effects are more in case of copper as compared to lead & cadmium. It has been suggested that an increase in alkaline phosphatase level occur due to the damage of the cells of liver, kidney, small intestine and bone resulting in liberation of this enzymes in the blood systems (Zimmerman 1969). Alkaline phosphatase helps in ionic movement across the cell membrane and in also associated with secretory and absorption processes of the cell[5]. Wise (1987) in bovine follicles also postulated AKP as an excellent indicator of atresia since AKP activity was greater in ovary. The changes in enzymes system had been correlated with the steroid biosynthesis in the granulose cells of maturing follicles of mammalian ovary[8].

Table 2: Effect of copper, lead and cadmium on the body weights of pups of treated mothers and dose after lactation.

	Body weight at birth (mean ±S.D.)	15 days	30 days	45 days	60 days
Control	7.06 ± 0.24	18.40 ± 1.94	40.86 ± 3.42	59.86 ± 2.43	81.92 ±4.61
Treated					
A	5.250±0.900[ab]	11.290±1.25[ab] (lead), 10.388±2.45[ab](cadmium), 11.399±3.23[ab](copper).	21.290±2.46 (lead), 19.38±3.58 (cadmium), 20.11±2.79 (copper).	35.21±0.21[ab](lead), 30.99±0.234[ab](cadmium), 31.29 ± 0.258 (copper).	-
B	5.306±0.370[ab]	9.8260±2.27[ab](lead), 9.768±3.14[ab](cadmium), 9.892±2.34[ab](copper).	16.440±4.29(lead), 15.230±3.03(cadmium), 16.089±2.15(copper).	33.80±0.39[ab](lead), 31.67±0.58[ab](cadmium), 32.34±0.24[ab](copper).	-
C	5.570±0.233[ab]	10.912±1.03[ab] (lead), 09.876±1.05[ab](cadmium), 08.896±1.11[ab] (copper).	20.990±1.56(lead), 18.678±1.89(cadmium), 19.453±1.99(copper).	31.82±0.00[ab](lead), 30.65±0.03[ab](cadmium), 28.232±0.42(copper).	30.21 ±0.00[ab](lead, died on day 63), 26.61±0.05[ab](cadmium, died on day 55), 32.12±0.25[ab](copper, died on day 52).
D	5.490±0.150[ab]	10.560±1.97[ab](lead), 09.384±1.82[ab](cadmium), 05.642±0.78[ab](copper).	20.765±1.14(lead), 19.325±2.28(cadmium), 21.221±1.02(copper).	31.48±0.00[ab](lead), 18.98±0.04[ab](cadmium), 23.122±2.12(copper).	-

Table 3: Survival rate of pups.

Days of treatment (female)	Number of pups	Survival at birth time	Survival after 15 days	Survival after 30 days	Survival after 30 days	Survival after 45 days	Survival after 60 days
Control (no treatment)	6-10	6-10	6-10 (lead/cadmium/ copper)	6-10	6-10	6-10	6-10
60	11	9	8(lead), 6(cadmium), 9(copper).	6	6	3	Died
60	Nil	Nil	Nil	Nil	Nil	Nil	Nil
60	8	5	5 (lead), 7(cadmium), 8(copper).	4 (lead), 3(cadmium), 5(copper).	4(lead), 6(cadmium), 7(copper).	2(lead), 4(cadmium), 5(copper).	Died (copper / lead /cadmium).
60	9	5	5(lead), 7(cadmium), 8(copper).	3(lead), 5(cadmium), 6(copper).	3 (lead), 6(cadmium), 5(copper).	1(lead), 2(cadmium), 7(copper).	1(lead), 3(cadmium), 2(copper).
60	7	5	3(lead), 2(cadmium), 4(copper).	2(lead), 1(cadmium), 3(copper).	2(lead/cadmium), 1(copper).	1(lead), Nil-(cadmium), 1(copper).	Died(copper/lead/ cadmium).

Table 4: Effect of copper, lead and cadmium on body weight of treated female.

Treatment dose (mg/kg)	0 day	15 days	30 days	45 days	60 days	75 days	90 days
0	122 ±4.52	132±3.33(lead), 120±4.24 (cadmium), 135±2.99(copper)	145±2.26(lead), 135±2.04(cadmium), 123±1.03(copper).	151±2.61(lead), 149±2.20(cadmium), 155±3.23(copper).	165±4.21(lead), 155±2.93(cadmium), 160±2.03(copper).	170±2.17(lead), 156±3.16(cadmium), 163±6.23(copper).	173±2.36(lead), 150±1.26(cadmium), 179±2.04(copper).
60	120±2.95	122±4.32[ab] (all dead, lead), 119±2.12[ab] (cadmium), 125±2.12(copper).	125±2.26[ab] (lead), 118±1.86[ab](cadmium), 128±2.51(copper).	130±1.56[ab](lead), 120±1.33[ab](cadmium), 128±2.35(copper).	127±4.56[ab](lead), 120±3.44[ab](cadmium), 130±2.14(copper).	125±4.03[ab](lead), 120±2.66[ab](cadmium), 128±2.13(copper).	126±3.92[ab](lead), 117±2.88[ab](cadmium), 131±2.34(copper).

Fig. 3: Antrum formed Graafian follicle undergoing atresia with complete detachment of granulose from theca shows advanced stage in atresia (HE stain) 100X (copper).

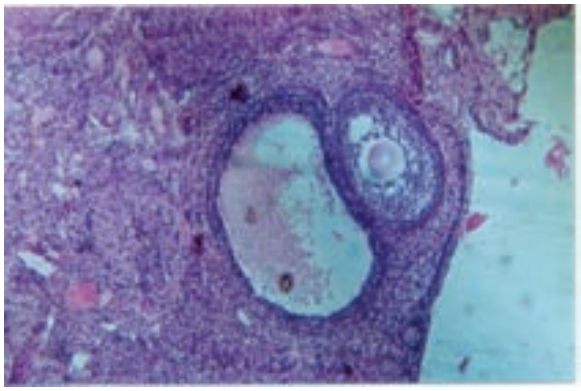
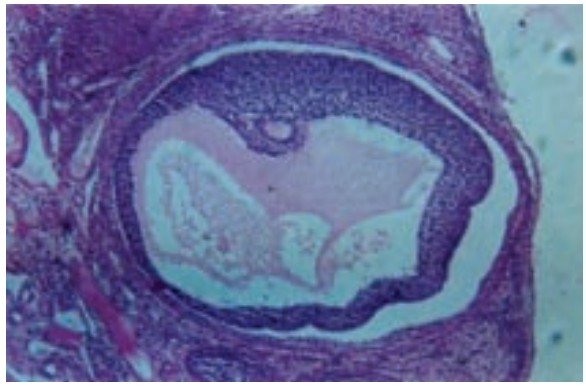


Fig. 4: Antrum formed Graafian follicle undergoing atresia with complete detachment (arrowheads) of granulose from theca shows advanced stage in atresia (HE stain) 100X (lead).



Copper, lead and cadmium (the dose rate of 35 mg/kg/day, 60 mg/kg/day and 40 mg/kg/day) for 90 days produced an overall increase in the levels of alanine aminotransferase in plasma, liver and ovary and a non significant rise in its level kidney. Alanine aminotransferase is present in liver, kidney, heart, skeletal muscles, intestines and RBC (Doxy 1971) and its increased values are specific indicator of hepatocellular (liver) damage (Kaneko 1989). Copper, Lead and cadmium also produced significant increase in aspartate aminotransferase in liver, plasma and ovary while the effect of lead on aspartate aminotransferase in liver, plasma and ovary is more as compared to cadmium (Table 2). This is a very important observation. Aspartate aminotransferase SGOT occur mainly in muscles (Doxey 1971) and increase in its activity related to the leakage of enzyme from muscles because of muscular activity induced by intoxication. Direct effect of lead on muscles increasing the permeability of cell membrane cannot be excluded (Thomson 1971). Thus decrease in AChE activity in the rat ovary might be an indicator of the lack of steroidogenesis resulting in poor fertility. Elevation of proteins might also be due to destruction of tissues, which cause release of proteins.

Fertility test

Five sets of experiments which were set up for the testing effect of lead on fertility of rats indicated that lead at a dose of 60 mg/kg caused 40% reduction in the fertility rate while cadmium at a dose of 45 mg/kg caused 50% reduction in the fertility rate (Table 2) as compared to control group of rats which showed 100% results. The decrease in fertility has been related to the decrease in AChE concentration which is considered important in the process of steroidogenesis and increase in level of other enzymes which might be damaging to the tissue leading to atresia (figures 1-4). Chronic dosage of lead and cadmium probably imbalances this delicate interplay of hormones and disallows implantation in rat[6]. In addition to the observations made above, the treated females showed irregularity in estrous cycle. Female pups of treated mother also showed late vaginal opening, poor fur growth, significantly lower body weight (Table 3) and decrease foetal survival ratio. Rat fed lead and cadmium showed significant decrease in body weight (Table 4) while the decrease in weight is more in case of cadmium as compared to lead. Parshant et al.[7](2009) in medico-legal update (journal) also mentioned the detailed method of analysis of Pb in blood samples but with the help of Flame Atomic Absorption Spectrophotometer which also shows good observations.

The above study concluded that copper, lead and cadmium has interaction with the vital body functions and reproductive parameters in rats. The dosage administered caused significant biochemical alterations and reduction in the weight of pups as well as the treated mothers. Copper, lead and cadmium caused high mortality rate in pups and also slows down their growth rate.

Valuable observations

Histological studies of ovary showed atresia (fig.1-4) in all the stages of folliculogenesis sustaining the poor fertility observations. Since the absorption of lead indicated toxicity in humans is great due to the intake through food, air, and water, it became imperative to carry out a systematic study on the effect of chronic oral dose of lead on female reproductive functions and also to record the various enzymatic changes in rats. These findings would be useful in understanding the various effects on sensitive species and also extrapolating, with care the results for humans.

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Role of Smile Photo Analysis in Forensic Identification

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Abstract

In certain cases, the victim being analyzed may not have clinical records showing relevant odontologic characteristics. Therefore, experts in the practice of human identification currently search for information from alternative sources, such as facial photographs, video recording or smile photographs that show specific characteristics of each individual. Established the importance of diagrams of dental aesthetic references (DDAR), where a smile can reveal dental relationships of symmetry, dental axis, gum contours, interdental contacts, incisal edges, teeth proportions and smile lines. The importance of searching for new parameters of human identification using odontologic characteristics, the importance of the forensic odontology analysis of smile photographs in human identification has been reviewed in this paper.

Keywords

Human identification, Skull repositioning, Facial reconstruction.

Introduction

The contribution of dentistry to human identification takes two main forms: the identification of human remains according to dental records existing antemortem, and a postmortem dental profiling in cases where there are no antemortem records. The antemortem records are compared with the dental status of the cadaver giving strong evidence of the identity of the cadaver. In case there is no dental anamnesis, a thorough dental profile is being completed. This in turn helps the specialists to sort the existent antemortem material and select the information that most fits to the profile of the cadaver.[1]

The importance of identification of human remains with methods of high accuracy is better understood in cases where the identification of the cadavers is impossible due to deformities caused by a disease that ailed the person and finally leaded to his/her death or by a natural or an aviation disaster.[2]

Dental identification of humans occurs for a number of different reasons and in a number of different situations. The bodies of victims of violent crimes, fires, motor vehicle accidents and work place accidents, can be disfigured to such an extent that identification by a family member is neither reliable nor desirable.[3] Persons who have been deceased for some time prior to discovery and those found in water also present unpleasant and difficult visual identifications. Dental identifications have always played a key role in natural and manmade disaster situations and in particular the mass casualties normally associated with aviation disasters. Because of the lack of a comprehensive fingerprint database, dental identification continues to be crucial.[4]

Identification

When human remains are found, the first priority of investigators is to identify who the individual was in life. To attain this goal, investigators and researchers use methods from many fields of science.[5]

Identification of the deceased is most commonly achieved visually by a relative or a friend who knew the person during life. This is performed by looking at characteristics of the face, various body features and/or personal belongings. However, this method becomes undesirable and unreliable when the body features are lost due to post- and peri-mortem changes (such as decomposition or incineration). Visual identification in those circumstances is subject to error.[6]

The Strongest Survives!!

Being diverse and resistant to environmental challenges, teeth are considered excellent post-mortem material for identification with enough concordant points to make a meaningful comparison.[7] Even when every other body part is extremely mutilated the teeth still stand strong and high, and that is what the forensic odontologist takes advantage off.[8]

Data available for Identification

For dental identification to be successful, ante-mortem data need to be available. This relies heavily on dental professionals recording and keeping patient records, casts, radiographs, interproximal and panoramic radiograph and postero-anterior skull radiographs. The availability of dental records will allow comparing the dental characteristics of the person during life with those retrieved from the person after death.[9]

However, in certain cases, the victim being analyzed may not have clinical records showing relevant odontologic characteristics.

Therefore, experts in the practice of human identification currently search for information from alternative sources, such as facial photographs, video recording or smile photographs that show specific characteristics of each individual.

Smile Photo Analysis as an Identification tool

Next to fingerprints, teeth are the most useful tool in determining positive identification of human remains and are unique to each person[10]- even in identical twins!!!!!

Fig. 1: Figure showing the dental relationships of symmetry, dental axis, gum contours, inter-dental contacts, incisal edges, teeth proportions and smile lines

Fig. 2: A single skull being superimposed on multiple antemortem photographs to check the best match.

It could be interesting to examine photographs from family albums or of social events in which the missing person participated.

Approximate age and useful indications of probable sex, race, occupation, personal habits, medical history, and environment can often be revealed by analysis of only teeth.

The dental analysis of the smile constitutes a current concern of specialties' that include aesthetic dentistry.

Orthodontics is one important field that deals with extensive clinical documentation of the dental elements that determine the smile of individuals, as it uses and needs complete odontologic documentation, including digital or analog photographs, for the planning and execution of treatments.

Established the importance of diagrams of dental aesthetic reference (DDAR), where a smile can reveal dental relationships of symmetry, dental axis, gum contours, inter-dental contacts, incisal edges, teeth proportions and smile lines.

Role of forensic odontologist

The most common role of the forensic dentist is the identification of deceased individuals. Dental identification takes two main forms. Firstly, the most frequently performed examination is a comparative identification that is used to establish (to a high degree of certainty) that the remains of a decedent and a person represented by antemortem (before death) dental records are the same individual. Information from the body or circumstances usually contains clues as to who has died. Secondly, in those cases where antemortem records are not available, and no clues to the possible identity exist, a postmortem (after death) dental profile is completed by the forensic dentist suggesting characteristics of the individual likely to narrow the search for the antemortem materials.

Fig. 3:

Fig. 4: Figure showing facial reconstruction.

Facial Superimposition

First case to be identified using the photographic superimposition technique was in the year in 1938 called as "Ruxton Case

1. Skull superimposition

Identification by photo-skull superimposition. The skull of an unknown child was superimposed onto the portrait of a missing person. The outline of teeth and the facial anatomical similarities suggested that the skull belongs to the child in the portrait. The right central incisor in the skull was lost after death.

2. Teeth superimposition

Facial Reconstruction

Cases where antemortem records are not available, and no clues to the possible identity exist, a postmortem dental profile is completed by the forensic dentist suggesting characteristics of the individual likely to narrow the search for the antemortem materials.

If the post mortem profile does not elicit the tentative identity of the deceased, it may be necessary to reconstruct the individual's appearance during life. This is the responsibility of forensic artists who utilise the dental profile to help with facial reconstruction.

Conclusion

The photographs become a key element and an integral part of forensic investigations and are usually the basis for determinations of responsibility.

This method is not time consuming and also has the advantage of allowing extraoral dental examination.

It is also recommended when there is a need to provide qualitative data for a forensic identification based on these structures.

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Trends of Childhood Poisoning and Parental Negligence

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Abstract

Present study was undertaken to determining the trends of childhood poisoning and parental negligence responsible for their poisoning. Insecticides and medicinal tablets were the commonest poisoning in children, commonly seen in age below five years. The poisoning is usually accidental in nature. Non-caring and poverty were the commonest reason of parental negligence with almost 50% of the parents had taken education up to primary school or less; and most of the parents were of low socio-economic status with poisonous substances causing poisoning were commonly available at home.

Key Words

Childhood poisoning, parental negligence, trends.

1. Introduction

Acute poisoning, a common paediatric emergency is one of the important causes of morbidity and mortality in children especially in developing countries. The exact incidence of poisoning in India is uncertain due to lack of data at central level as majority of cases are not reported, particularly in the rural areas due to ignorance, illiteracy, non availability of primary health centres and transport facility.[1,2] Furthermore the introduction of whole range of new and complex chemicals in the form of pesticides, household cleaners, and medicines has widened the spectrum of toxic product to which children may get exposed.[3] Thousands of innocent children under the age of five years are poisoned accidentally every year throughout the world, mainly due to their innovative and exploratory nature and mouthing tendencies.[4,5] The present study was undertaken to evaluate the patterns in childhood poisoning.

2. Material and Methods

The present study was carried out during the period of 2005 to 2008 in the department of forensic medicine and toxicology at Mahatma Gandhi Institute of Medical Sciences (MGIMS), Sevagram, Wardha. It is a rural district of Maharashtra with a population of about 25 lakhs. The present study includes all cases of poisoning in the child age groups of 0-14 years admitted in District hospital and department of paediatrics, MGIMS, Sevagram. The cases of drugs reaction, food poisoning and venomous bites were not included in the study. Two cases of childhood poisoning were brought dead directly in the hospital. The information regarding age, sex, types of poisoning, manner of poisoning, duration of hospitalisation with reason of parental negligence, education status of the parents, socio-economic status, and accessibility of poisonous substances were noted and evaluated.

3. Results

3.1: Age and Sex

The age and sex distribution is given in table 1. In childhood poisoning cases, 55.3% of the victims were male and 44.7% were females with male to female ratio equal to 1.2:1. The age of victims ranges from 6 months to 14 years. 56.3% of the victims were between the ages of 0-5 years and only 6.8% were above the age of 10 years. Male predominance was seen in all age groups except 6-10 years.

3.2: Types of poisoning

As per table 2, the commonest type of poisoning in children was insecticides and medicinal tablets (22.3% each) followed by kerosene (11.7%) and camphor (6.8%). In 18.4% cases, the poisoning was unknown. Male predominance was seen in all type of poisoning except naphthalene balls, camphor and mosquito repellent liquid /coil.

3.3: Manner of poisoning

Table 3 shows distribution of manner of poisoning in children. Accidental poisoning (79.6%) was the commonest manner of poisoning followed by suicidal poisoning (10.7%) and homicidal poisoning (2.9%). In 7 cases (6.8%) the manner of poisoning was not ascertained. Male predominance was seen in all manner of poisoning except homicidal poisoning in which female victims (4.3%) outnumbered male victim (1.8%).

3.4: Duration of hospitalisation

As per table 4, two cases were brought dead directly to the hospital. The duration of hospitalisation ranged from 6 hours to 7 days. Most number of victims was hospitalised for the duration of 1-3 days (54.4%) followed by 3-5 days (22.3%). In 15.5% cases the victims were hospitalised for up to 24 hours. Only 7 victims (6.9%) were expired during the course of treatment.

3.5: Reason of parental negligence

As shown in table 5, the commonest reason of parental negligence in childhood poisoning was non-caring parents seen in 48.5% cases, followed by poverty (28.2%) and quarrel (6.8%). In 8.7% the reason was not known. The other reasons behind parental negligence in childhood poisoning were chronic illness, mental illness, sexual relation with other, female child and illegitimate child. Slight female predominance was seen in childhood poisoning due to non-caring parents and poverty.

3.6: Educational status of the parent

In some cases of childhood poisoning, both parents were not available due to the death or separation of one parent. So the educational status of the available parent or the parent with more educational status is considered in the present study. As per table 6, 10.7% of the parents has not gone to school in their life and almost equal number of parents were graduate and above (9.7%). Most of the parents had taken education up to primary school (38.8%) followed by middle school (24.3%). In 16.5% cases, the parents had taken education up to junior college level.

Table 1: Age and sex distribution in childhood poisoning

Age Group	Male	%	Females	%	Total	%
0-5 years	33	57.9	25	54.3	58	56.3
6-10 years	17	29.8	21	45.7	38	36.9
11-14 years	7	12.3	0	0.0	7	6.8
Total	57	55.3	46	44.7	103	100.0

Table 2: Distribution of types of poisoning in children

Types of poison	Male	%	Females	%	Total	%
Insecticides	13	22.8	10	21.7	23	22.3
Medicinal Tab.	12	21.1	11	23.9	23	22.3
Unknown	10	17.5	9	19.6	19	18.4
Kerosine	8	14.0	4	8.7	12	11.7
Camphor	3	5.3	4	8.7	7	6.8
Mosquito repellant liquid\Coil	1	1.8	3	6.5	4	3.9
Naphthalene Balls	0	0.0	3	6.5	3	2.9
Scabidex Lotion	3	5.3	0	0.0	3	2.9
Alcohol\Ethanol	2	3.5	0	0.0	2	1.9
Plants	2	3.5	0	0.0	2	1.9
Phenol	1	1.8	1	2.2	2	1.9
Zinc Phosphide	1	1.8	0	0.0	1	1.0
Diethyl Benzomide Odonum	0	0.0	1	2.2	1	1.0
Terpentine oil	1	1.8	0	0.0	1	1.0
Total	57	55.3	46	44.7	103	100.0

3.7: Socio-economic status of parent

During the study period, the socio-economic status of the parents is arbitrarily divided into three groups depending on parental annual income. The income below 24000 rupees is considered as lower socio-economic status, income between 24000-49000 is considered as middle socio-economic status and income above 50000 rupees is placed in high socio-economic status. As per table 7, 51.5% of the children belonged to low socio-economic status, 42.7% in middle and 5.8% in high socio-economic status.

3.8: Accessibility of poisonous substance

As shown in table 8, the poisonous substance was available at home but beyond the reach of children in 26 cases (25.2%) and within the reach of children in 46 cases (44.7%). In 12 cases (11.7%) the poisoning occurs from substances outside home, whereas in 9 cases (8.7%) the availability of poisonous substances was not known. However in 7 cases (6.8%) the poisonous substances was accidentally administered to child and in 3 cases (2.9%) it was deliberately given.

4. Discussion

Childhood poisoning is one of the important causes of morbidity and mortality in children, especially in developing countries. According to world health organization, mortality due to poisoning in children up to 4 years age varies between 0.3 to 7.0 per 1,00,000 population in various countries[6].

Table 3: Distribution of manner of poisoning in children

Manner of poisoning	Male	%	Females	%	Total	%
Suicidal	6	10.5	5	10.9	11	10.7
Homicidal	1	1.8	2	4.3	3	2.9
Accidental	46	80.7	36	78.3	82	79.6
Not Known	4	7.0	3	6.5	7	6.8
Total	57	55.3	46	44.7	103	100.0

As similar to Goto et al.[4] and Honnungar et al.[2], the most vulnerable age in childhood poisoning were below 5 years with slight male predominance. A retrospective analysis of the telephone calls received by the National Poison Information Centre, AIIMS, NewDelhi revealed children below the age of 6 years have been more affected than other age groups but higher male predominance seen in 63.11% of the cases[3]. Fernando et al.[7] also noticed children below 5 years have been affected more (60%) with male preponderance (66%). This is mainly due to the innovative and exploratory nature and mouthing tendencies of the young children.[4,5]

In the present study, insecticides and medicinal tablets was the commonest type of poisoning in children followed by kerosene. Honnungar et al.[2] also noticed insecticides followed by kerosene and seeds as the commonest childhood poisoning. However, Job[8], Ahmed et al.[9], Ganga et al.[10] and Alka Singh et al.[11] observed kerosene as the commonest poisoning in children.

As similar to Dutta et al.[1] accidental poisoning was the commonest manner of poisoning in children followed by suicidal and homicidal poisoning. Yang et al.[12] also noticed accidental exposure in 77.7% cases of childhood poisoning. National Poison Information Centre, New Delhi also reported accidental poisoning in 79.7% and intentional attempts in 20.2% in childhood poison-

Table 4: Distribution of cases according to duration of hospitalisation

Duration of Hospitalisation	Male	%	Females	%	Total	%
Brought dead	1	1.8	1	2.2	2	1.9
Upto 1 day	10	17.5	6	13.0	16	15.5
1-3 days	28	49.1	28	60.9	56	54.4
3-5 days	14	24.6	9	19.6	23	22.3
> 5 days	4	7.0	2	4.3	6	5.8
Total	57	55.3	46	44.7	103	100.0

Table 5: Reasons of parental negligence in childhood poisoning

Reasons	Male	%	Females	%	Total	%
Non-caring parents	27	47.4	23	50.0	50	48.5
Poverty	15	26.3	14	30.4	29	28.2
Quarrel	5	8.8	2	4.3	7	6.8
Female child or illegitimate child	1	1.8	1	2.2	2	1.9
Psychiatric illness	1	1.8	0	0.0	1	1.0
Chronic illness	2	3.5	1	2.2	3	2.9
Sexual relationship with others	1	1.8	1	2.2	2	1.9
Indeterminate	5	8.8	4	8.7	9	8.7
Total	57	55.3	46	44.7	103	100.0

ing.[3] Honnungar et al.[2] and Andiran et al.[13] revealed 92% and 97% accidental poisoning in children respectively. This is probably because of the accidental exposure from household products and drugs for these young children below 10 years of age.

Most of the victims were hospitalised for 1-3 days followed by 3-5 days. In almost 20% cases, the victims were hospitalised for up to 24 hours. Seven victims were expired during the course of treatment and only two victims were brought dead directly to the hospital. Manchanda and Sood[14] reported that out of 38 children admitted for poisoning in children, 17 were discharged after 24 hours and 18 stayed for 2-6 days with an average of 2.5 days of hospitalisation.

In present study of childhood poisoning, non-caring parents and the poverty were the commonest reasons of parental negligence with almost 50% of the parents had taken education only up to primary school or less; and most of the parents (51%) were from low socio economic status. However Singh et al.[15] noted more than half of the children belonged to middle income group followed by lower income group and higher income group in childhood poisoning. Eddleston et al.[16] observed that family arguments and love affairs were the main reason of poisoning in their study of self poisoning with seeds of yellow oleander seeds in northern Sri Lanka. Hawton et al.[17] noted relationship difficulties with parent, friends, school and social isolation were the main reasons of self poisoning and self injury in children and adolescents in Oxford.

Table 6: Distribution of educational status of the parents

Education	Total	%
No School	11	10.7
Primary School	40	38.8
Middle School	25	24.3
High school/Junior College	17	16.5
Graduate and above	10	9.7
Total	103	100.0

Table 7: Distribution of socio-economic status of the parents

Income group	Total	%
Lower income <24,000 Rs.	53	51.5
Middle Income 24,000-49,000 Rs.	44	42.7
Upper income >50,000 Rs.	6	5.8
Total	103	100.0

In the present study, poisoning were commonly due to the availability of poisonous substance at home, especially when the substance were within reach of child as compared to when beyond the reach of child. Goto et al.[4] also reported that 96.4% of the poisoning in children occurred due to the availability of poisonous substance at home. Spann et al.[18] noted disinfectants primarily bathroom and kitchen cleaners were responsible for the majority of the exposure to young children. Jayalakshmi et al.[19] observed that 75% of the accidental poisoning in children was caused by household substance in the form of dyes, cosmetics, cream and toiletries. Care of the child is compromised in large families where the mother is often careless in storage of potentially poisonous household substances. Also where there is small house with little storage facility, substance may be stored in easily accessible places and therefore the children living in small-overcrowded houses are exposed to greater risk of poisoning. Similarly, the parents with no education or less education up to primary school in turn leads to carelessness and negligence in handling the poison, drugs and other household poisonous substances. Thus, the children with low socio economic status of the parent and less education were more indulge in poisoning.

5. Conclusion

Accidental poisoning is commonly encountered in children with insecticides and medicinal tablets as the commonest poisoning and parental negligence is commonly responsible for poisoning in young children. In developing countries, a combination of factors contributing to accidental poisoning among children is likely to exist in house of low socio-economic groups. Such a family is likely to have small house and more children with poisonous household substance kept in easily accessible places making them more exposed to greater risk of poisoning. Hence, accidental poisoning in children is preventable by combined efforts of all concerned. This can be achieved by following ways:

a. Protecting the child from poisonous substances. The poisonous household substances like medicinal tablets, kerosene, disinfectants, etc. should be kept in safe place. The whole house, especially the kitchen and bathroom should be periodically screened for poisonous substances and their inaccessibility to children is ensured. "ALL POISONOUS SUBSTANCES SHOULD BE KEPT OUT OF REACH OF CHILDREN".
b. Public education to keep toxic substance properly in safe place through television, radio and newspaper.
c. Educating the parents about the potential household poison and also about their own behavioural attitude towards the

Table 8: Accessibility of poisonous substance in childhood poisoning

Availability of poisonous substances	Total	%
Poisonous substances available at home but beyond the reach of children	26	25.2
Poisonous substances available at home and within reach of child	46	44.7
Poisonous substances outside home	12	11.7
Poisonous substances administer to child accidentally	7	6.8
Poisonous substances administer to child deliberately	3	2.9
Not known	9	8.7
Total	103	100.0

children. Need for parental supervision should be emphasized.

d. Safety regulations by state should be enforced.
e. Establishment of well-equipped poison control centres to collect, compile and disseminate information on poisons and their treatment and also guide and conduct research in the problem.
f. Prevention also depends on many factors like the economic development of the society, the level of education and the presence of protective legislation.

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Accelerated elimination with Charcoal Hemoperfusion in Acute Phenobarbital Intoxication: A case report

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Abstract

Phenobarbital is long acting barbiturate with low lipid solubility that act as central nervous system depressants and used as anticonvulsant, sedative, hypnotic drug. In acute severe barbiturate intoxication, through CNS depression, coma, respiratory arrest and hypotension may occur, which are the major causes of mortality. Mortality is high for blood levels over 80 micro/mL and the lethal dose in adult is estimated as 6 to 10 gram. We report a case of Phenobarbital intoxication in a 24 years old female, with history of consumption of 120 tablets of phenobarbitone of 60 milligram each (7.2 gram) who was successfully treated by emergency charcoal hemoperfusion.

Key Words

Phenobarbital poisoning, charcoal haemoperfusion

Introduction

Phenobarbital is a barbiturate, nonselective central nervous system depressant which is primarily used as a sedative hypnotic and also as an anticonvulsant in subhypnotic doses. Phenobarbital is Chemically Designated as 5-Ethyl -5-phenylbarbituric acid with molecular Formula of $C_{12}H_{12}N_2O_3$ and molecular weight of 232.24.[1,2]

Symptoms of acute barbiturate intoxication includes, altered level of consciousness, difficulty in thinking, drowsiness or coma, faulty judgment, incoordination, shallow breathing, slowness of speech, sluggishness, slurred speech and staggering. The most common physical exam findings seen in a barbiturate overdose are like, hypothermia, hypotension and respiratory depression.[3]

Case Report

24 yr female was referred to Krishna institute of medical sciences karad with history of consumption of 120 tablets of phenobarbitone of each 60 milligram each (7.2 gram). On admission she had hypotension, hypothermia, respiratory depression and was in comatose state. On examination pulse was feeble 68/ minute. Blood pressure was 80/44 mmHg. Respiratory rate was 8-10 per minute with Cheyne- Stokes respiration, areflexia and low SpO_2 (76%).

Investigations

Hb: 11.8 gm%, TC: 8710, platelet count: 2.35 lac, BSL: 56 mg%, BUL: 42 mg%, Sr. Creatinine: 1.2 mg%, Na: 136 meq/l, K: 3.9 meq/l, Urine micro: normal.

Electrocardiogram was showing 'J' point elevation (secondary to hypothermia). Chest radiograph was normal. Arterial blood gas analysis was showing PaO_2- 40 mmHg, $PaCo_2$-42 mmHg and SpO2-76% suggestive of respiratory acidosis with type two respiratory failure.

Sr. phenobarbitone level was done which was > 80 microgram/ l. (critically high) by chemiluminicence technique. An electroencephalogram (EEG) showed diffuse 5-Hz theta activity. Computerised tomography (CT) brain was normal.

After initial clinical and laboratory assessment patient was admitted in intensive care unit and treated with intravenous fluids as per requirement and input output charting. Endotracheal intubation was done and kept on assisted artificial ventilation and oxygen administration.Ryles tube insertion and aspiration of stomach content was done. First stomach sample was preserved for chemical analysis. Gastric lavage was performed with activated charcoal (30 grams activated charcoal). Fluid therapy and inotropic support was given for shock. Initially forced alkaline diuresis was also attempted. In view of consumption of large amount of phenobarbitone we planned to accelerate elimination of drug with the help of Charcoal Hemoperfusion. Charcoal Hemoperfusion was done with gambro-Adsorba 300 C hemoperfusion cartridge for total three cycles over period of 36 hours. Patient was put on broad spectrum antibiotics to treat the nosocomial infections associated with intubation and catheterization. Appropriate nursing care was taken to prevent hypostatic pneumonia, decubiti, aspiration and other complications of patients with unconsciousness.

Along with supportive line of treatment hemoperfusion was attempted to remove rapidly Phenobarbital from blood. After starting treatment patient regained her consciousness after 48 hours and slowly weaned off from the ventilator in next 24 hours. Initially she had oligourea in 48 hours of admission. She was off the inotropic support after 72 hours. Phenobarbitone level at the time of admission was > 80 microgram/ l. (critically high) by chemiluminescence's technique which was dropped to 16 microgram/ l with in seven days. Patient was discharged on ninth day in ambulatory state after Phenobarbitone level became undetectable and an EEG on day no longer showed abnormal slowing.

Discussion

There is no direct antidote to barbiturates overdose. In such overdoses, respiration must be maintained by artificial means until the drugs are removed from the body. For barbiturate overdose, the death rate is about 10%, and can be higher if proper treatment is not readily given. Early deaths result from cardiovascular collapse and respiratory arrest. In general, an oral dose of 1 gram of most barbiturates produces serious poisoning in an adult. Death commonly occurs after 2 to 10 grams of ingested barbiturate. Typical shock syndrome (apnea, circulatory collapse, respiratory arrest, and death) may occur. Complications such as pneumonia, pulmonary edema, cardiac arrhythmias, congestive heart failure, and renal failure may occur. Uremia may increase CNS sensitivity to barbiturates if renal function is impaired. Differential diagnosis should include hypoglycemia, head trauma, cerebrovascular accidents, convulsive states, and diabetic coma.[2,3]

In this case report patient had consumed critically high dose of phenobarbitone (7.2 gm.) and was successfully treated

with accelerated elimination with Hemoperfusion which was definitely lifesaving and reducing duration of coma. Thus we have concluded that accelerated elimination with Hemoperfusion in Acute Phenobarbital Intoxication with deep coma, respiratory depression, hypothermia, hypotension and oligourea will be cost effective measure of treatment along with supportive line of management. Koffler A et al in their study used fixed-bed activated charcoal cartridges for hemoperfusion in the treatment of with overdose of barbiturate which resulted in dramatic improvement. The clearance rates of the drugs with hemoperfusion were greater than those usually achieved with hemodialysis.[4] Lindberg MC et al, Jacobsen D et al and Palmer B et al also recommended haemoperfusion in cases of serious poisoning with phenobarbital to enhance drug clearance.[5,6,7,8]

Conclusion

Phenobarbital is a long-acting barbiturate often prescribed for seizure disorders. It has a high abuse potential and was commonly used in suicide attempts in the past. Although benzodiazepines are now more frequently used in suicide attempts, barbiturate intoxications are still occasionally seen and constitute a medical emergency. Barbiturate withdrawal syndrome is presumed to require a history of abuse; however in patients with a history of treatment with barbiturates physicians treating acute barbiturate poisoning should be alert for the possibility of barbiturate withdrawal syndrome even in the absence of barbiturate abuse. The management of Phenobarbital overdose includes cardiac and respiratory support, cathartics, activated charcoal, and alkaline diuresis. Accelerated elimination with Hemoperfusion in acute Phenobarbital intoxication with deep coma, respiratory depression, hypothermia, hypotension and oligourea will be life saving measure of treatment along with supportive line of management. If elimination needs to be speeded up, then hemoperfusion can be considered.

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Analysis of Fatal Burns Cases – A 5 year study at Sri B M Patil Medical College, Bijapur, Karnataka

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Abstract

The purpose of this study was to record and evaluate the causes and the magnitude of the fatal burn cases. This retrospective study of 5 years duration (2005 – 2009) was carried out in the Dept. of Forensic Medicine, Sri B M Patil Medical College, Bijapur, Karnataka. During this period a total number of 410 medico-legal autopsies were conducted, amongst them death due to burns constituted 119 cases (29.02%). The majority of deaths (34.5%) occurred between 21 to 30 years of age group with preponderance of females (74.78%). The majority of burn incidents were accidental (78.2%) in nature followed by suicidal (17.5%) and homicidal (4.3%) deaths. The percentage of burn (TBSA) over 40% was observed in most of the cases (92.5%). The majority of deaths occurred within a week (69.87%) and most the victims died because of septicemia (50.9%).

Key Words

Burns, Medico Legal autopsy, Mortality, Septicaemia.

Introduction

Death due to burns is a major public health and social problem in India and other developing countries. Burns are also a significant cause of mortality and morbidity among the populations of the world. Though injury caused by burn is one of the most important preventable causes of prolonged illness and death, it has failed to catch the attraction of both of medical profession and lay public, only because the colossal losses of life, money and time are not eye catching like epidemics of infectious diseases, that sweep away number of lives in a short time. In a developing countries burn injuries are most often related to accidents.[1,2,3] A number of studies on various aspects of burn have been reported from various part of India, but there is lack of information especially on fatal victims from the Bijapur area of Southern India. Sri B M Patil Medical College Hospital, Bijapur being the tertiary care centre receives many burn cases from various parts of North Eastern Karnataka.

Material and Methods

Of the 410 autopsies performed at the Department of Forensic Medicine of Sri B M Patil Medical College, Bijapur, between 1st January 2005 and 31st December 2009, 119 (29.02%) were the cases of burns. These 119 fatal burn cases form the material of this study. Comprehensive examination of the epidemiological features and medico legal aspects of these 119 burn deaths was performed in an effort to more clearly understand the dynamics surrounding these deaths. Retrospective data were collected from the autopsy reports of the department, case sheets from the hospital and the inquest report from police. Information pertaining to their age, sex, address, manner, type, extent, survival period and the cause of death were compiled, analyzed and discussed.

Results

Out of 119 cases of fatal burns victims, there were 89(74.78%) females and 30(25.22%) males [Table No. 1]. Majority of these deaths occurred in the age group 21 – 30 years with 41 cases (34.45%), followed by the age group 31 – 40 years with 28 cases (23.53%) and 24 cases (20.16%) were seen in the age group 11 – 20 years [Table No. 2]. The majority of burn incidents were accidental in nature, 93 cases (78.2%), followed by suicidal 21 cases (17.5%) and homicidal 05 cases (4.3%) [Table No. 3] and the most common place of such burn accidents was home. Majority of the victims survived for a period more than 72 hrs to 1 week (31.93%) [Table No 4]. The total surface area burnt (TBSA) in majority of the victims was 81 – 90% (31.1%) followed by the victims who sustained 61 – 70% (17.64%) [Table No. 5]. Septicemia was the most common cause of death with 70 cases, followed by hypovolemic shock with 22 cases, 15 cases succumbed to neurogenic shock [Table No. 6].

Discussion

In the present study, out of 119 cases of fatal burns victims, there were 89(74.78%) females and 30(25.22%) males. The study conducted at Government Wenlock District Hospital, Mangalore,[4] BJ Medical College, Ahmedabad,[5] JN Medical College and Hospital, UP,[6] Jawaharlal Nehru Medical College and Hospital, Aligarh[7] and Government Teaching hospital, South India,[8] where maximum numbers of victims were females.

Table 1: Sex – wise distribution of cases.

Sex	No. of Cases
FEMALE	89 (74.78%)
MALE	30 (25.22%)
Total	119

Table 2: Age – wise distribution of cases.

Age Group (Years)	No. Of Cases
0 – 10	04(3.36%)
11 – 20	24(20.16%)
21 – 30	41(34.45%)
31 – 40	28(23.53%)
41 – 50	13(10.92%)
51 – 60	04(3.36%)
61 – 70	01(0.84%)
71 – 80	02(1.68%)
81 – 90	02(1.68%)
TOTAL	119

Table 3: Manner of death.

Manner	No. of Cases
Accidental	93(78.2%)
Suicidal	21(17.5%)
Homicidal	05(4.3%)
TOTAL	119

Table 4: Survival period of the victims.

Survival Period	No of Cases	%
Up to12 hours	19	15.96
13 – 24 hours	14	11.76
25 – 48 hours	11	9.24
49 – 72 hours	15	12.60
73hrs – 1 week	38	31.93
>1 week	22	18.48

In the present study, Majority of these deaths occurred in the age group 21 – 30 years with 41 cases (34.45%), followed by the age group 31 – 40 years with 28 cases (23.53%) and 24 cases (20.16%) were seen in the age group 11 – 20 years. Our results are similar to the result of study conducted at MY Hospital, Indore.[9] This is the productive age, when they are generally active and exposed to hazardous situations both at home and work. Proper care and rehabilitation of these patients is critical as they belong to productive age group (they are the earning members of the family).

In the present study, the majority of burn incidents were accidental in nature, 93 cases (78.2%), followed by suicidal 21 cases (17.5%) and homicidal, 05 cases (4.3%) and the most common place of such burn accidents was in homes. This is similar to the study done in Manipal, the majority of burn incidents were accidental (75.8%) in nature followed by suicidal (11.5%) and homicidal (3.1%) deaths.[10]

In the present study, Majority of the victims survived for a period more than 72 hours to 1 week (31.93%). In the study done by Dr.Zanjad N. P and Dr.Godbole H.V, the majority of deaths due to burns were observed within 1 week (66.2%).[11]

In the present study, the total surface area burnt (TBSA) in majority of the victims was 81 – 90% (31.1%) followed by the victims who sustained 61 – 70% (17.64%). The studies conducted at Jawaharlal Nehru Medical College and Hospital, Aligarh[7], 66% cases had ≤ 25 % TBSA burns, 22% cases had 26-50% burns, 8% had 51-75 % burns and 4% had burns more than 75%.

Maximum number of victims died due to septicemia, which is similar to the result of other studies[12,13,14]. High rate of mortality due to septicemia is probably due to the fact that burnt tissue acts as a nidus for infection and the rampant use of higher antibiotics which are resistant to the nosocomial microorganisms

Conclusion

The present study highlights the following features pertaining to the burn deaths:

1. Peak incidence of mortality is in adolescent and young age groups (11–40 years).
2. Majority of the burn victims are females in child bearing age.
3. Accidents were the major cause of burn.
4. Majority of deaths occurred within a week of the incident.

Table 5: Body surface area burnt.

% of body surface area involved	No of Cases	%
>33	02	1.68
33 – 50	13	10.92
51 – 60	15	12.60
61 – 70	21	17.64
71 – 80	16	13.44
81 – 90	37	31.10
91 - 100	15	12.60

Table 6: Cause of Death

Cause of Death	Number (%)
Septicaemia	70 (58.9%)
Hypovolemic shock	22 (18.5%)
Neurogenic Shock	15 (12.6%)
Others	12 (10%)
Total	119

5. Most of the fatal victim had more than 40% TBSA.
6. Septicemia was the major cause of burn death.

The implementation of an education program for burn first aid should be considered. The rate of inadequate first aid practice is too high. First aid has been proven to be useful in stopping the burning process, reducing post burn hyperthermia and pain, and reducing burn morbidity. The development of a burn awareness program with a special focus on kitchen workers, as these groups were most at risk as shown in this study. Improved tertiary facilities for surgical burn management in countries like India should be developed to prevent burn morbidity and mortality.

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Comparison between CT Scan and Autopsy Findings of Head Injury Victims

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Abstract

Computerized Tomography (CT) Scan, the standard investigation modality in Head Injury (HI) victims, remains incompletely reliable in diagnosing the lesions of HI victims. Systematic analysis of discrepancies of CT scan, with respect to final findings at autopsy of fatal HI, was conducted. Glaring fallacies existed in most aspects – for instance – Sub-Dural Hemorrhage, Sub-Arachnoid Hemorrhage, contusions especially of the Temporal and Occipital Lobes of the brain. Linear fractures, fractures of the Middle Cranial Fossa and other basal fractures were missed at most CT scan results. The present study aims at pointing out these discrepancies for the benefit of Neurologists / Neurosurgeons, Radiologists and the victims of RTA head injuries.

Key Words

CT scan, Head Injury, Autopsy

Introduction

Head injuries remain a major complication in Road Traffic Accidents. Injury to vital areas of the brain cause extensive disability, and in most cases, death of the victim. The Standard modality for investigation in victims of head injury remains Computerized Tomography (CT) Scan. Even though a Magnetic Resonance Imaging (MRI) Scan is a better radiological investigation, certain practical parameters make CT the investigation of choice. CT scan is less expensive, quicker and easier to perform, justifying its use. However, the inability of CT to detect certain critical lesions has resulted in inadequate information, and thereby, incorrect / incomplete treatment of the victim concerned. The apparently 'normal' CT fails to explain the poor Glasgow Coma Scale (GCS) scores in many patients, making it unreliable (in its present usage form). Hence, this study was undertaken to highlight these discrepancies.

The main aim of this research work is to

- Find out the discrepancies between CT and autopsy in cases of fatal Head Injury.
- Identify any traumatic lesions of scalp, skull and brain at autopsy, which were undetectable on CT.

Material and Methods

This is a retrospective study conducted on all fatal Head Injury victims brought at Emergency & Trauma Department, Kasturba Hospital, KMC, Manipal. Forty-five (45) cases, occurring from June 2007 to May 2008, were analyzed.

The Inclusion Criteria for the study were

- Cases reporting due to trauma following Road Traffic Accidents.
- Cases that were brought alive, entered into the hospital records and investigated with CT scan.
- Fatal head injury which had an autopsy conducted.
- Photographic and / or Videographic evidence of gross features on autopsy present.

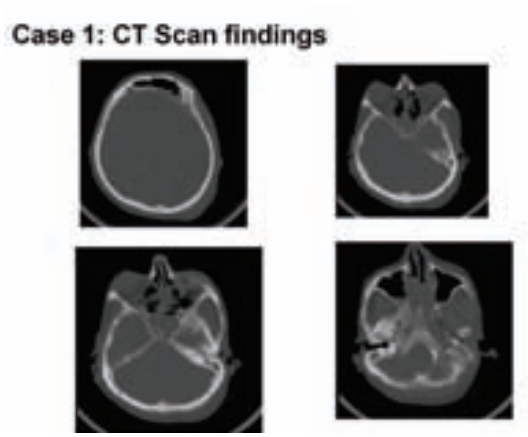
The Exclusion Criteria were cases

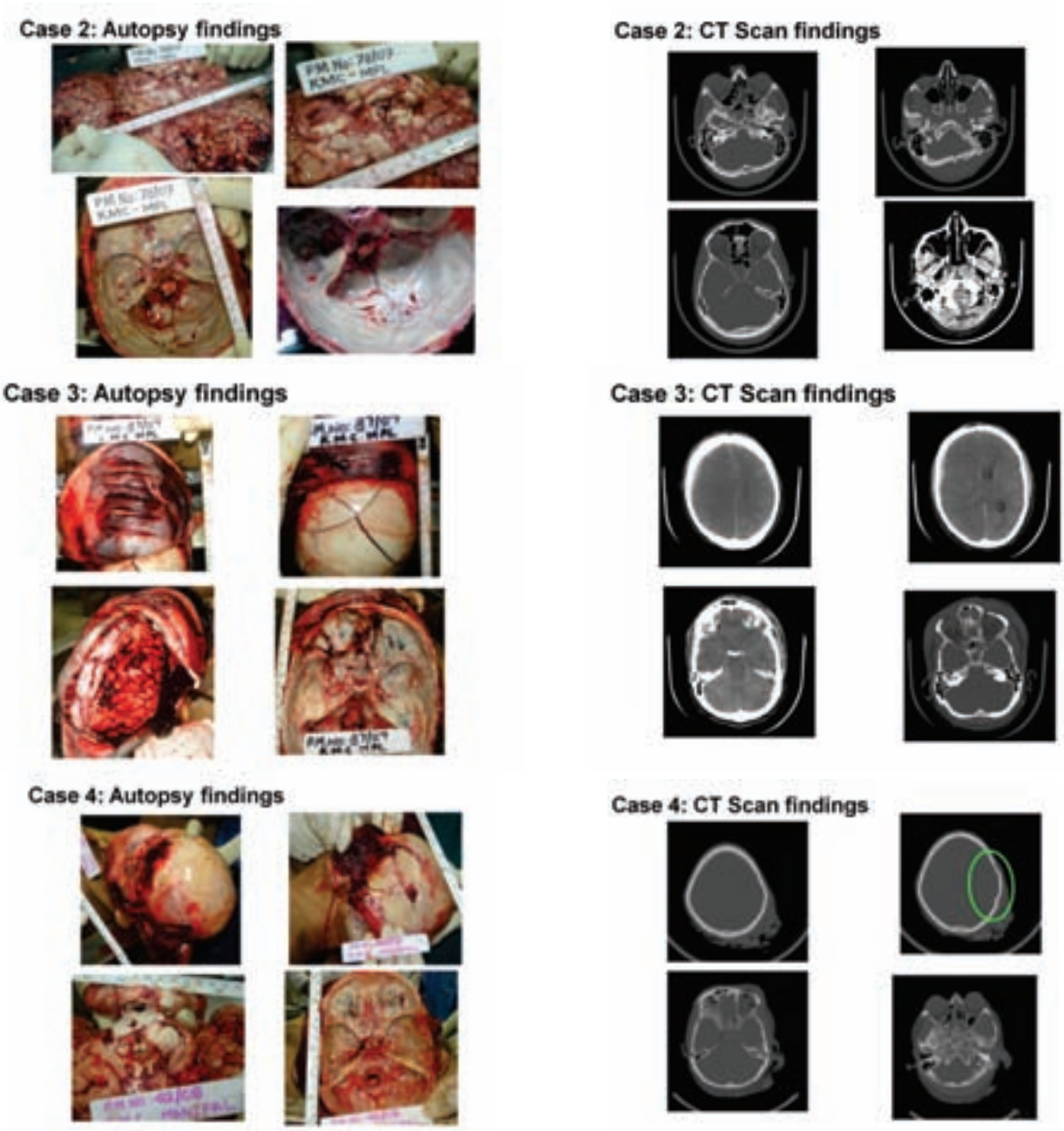
- Brought dead to the Emergency Department.
- On which CT was not performed.
- On which autopsy was not performed.
- Of Road Traffic Accident, in which the cause of death is not a fatal Head Injury.
- Of death due to fatal Head Injury, cause of which is not RTA.

The cases included were free of bias on the basis of age, gender, religion, etc. The study included 39 males and 6 females (Graph # 1) in the age range of 6 to 75 years (mean – 40.311 years). (Graph # 2). Details were tabulated as per pre-fixed parameters in a standard Proforma. Ante-mortem CT findings were obtained from the medical records of victims from Medical Records Department, KMC, Manipal, and the autopsy findings were documented from PM Reports of Department of Forensic Medicine, KMC, Manipal. These findings were compared and contrasted and results were arrived at.

Findings

Time delay in admission, period of hospital stay, and period of survival were calculated from the available data (Graph # 3,





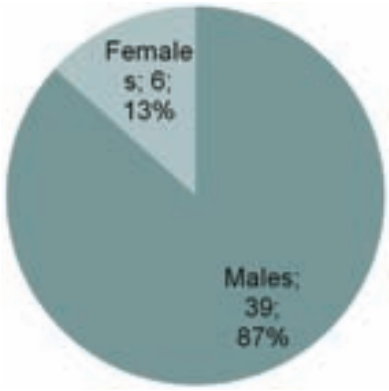
4, 5). Out of the 45 cases, 22 had a GCS score of 3/15 or below (Graph # 6). These patients were brought in with loss of consciousness, vomiting, ear / nose / throat / oral (some or all of the above) bleed(s), altered sensorium and other conditions. Only 3 out of 45 patients had significant pre-morbid conditions such as alcohol consumption, tobacco usage, diabetes mellitus, hypertension, ischemic heart disease, and myocardial infarction. Pupillary status and reflexes status are mentioned in graph # 9 and # 10 respectively.

Extra Dural Hemorrhage (EDH) was detected only in 5 cases on CT, as compared to 14 cases on autopsy (detection rate – 35.71%) (Graph # 6). EDH of the occipital region had the poorest detection rate of 0% - 0 cases of the 4 cases of occipital EDH were detected on CT. Parietal EDH had a low detection rate of 25% (1 out of 4 cases had a positive CT finding). Traumatic Sub-Dural Hemorrhage (SDH), which was detected only in 18 cases, of 43 cases at autopsy (detection rate – 41.86%) (Graph # 7). Sub-Arachnoid Hemorrhage (SAH) was detected only in 16 cases of a total of 36 cases (detection rate – 44.44%) (Graph # 8). Only 40% of frontal SAH (2 out of 5 cases) was detected. Temporal, parietal and occipital all had a 0% detection rate (Total 7 cases of temporal, parietal and occipital SAH at autopsy).

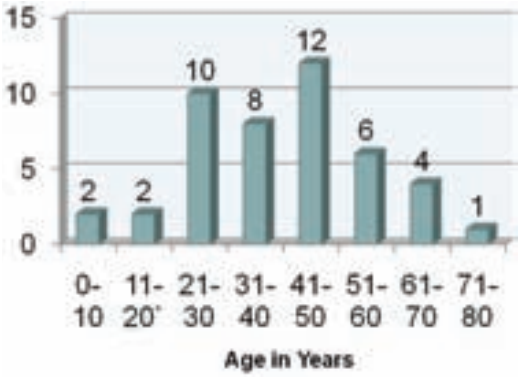
Cerebral oedema had a marginally better detection rate of 62.79% (27 of 43 cases had a positive CT finding). However, the CT fell grossly short in detecting herniation, and the detection rates for orbital, tonsillar and uncal herniation were – 0%, 16.67% and 35.29% respectively (Graphs # 9).

Lobar findings were tabulated as per lobe involved (frontal, temporal, parietal and occipital). Out of 29 frontal lobe lesions (contusions, lacerations, crush injury, necrosis and miscellaneous findings) only 14 were detected (detection rate – 48.28%). Detection rate for parietal lobe lesions was 50% (6 out of 12 lesions detected). 2 out of 7 occipital lobe lesions were detected, making the CT 28.57% accurate. Temporal lobe detection rate was 50% (12 on 24 lesions detected).

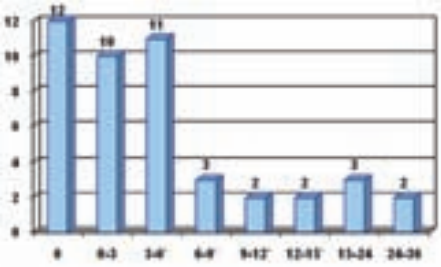
Graph 1: Gender Distribution



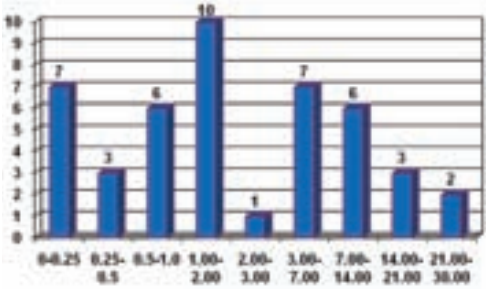
Graph 2: Age wise distribution of subjects



Graph 3: Delay in admission in hours



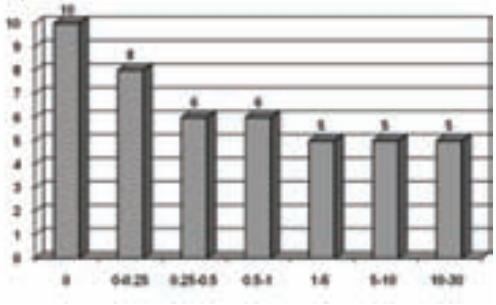
Graph 4: Period of survival in days



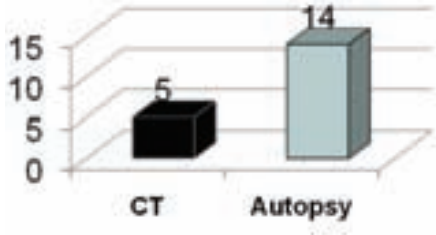
Pontine hemorrhage was very poorly diagnosed with only 1 out of 12 cases detected (detection rate – 8.33). Thalamus and / or hypothalamus hemorrhage was undiagnosed, and CT over-diagnosed 1 case of thalamic and / or hypothalamic contusion. All 5 cases of Basal Ganglia hemorrhage remained undetected on CT (detection rate – 0%). In the ventricles, CT could not detect 8 of the 12 lesions (Success rate – 33.34%).. Detection rate of intra-ventricular hemorrhages was only 50% (5 out of 10 cases). Corpus Callosum findings were totally undetected.

Fractures were evaluated as basal skull fractures & non-basal skull fractures. Amongst the basal skull fractures 10 out of 27

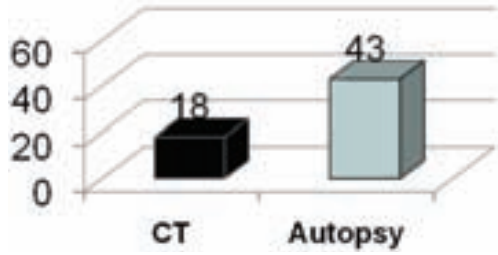
Graph 5: Period of hospital stay in days



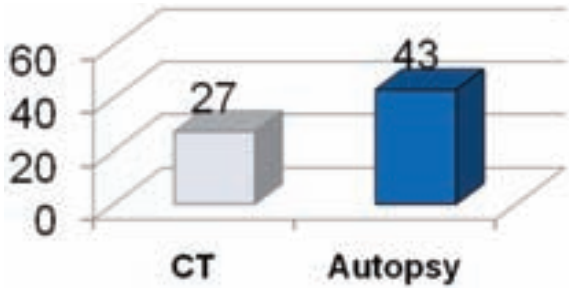
Graph 6: Extra-Dural haemorrhages



Graph 7: Sub-Dural Haemorrhages



Graph 8: Subarachnoid haemorrhages

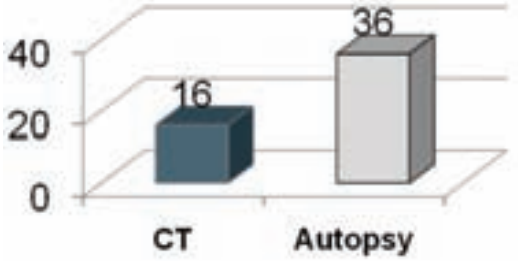


cases were detected on CT. (detection rate – 37.04%) (Graphs # 40, 41). CT had a marginally better detection rate of 48.39% with respect to non-basal skull fractures, detecting 15 of 31 cases on autopsy (Graph # 10).

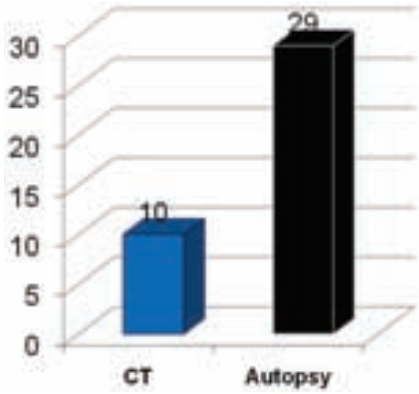
Cerebral lobar contusions deserve a special mention because of a high rate of failure in detecting these lesions. Out of a total 60 contusions (frontal – 25, parietal – 11, occipital – 5, temporal – 19), only 29 lesions (frontal – 12, parietal – 6, occipital – 1, temporal – 10) were detected (detection rate – 48.34%).

Over-diagnosis of lesions at CT is a common occurrence and deserves special reference because of its impact on the treatment modality adopted and its effectiveness. In the lobar findings, CT over-diagnosed 4 lesions of the frontal lobe that were absent on autopsy (Graphs # 22, 23, 24). CT over-diagnosed 4 cases of parietal lobe findings (Graphs # 25, 26, 27). CT over-diagnosed 2 lesions of the occipital lobe (no evidence at autopsy) (Graphs # 28, 29, 30). In the parietal lobe over-diagnosis of 4 cases occurred on CT (Graphs # 31, 32, 33). CT over-diagnosed 1 case of thalamic and / or hypothalamic contusion (Graph # 36). Amongst the skull

Graph 9: Cerebral oedema



Graph 10: Fractures



fractures, CT over-diagnosed 2 basal and 4 non-basal skull fractures (Graphs # 40, 41, 42, 43).

Discussion

Head injuries are one of the leading causes of mortality and morbidity in the world. A great deal of work has been reported by various workers for evaluating head injuries of various kinds. In recent years, considerable experiments have been carried out, providing modern concepts of head injury.

The diagnosis of traumatic head injury has become very critical in today's healthcare scenario, as timely intervention can reduce the mortality especially in cases of extradural hemorrhage. Thus, faster and more reliable diagnostic aids play a very vital role in the diagnosis, treatment and assessment of the prognosis of these patients. At present Computed Tomography (CT) remains the method of choice in the diagnosis of traumatic head injuries.

Road traffic accidents account for the highest number of deaths due to head injuries. This confirms Roberts[1] statement that traffic accidents constitute a pandemic of destruction. Traffic accidents remain the single most common cause of traumatic death in the world and the third most common cause of death from any aetiology.[2-9] Present study is no exception from this concept observed in the literature.

According to Zimmerman[10], fractures of the base of the skull are best demonstrated by high resolution Computed Tomography. Fracture of the base of the skull is usually suspected clinically when there is evidence of otorrhoea or rhinorrhoea. Autopsy is the best method for diagnosing fracture of the base since even thin fissured fractures can be detected which may be missing in CT.

The findings regarding intracerebral hemorrhages had no significant correlation between CT and autopsy study in this series, as CT failed to diagnose these lesions in more than 50% of the cases. According to Dolinskas[11], intracerebral hemorrhages can occur at any time between one to seven days after the infliction of injuries. This can possibly explain the insignificant correlation between the autopsy findings and the CT.

Conclusion

CT scan in the present study has failed to provide 100% accuracy in its diagnostic value. However, further studies with more number of cases is essential in providing an insight to the clinicians about CT scan as a diagnostic and prognostic tool in fatal cranio-cerebral trauma, thereby saving the lives of unfortunate victims.

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Trends of Unnatural Deaths in Nagpur, India

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Abstract

A two year retrospective study has been undertaken in the Department of Forensic Medicine and Toxicology, Indira Gandhi Government Medical College, Nagpur to elucidate the trends in unnatural deaths specifically regarding the

1. Incidence, age group, sex distribution and manner of unnatural deaths.
2. Impact of factors and adopted methodology used for intentional or unintentional violence.

Total numbers of unnatural deaths were 71.61 % in the studied period. Unnatural deaths were more in males as compared to females. Accidents accounts for 62.72 %, followed by suicide (29.88 %) and homicide were (7.40 %) of unnatural deaths. Burn accounted for 25.38 % cases, followed by the road traffic accident (22.24 %) cases, violent asphyxial death and poisoning were responsible in (17.60 %) and (14.17 %) unnatural cases respectively. Poisoning (34.63 %) was the most common method for suicide followed by hanging (24.76 %) and burns (22.81%). In homicidal cases, male to female ratio was 3.03:1, indicating male predominance.

Key Words

Unnatural Deaths, Accident, Burn, Poisoning, Suicide, Homicide, India.

Introduction

Death, natural as well as unnatural is always important from the medicolegal point of view. Natural deaths are the consequences of many pathological conditions and endogenous as well as exogenous factors are responsible for it. But unnatural deaths are due to exogenous factors alone.

According to WHO [1], 1.3 million people die annually worldwide due to suicide and homicide and about 1 million people die of intentional injuries or violence (0.3 million homicide and 1 million suicides) and about 3.5 million people die of unintentional. Road traffic accidents alone constitute 23.8% of deaths. An up-to-date figure on a global scale of all age group records about 8, 85,000 persons die of vehicular accidents annually. In India, accidents accounts for 2.5 % of the total deaths. As per suicide is concerned, it is estimated that about 8,15,000 people died of suicide last year, making it the 13th leading cause of death all over the globe, while in India about one lakh people most of them in the age group of 20-40 years took the extreme step.

Nagpur is an important city as well as an industrial town and the second capital of State of Maharashtra. It is situated in the central part of India. As per the sensex 2001, the population of Nagpur city was 20, 51,320 and that of Nagpur district was 40, 51,444, of which the peoples residing in urban area were 64.36 and in rural area were 35.64 % respectively. Nagpur has rapid economic growth and industrialization during last 25 years with increase in the Gross National Product (GNP) and improvement in the standard of living. Being the heart of India, many national highways pass across the city joining the various states around it. The heavy burden of traffic, rapidly growing population, industrialization and agriculturally dominant area are collectively responsible for road traffic accidents and occupational deaths. Hence, the study is reflecting the trend of unnatural deaths of the central part of India.

Material and Method

The study has been carried out in the Department of Forensic Medicine and Toxicology, Indira Gandhi Government Medical College, Nagpur for a period of two years from January 2001 to December 2002.The detailed data is gathered from police papers (Requisition and Inquest Panchnama) and postmortem examination report.

The following categories of cases were incorporated in the study.

* Accidents.
* Homicidal deaths.
* Suicides.
* Poisoning confirmed by chemical analyzer's report.

Observation

Total 2068 (71.61%) cases of unnatural deaths have been evaluated and observations documented as follows.

Table 1: Year wise total number of medicolegal autopsies and unnatural deaths.

Year	Total Postmortem cases	Total Number of Unnatural Deaths
2001	1448	1090
2002	1440	978
Total	2888	2068 (71.61%)

Fig. 1: Manner of unnatural deaths.

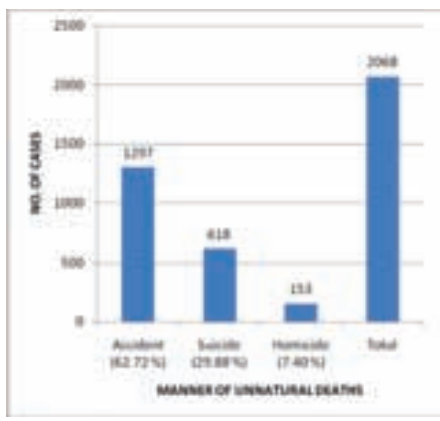

Table 2: Age and Sex wise distribution of unnatural deaths.

AGE GROUP	MALE	FEMALE	TOTAL	%
0-9	45	34	79	3.83
10-19	117	92	209	10.12
20-29	391	207	598	28.87
30-39	399	144	543	26.25
40-49	242	58	300	14.51
50-59	130	28	158	7.64
60-69	77	28	105	5.09
>70	53	24	77	3.72
Total	1454 (70.31 %)	614 (29.69 %)	2068	100

Fig. 2: Marital status of unnatural death victims.

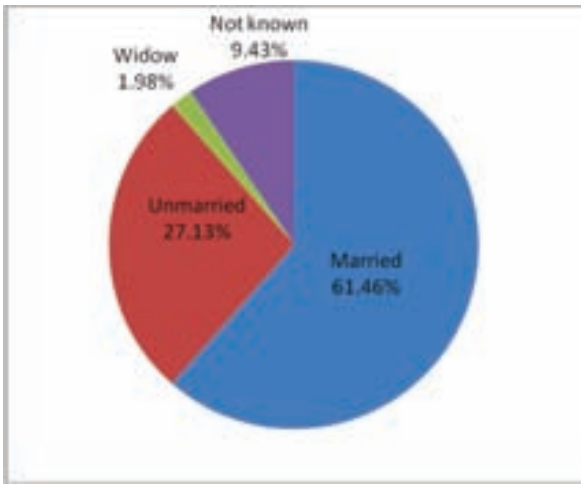

Table 3: Area wise distributions of unnatural deaths.

Area	No. of Unnatural deaths	%
Urban	1272	61.50
Rural	796	38.50
Total	2068	100

Fig. 3: Types of various unnatural deaths irrespective of manner of death.

Table 4: Types of various accidental deaths

Types	Male	Female	Total number	%
Road Traffic Accident	403	57	460	35.47
Train Accident	146	12	158	12.18
Violent Asphyxial Death	77	20	97	7.48
Electrocution	33	5	38	2.93
Burns	113	250	363	27.99
Poisoning	63	16	79	6.09
Fall from height	53	10	63	4.86
Others	29	10	39	3
TOTAL	917	380	1297	100

Table 5: Distribution of suicidal cases as per method adopted

METHOD	Male	Female	TOTAL NO	%
Poisoning	169	45	214	34.63
Hanging	118	35	153	24.76
Death on railway Track	9	6	15	2.43
Drowning	75	20	95	15.37
Burns	52	89	141	22.81
TOTAL	423	195	618	100

Table 6: Distribution of pattern of homicidal deaths.

Pattern	Male	Female	Total number
Mechanical injury	102	11	113
Poisoning	0	0	0
Hanging	1	1	2
Drowning	3	1	4
Homicidal cases associated with strangulation	6	7	13
Burns	3	18	21
Total	115 (75.16 %)	38 (24.83 %)	153

Discussion

In the study, total 2888 medicolegal postmortem cases were studied, out of which 2068 (71.61%) were of unnatural deaths. 1090 (75.27 %) and 978 (67.91%) unnatural deaths were recorded in year 2001 and 2002 respectively. No significant differences have been observed during these respective years. It was more in males 1454(70.31 %) compared to females 614 (29.69 %). Male to female ratio in the studied period was 2.37: 1, which is consistent with the other findings [2, 3, 4-9]. Irrespective of the gender, most of the unnatural deaths were falling in the age group of 20-29 years (28.87 %) and 30-39 years (26.25 %); similar finding are noted by others [2,3,10]. This is due to more exposure of this age group specially males to the outside environment as the socioeconomic structure of our community where the man is the senior partner who earns and has freedom out of doors, while women usually stays indoor.

The maximum cases were due to accidents 1297 (62.72%), followed by suicide 618 (25.4%) and homicide 153 deaths (7.40 %). This is consistent with these findings [3,10,11]. The reason is due to availability of faster mode of transportation leading to traffic accidents, more travelling, the chances of being more exposed to industrial and occupational hazards.

Irrespective of manner; burn claimed the highest number of victims 525 (25.38 %), closely followed by the road traffic accidents 460 (22.24 %). However, the findings are differ with the findings of some observant [6,12,13] because in this studied area, most of the people belongs to the low socioeconomic classes who uses the kerosene stoves, sigris (coal used as material in cooking apparatus) which are used as the main instrument for the cooking and warming water for bathing ,use kerosene lamps for light at night increases the burning chances; also the kerosene is the cheapest, easily available material to use for the suicide purpose and better transport system decrease the road traffic accidents in the region thus explaining the higher burn mortality.

Unnatural deaths were more in married victims (61.46%) as compared to others. The probable reasons is due to conflicts among the married couples, extra family oriented financial burden, unemployment, stress and strain of family. Study shows that the incidence was higher in the urban population (61.50 %) as compared to rural 38.50 %; agreed with the other's finding [4,8]; because this institution where study has been done is situated in the most prevalent urban area and hence majority of cases belongs to the urban. In the urban, people are residing in the high density area with problem of transport system, faster modes of transportation, more vehicles on the roads, carefree and reckless behavior, more exposure to industrial and occupational hazards, infidelity contributing to suicidal deaths, criminal and anti-social activities, sexual jealousy, insult related to the moral conduct of close female relative, dispute over money & land leads to bulk of homicides. These incidences are more in the urban area compare to the rural areas.

When the accidental cause was analyzed, it was noted that maximum accidental victims were males 917(70.70%) outnumbering females 380 (29.30 %), which is in agreement with Sharma BR, Singh, Virendar Pal, Sharma Rohit, Sumedha [4]. Majority of males died in the road traffic accidents, whereas females were mostly involved in accidental burns [4]. Maximum cases were composed of road traffic accidents 460 (35.47%), followed by burns (27.99 %). Other include train accidents (12.18 %), asphyxial deaths (7.48 %) & poisoning in 6.09 % cases, which is similar with the other studies [5,6]. Majority of burns occurred accidently in the kitchen because as per Indian tradition, female is involved in making food for the family and victimized due to the faulty cooking apparatus, carelessness during making food.

Suicide means self-murder. The choice of method for taking one's own life may be purely coincidental or easy availability of the tools or by methods that are considered acceptable by regional norms.

Poisoning (34.63 %) was the most common method for suicide followed by hanging (24.76 %) and burns (22.81%); similar findings are observed by others [14-16]. Males were 423 (68.45 %) while the females were only 195 (31.55 %). Male to female ratio was 2.17:1; showing the predominance of males over females which is consistence with other studies [14,16,18,19].For suicide purpose, male preferred for the poisoning (169 cases,39.95 %), hanging (118 cases,27.90 %) then drowning (75 cases, 17.73 %) and minimally by burns (52 cases,12.29 %) , while the females chose the burns (89 cases, 45.64 %) then poisoning (45 cases,23.08 %) followed by hanging (35 cases,17.95%); consistent with others study [8,15,17]. Poisons being easily available and cost effective with reasonable surety of painless death attracted the male population while inflammable materials like kerosene being readily available in home lead the females to its easy access.

The word "homicide" is used to denote death of person resulting from the act of another, which is not accident. As far the law is concerned, a homicide may be criminal or innocent.

In homicidal cases, male outnumbered the female i.e.115 (75.16 %) and 38 (24.83 %) cases respectively, with male: female ratio of 3.30 :1, similar findings observed in various studies [20-22]. Because males indulges more in violent activities, vicarious freedom and escapes from the parental society compared to females. Maximum homicidal deaths were due to mechanical injuries (73.85 %) and mostly in males (90.27 %); then homicidal burns (13.72 %) mostly in females (85.71 %), followed by the asphyxial deaths 19 (12.42 %) ; corroborates with studies [20,21,23]. Female burn homicides are due to dowry related cases, infidelity of the partner and dispute over money and sometimes internal family disputes.

Conclusion

Pattern of unnatural deaths differs in various regions due to different geographical influences, prevailing social set up and mental health status of the region; illustrating the necessity to take up studies of trends of unnatural deaths at different geographical areas. Access to systematically compiled knowledge is an absolute pre-requisite for preventive actions. By systematic registration of findings and experiences in Forensic Medicine, trends and patterns can be discerned and relevant measures can be taken without unnecessary delay. Responsibility for prevention of violence in society does not rest only on the law enforcement personnel but public health and other human service agencies must assist as they did previously to prevent other major causes of morbidity and mortality. However, the efforts of physicians, other members of the health team, families, friends, social organizations and the authorities may never eliminate such deaths.

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Study of Laundry and Linen Services in Pt. B.D. Sharma PGIMS Superspecialty Hospital, Rohtak

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Introduction

It is well appreciated that the patients do not get cured only by medical and nursing care, by drugs or operations but by combinations of many other factors like good food, clean linen, a clean environment, good interpersonal relationship and each of them has a definite role to play. No hospital can operate without the less glamorous and not-so-conspicuous services such as housekeeping, kitchen, CSSD and laundry and linen services that go by the name of supportive services[1]. The importance of a clean environment and linen for optimal patient care has been stressed upon since the very inception of hospitals. An adequate supply of clean linen is sufficient for the comfort and safety of the patient thus becomes essential. A sick person coming to the alien environment of the hospital gets tremendously influenced and soothed by the aesthetics or cleanliness of the surroundings and the linen[2]. Clean linen is an aid to reduction of hospital acquired infections. In healthcare, laundry services is faced with the daunting challenge of increasing efficiency and productivity, and finding creative ways to become less of a drain on the organization's bottom line. An efficient and reliable linen service is a priority for any institutional healthcare system[3]. The provision of this essential service is a major concern of hospital administration.

The word laundry is derived from launderer/laundress which means washerman or washer woman[4]. By Hospital linen we mean all fabrics made of the fiber and this may be of cotton, nylon or wool or synthetic. We see that the importance of laundry and linen services of the hospital has been given due importance as early as 60's. Hospital laundries as a separate entity was discussed by a Government of India Committee for planning and organizing the hospital services popularly known as "Jain Committee" (1968) on "Study group on Hospitals" suggested mechanization of laundries in teaching hospitals[5].

Importance, Roles and Functions of Laundry and linen services

Globalization, privatization, need for quality assurance in health care institutions, increase in knowledge, expectations, needs, demands and requirements of clientele and staff are some of the factors which make laundry services of utmost importance in hospitals. The aim of the hospital laundry and linen services is to provide well laundered linen for all requirements of the hospital in adequate quantities, at right place, at the right time[6]. The importance of providing clean linen to the patients in the hospital is considered under the following headings.

a. Cross Infection
   Providing of clean linen to the patient, frequent change of linen and its effective washing serve as well known preventive and hygienic measure in controlling cross infection of the hospital. Studies have proved beyond doubt, that hospital acquired infections show an increase whenever laundry and linen services are inadequate.[7,8]
b. **Patients Comfort and Satisfaction**
   Patient not only expects but demands clean bed and body linen during his stay in the hospital. Supply of adequate clean linen help in ensuring patients satisfaction. Fabrics properly chosen, can give comfort, warmth or coolness to the patient.
c. **Aesthetic Value**
   Clean linen in a ward makes it look more pleasant aesthetically beautiful. It provides psychological satisfaction to the patient and improves the aesthetics.
d. **Public Relation**
   An efficient laundry service reflects a positive image of the hospital. Clean ward displaying bright, crisp and clean linen makes pleasant impact on all who work or visit in the hospital. The other aspect of this is the personal appearance of the staff who attends the patients with neat uniform which instills confidence in the patients and the public and enhances their faith in the medical services rendered by the hospital.

The activities/services pertaining to the washing/cleaning of linen come under the ambit of laundry department of Pt BD Sharma PGIMS Hospital.

Aim

To study the functioning of laundry linen devices at Pt BD Sharma PGIMS superspeciality Hospital.

To identify the bottlenecks and suggest methods to improve the functioning of the laundry department.

Objective

To study the organizational structure functions and laundry services and to suggest short and long term corrective measures for improving and strengthening the laundry services of Pt BD Sharma PGIMS superspeciality Hospital.

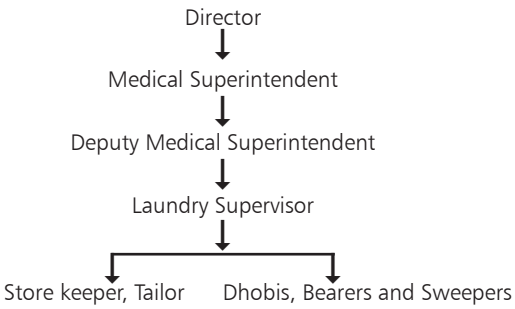
Methodology

1. **Study by Direct Observational:** This was done to study the physical facilities, layout and activities of laundry.
2. **Study by doing interview:** The study was done by physical interviews and discussions with various staff in the laundry as well as staff of Pt BD Sharma PGIMS Hospital at various levels. With the interviews, schedules and checklist in order to collect information on policies, procedures, organizational structures, functioning problems, suggestion for laundry services.
3. **Study of relevant literatures:** This review comprised a systematic search of national and international standards and guidance, published books, literature and data on recent advances in laundry technology and processes.

Study of laundry services was carried out with the following aspects:

a. Existing physical layout of laundry so as to compare with standard normal guidelines.
b. Procedure followed and functioning of laundry as compared to standard norms.

Organization of Laundry department at Pt BD Sharma PGIMS, Rohtak.



Location of the Laundry

The laundry department is located on the ground floor of the main building of the hospital adjacent to main kitchen of the hospital and nearby to General Hospital (TA).

Physical Layout

The laundry department covers an area of approximately 3684 square feet. This is rectangular shape with entrance and exit doors. The following areas are there with crisscross workflow in the laundry department.

a. Receiving
b. Sorting
c. Washing and Hydroextraction
d. Drying
e. Folding area
f. Laundry Supervisor Room
g. Store room

Observation and Discussion

Pt. B.D. Sharma PGIMS is a well known institution for medical education as well as for the health care facilities both at the national as well as international level. It has well equipped multispecialty/ super specialty Hospital of 1597 beds. The laundry is one of an essential support service of this hospital to provide clean linen, aesthetic environment and prevent infection among patients and for optimal patient care. In Pt. B.D. Sharma PGIMS hospital linen is changed alternate day and on every fresh admission of the patient. On observation on the spot it was observed that laundry staff is hardworking and sincere and meeting the hospital linen requirement in a stringent condition with available resources and staff. The laundry staff is working for 15 hrs in 3 shifts on working days and 6hrs on holidays. Washing days are all seven days in a week.

Fig. 1: Physical layout of the laundry department.

Present work load in the laundry is 1800 Kg linen per day for laundering.

Average number of cycles in a day is 10 -11.

Sister in charges of wards were contacted so as to take their views regarding quality of laundry services. It was observed that special consideration is given to OT linen and OT linen is washed on priority basis. It was observed various complaints about quality of services from various user departments of the hospital.

A few pitfalls were observed like use of common carriage for both soiled and fresh washed linen dispatch.

Collection and distribution of linen

Bearers from respective wards collect dirty linen and carry them in wheel chair or trolley to laundry and from laundry clean linen is carried in the same wheel chair or trolley which should not be done as there is fair chance of cross infection thereby spoiling the purpose of disinfections.

Issue Process

A register is carried along by the bearer and duly signed by the sister in charge of the ward to which clean linen is supplied and dirty linen is collected. One register is also maintained by the sister in charge for laundry supply.

Sorting in ward and OT

Pre washing of infected linen like in Swine flu or HIV is done in wards by 2% of sodium hypochlorite solution but pre washing of blood stains or soiled clothes is not done in wards nor treated with 2% sodium hypochlorite solution.

Equipment planning in the Laundry in Pt BD Sharma PGIMS hospital

Sl. No	Machines	No's	Present status of the machines
1	Washing Machines	04	02 condemned
2	Drying Tumblers	Nil	04 are condemned
3	Hydro extractor	02	working
4	Hot Head Press	01	01 condemned
5	Sluicing machines-Nil	Nil	02 condemned
6	Calendaring Machine	01	working

Present work load in the laundry is 1800 kg linen per day for laundering. Bed sheets, Gown, Kurta & Pajamas washed and Kurta, Payjama from special wards are pressed by 18 class—IV staff in three shifts.

Documentation

The following records are maintained in the laundry department.

a) Receiving and distribution register

Staffing of Laundry department at Pt BD Sharma PGIMS Hospital

Sr. No.	Posts	Sanctioned	Filled	Vacant
1	Supervisor	1	1	-
2	Store Keeper—cum--clerk	1	1	-
3	Tailor	1	-	1
4	Dhobi	10	2	8
5	Bearer	-	16	-
6	Sweeper	1	-	1

Work flow

b) Chemical register
c) Stock register (Equipment register)
d) Attendance
e) Daily work load register
f) Tailor register

Workload

About 1800 kg of clothes are washed in a day and all seven days in a week are fixed for washing.

Critical Appraisal and recommendations

Critical Appraisal

1. No sluicing machine in the department presently. Sluicing is done manually.
2. Calendaring machine is available but lying unused due to shortage of manpower.
3. The water supply is adequate but the laundry has neither boiler plant for supply of steam nor water softening plant.
4. The laundry has supply of electricity without any backup supply and there is frequent power failure.
5. Most of the equipment like calendaring machine, hot head press is not in annual maintenance contract.

Bottlenecks

1. Clean and dirty linen are not carried on separate trolleys. The linen is delivered to and from ward on wheel chairs rather than trolleys and no specific precaution is taken to avoid cross infection.
2. There is no ward specific marking on the linen this usually leads to mixing and missing of linen with other areas.
3. The laundry area is not separated as dirty and clean zone, so there is a fair chance of cross infection.
4. There is no separate parking area for trolleys carrying dirty and clean linen.
5. Linen is changed at every fresh admission and on alternate day. There are only 3 sets of linen per patient instead of the requirement of linen as per norm is 6 sets of linen per patient.
6. Manpower requirement in the laundry department is less than the norm so the existing staffs work in a stringent condition.

Recommendations

Equipment

1. All the old machines like Washing Machines, Hydroextactors and Drying Tumblers which are not in working condition can be replaced by equipment of automatic and modern technique so that less manpower will be required to operate the laundering process.
2. Calendaring machine installed in the laundry department in the year 1997 but the equipment is underutilized. It is not used regularly due to the shortage of manpower.
3. There should be sluicing machines which will enhance the efficiency and quality services by the laundry.
4. Electrical wiring of the laundry is quite old. Though recently repairing and replacement has been done to a stay away from frequent electrical fault, still there is open wiring and wires hanging all around and no concealment of open wires.
5. There should be backup power supply so that laundry work cannot be hold back or interrupted.
6. A procedure for planned preventive and breakdown maintenance of equipment.
7. A procedure for periodic meetings of the condemnation board for condemnation of unserviceable equipment and linen which is not done presently.
8. Preventing wastage of man-hours and under utilization of equipment.

Manpower

The workload of the laundry department has increased almost three fold, but the manpower has been reduced than the previous existing manpower of previous years. The previous manpower was 24 when there was around 600 kg of linen per day in the year 2001[9]. The present manpower is 20 (02 Class-III & 18 class-IV) where workload is around 1800 kg per day. The manpower requirement of the laundry services can be calculated as follows[10]:

Beds	100	200	300	400	500	Authority
Staff	5	8	12	17	22	Todd wheeler
	6	11	20	27	32	McGibony

Keeping in view the workload of the hospital the vacant post of the laundry should be filled up for smooth functioning of the laundry for standard patient care.

Washing

1. Linen should be weighed before wash and washing material should be used as per laid down standards instead of approximation.
2. There is scope of improving number of linen per bed per patient.
3. Inventory of linen. An inventory of total linen (Patient, staff

and bed linen) must be available with the category wise distribution of hospital. Similarly all departments must have an inventory of linen supposed to have in their custody.
4. Policy for purchase of quality linen not there.
5. Policy for purchase of consumables. With due process of consultation with the laundry department to ensure the desired quality of materials.
6. Training of staff of laundry in handling of equipment properly.
7. Periodic medical checkup of laundry workers should be done regularly.

Conclusion

Though the laundry department in Pt BD Sharma PGIMS Hospital working in a stringent condition in terms of inadequate staff, inadequate machine and no quality washes and promptness of timely delivery still adequately meeting demand of the hospital. The quantity and quality of linen is just acceptable but not ideal. The laundry services can be improved through prompt administrative action line. The scientific and rational organization and management of the laundry services covering all aspects from standardization purchase to condemnation can offer vast opportunities for cost-cutting measures.

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