

Role of a General Dental Practitioner in Forensic Odontology

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Abstract

Forensic odontology has now gained momentum and acceptance globally in legal cases. Teeth being the hardest structure in the human body, serve as a unique identifying feature of each individual. With increasing demand, a general dental practitioner should also be well trained to perform victim identification using simple procedures. We present a short review indicating the role of a general dental practitioner in forensic odontology.

Keywords: Forensic odontology; Age estimation; Bite marks; Victim identification; General practitioner.

INTRODUCTION

Forensic odontology is defined by Keiser and Neelsen as “that branch of dentistry which in interest of justice deals with the proper handling and examination of dental evidence”.¹ It has been described as sub specialty of forensic medicine, but its branches are in dentistry.²

Teeth are considered to be the unique as a finger print. They are the least destructible tissues in the human body. The mouth provides a library from which information can be extracted at any time for a considerable period after death.³

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Dr. Oscar Amoeda is considered as the “father of forensic odontology”. His main contribution was identification of the victims in the Parsi charity bazaar fire by using dentition.⁴ Identification of Adolf Hitler with the help of his peculiar “telephone bridge” is another interesting example of Forensic odontology.⁵

India also has a fair share in development of Forensic odontology. The body of Raja Jaichand was identified by the identification of his unique “gold teeth”.

A general dental practitioner should be well trained to perform disaster victim identification. A formal training should be included as a part of BDS curriculum.

Role of general dental practitioner in Forensic odontology:

A dental practitioner should be able to⁶

- Disaster victim identification
- Age estimation
- Sex estimation
- Bite mark analysis
- Identification from palatal rugae

1. Disaster victim identification (DVI)

A disaster is a sudden calamitous event that seriously disrupts the functioning of a community or society. Disasters can be natural or man made. Earthquakes, flood, cyclones, tsunami, landslides are considered as natural disasters. Whereas industrial accidents, fires, structural collapses are considered as man-made disasters. Victims can be so mutilated that their identification becomes impossible. Challenges faced during victim identification are:

- Victims highly mutilated
- Remains may be charred
- Remains are fragmented ⁷

It can be expected that other tissues of the body will be completely charred. As teeth are resistant to any severe postmortem procedures also, they can be used as a means of identification.

Role of a dentist in DVI

- Collecting the evidence: To determine if items such as dentures, crowns etc. missing from the body for which a search must be made
- Identification of the dead
- A general examination and extra oral features
- The Status of the teeth
- The Condition of the mouth
- Skeletons and Radiographs
- Charting The Findings
- Postmortem Records

2. Age estimation:

Identification of correct age is the bottom line of forensic investigation. Age sets a bar at which certain activities we undertake in the society. It is also important to understand the biologic profile



Fig. 1: The dental identification kit

of an individual. Age can be estimated by skeletal maturation, sexual development and dental development. Since dental development is robust and can be easily estimated, it remains a popular choice to estimate age.

Teeth in its development process are in various stages of development. This property can be exploited to estimate the age of a patient. Various methods of age estimation are:



METHODS

Prenatal age can be determined on radiographs by evaluating development of tooth buds. A new born's age can be determined by evaluating the development of jaws and eruption sequence. No teeth will be present for up to 6 months of age but that does not mean changes are not occurring. Then after, permanent teeth start erupting.

Age estimation after the first two decades of life depends on:

- Degree of occlusal wear.
- Deposition of secondary dentin.
- Level of gum attachment around the neck of the tooth.
- Transparency of root dentin.
- Amount of secondary cementum at the apex.
- Extent of resorption of the apex.

Various researchers have formulated different methods of age estimation like Schour and Massler's atlas,^{8,9} Nollas method, demirjan's method.¹⁰

3. Sex determination:

Just like age, gender determination is also equally important for the biologic profile of an individual. Sex determination is important in identifying mutilated, decomposed body remains in cases of mass disaster. A general dentist can also distinguish sex of an individual by anatomic findings.

Using anatomy of teeth:

- Male teeth larger both mesio-distally & labio-lingually.
- Size difference is more in maxillary centrals & laterals.
- Incisal edges are rounded off in females.
- Tooth eruption & development processes take place earlier in females.

Using the Skull

In males.

- Skulls are larger
- Orbits are more squarish
- Nasal apertures are higher & narrower
- Lateral aspect of mandible in males shows a roughened appearance
- Lower border may deviate laterally

- In females, forehead is more vertical but supra orbital ridges are rounded^{11,12}

Sex determination can also be done by histologic means i.e. identifying barr bodies,¹³ DNA based techniques, etc. which fall under the realms of experts.

4. Bite mark analysis:

Biting is considered as a protective instinct to any attack. It is more common in the assault of sexual nature.^{14,15} They can also be found at a robbery or theft scene on items such as cheese, apple or a chocolate bar.

A general dentist can be trained to identify and interpret bitemarks as a dentist can be approached in many cases. A systematic approach can be taken in order to arrive at a consensus:

1. Is the bite mark injury or something else?
2. If it's a bite mark injury is it caused by a human or any animal?
3. If it's a human bite mark, is it caused by an adult or a child?
4. If it's a bitemark caused by adult human dentition, who caused it?

Bitemarks can be recorded as: photograph or by taking impression of the bitemarks.

After that a comparison is made between the bite mark of the suspect and that of victims and the distinction is given as:

- Unique
- Distinctive
- Possible bite mark
- Definite bite mark
- Unlikely, inconsistent, improbable
- Incompatible, excluded, impossible

5. Palatal Rugae in Identification

Rugae are as unique as thumbprints and they Reappear after trauma or surgical procedures.

Classification of Rugae

1. Primary rugae (>5 mm)
2. Secondary rugae (3-5 mm)
3. Fragmentary rugae (should not be considered)

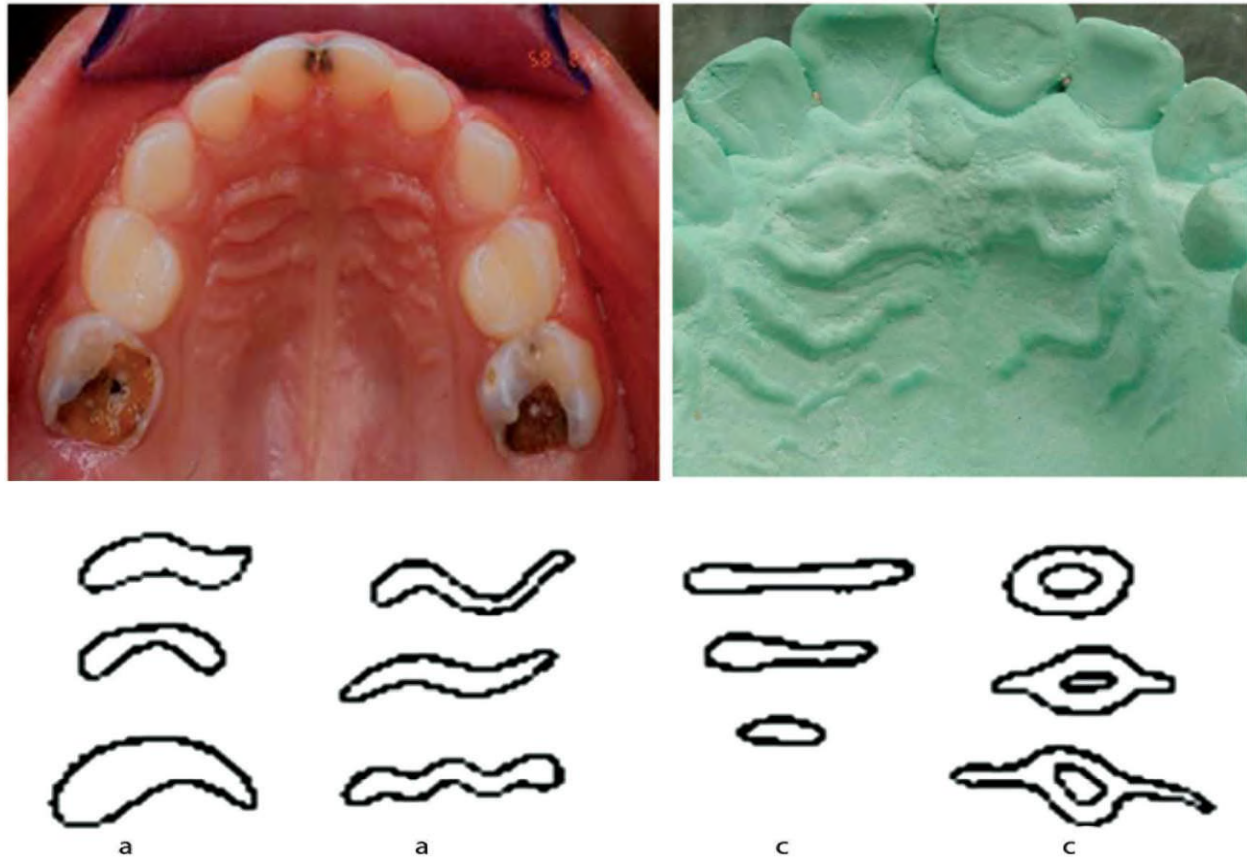


Fig. 2: A. Curved, B. Wavy, B. Straight, D. Circular

Thomas & Coltz Classification:

A. Curved, B. Wavy, B. Straight, D. Circular

Analysis of rugae Pattern is done by: using ante mortem dentures & casts. Digitalized imaging of palate is obtained followed by evaluation with the help of software RUGFO-ID. It is 97% accurate.

CONCLUSION

Methods like chieloscopy (study of lip prints), aspartic acid racemization, DNA identification, amelogliptics (tooth prints) are some of the methods for which expertise in forensic odontology is needed. For these it is best to refer the case to an expert. But the methods like victim identification, age estimation, bite mark analysis can be performed by a general practitioner also if trained properly.

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