Review Article

Evidence of Perio in Forensic

T. Suganya Harshni, Mohan Umayal, Navarsu Mathimarai Selvan, R. Nivetha

Department of Periodontology, Best Dental Science College, Madurai, Tamil Nadu, India

ABSTRACT

Forensic odontology is used in medicolegal cases for identifying the victim and deceased. The paper focuses the role of periodontics in forensic field. It is important for knowing about the field and its application and maintenance of clinical records.

KEYWORDS: *Forensic, legal, periodontics*

INTRODUCTION

Forensic odontology is a field of dentistry which is involved in analyzing dental evidence in the interest of justice. Periodontics deals with diseases of the periodontium. Forensic dentistry is used for identification of individuals through morphology and pathology of periodontium and is also utilized for age estimation studies which include periodontosis, root transparency and root length.[1] The dental human identification is an essential procedure in the routine of medicolegal investigations. It is often performed through the comparison between the available antemortem (AM) dental data of the missing person and the postmortem (PM) data collected from dead person.[2]

METHODS TO IDENTIFY THE REMAINS OF PERSON

Circumstantial evidence is the evidence which is found at the site of remains such as the personal items, etc. External characteristics such as sex, weight, height, skin color, hair, tattoos, scars, birthmarks, etc. Internal characteristics revealed by autopsy such as cancer, heart disease, kidney stones, implants, suture material, etc. Radiographs are used to identify the bony characters such as fractures, deformities the presence of foreign bodies such as bullets, evaluation of age, and growth by the presence or absence of growth plates, and the extent of osteophyte formation.

Craniofacial reconstruction is used when there is a body that is unrecognizable due to its state of decomposition, skeletization, mutilation, or calcinations. It is used to recreate the face of the individuals immediately before their death and also computer software and several three-dimensional manual methods are available for forensic purpose.[3]

ASSESMENT OF GINGIVAL EPITHELIUM

Cell death occurs by apoptosis, necrosis, or autolysis. Tissue fluids which are liberated causes cell autolysis which causes the decomposition of a corpse. As the body continues to alter after death, it is important to note the PM changes in medicolegal practice. Histological examination of gingival tissues obtained from PM and AM samples at different time intervals revealed that the decomposition process is initiated within 10 h after death and other cellular changes occur subsequently. The use of oral epithelium cells harvested by pressure application of a toothbrush to assess the minute qualities of DNA of individuals which was followed by gender identification by sex determining region-Y gene amplification was carried out using real-time polymerase chain reaction.[4]

CEMENTUM IN AGE ESTIMATION

Age estimation is an important criterion in the identification process when there is very less information about the deceased is available. Cementum will be deposited throughout the life. Deposition will occur in the form of concentric incremental lines and each line corresponds to 1 year of life. Tooth cementum annulations are a reliable source.[4]

Address for correspondence: Dr. T. Suganya Harshni, Department of Periodontology, Ultra Nagar Madurai-Chennai Highways, Madurai - 625 104, Tamil Nadu, India.
E-mail: drsuganyaharshnimds@gmail.com

Access this article online

Quick Response Code:

Website: www.jiadsr.org

DOI: 10.4103/jiadsr.jiadsr_24_17

Amino Acid Racemization

Organisms utilize proteins which are the building block of their biologic composition. All amino acids (except glycine) have two asymmetrical geometric forms that are mirror images of one another and are known as stereoisomer designated as "L" and "D" forms of the molecule. At birth, only the L form of the amino acid exists systemically. Racemization is the gradual and spontaneous process of converting to a mixture of equal amounts of the L and D stereoisomers. Racemization will begin immediately at birth. Age can be estimated by measuring the degree of racemization that has occurred in a metabolically inactive tissue. Tooth dentin is rich in aspartic acid and assaying the degree of aspartic acid racemization within the tooth dentin has resulted in chronologic age assessment with error rates as low as ±3 years.[5]

Interrelationship of Periodontics with Forensic

Gingival morphology and pathology

a. Contour, recession, focal/diffuse enlargements, interproximal craters
b. Color-inflammatory changes, physiological (racial), or pathological pigmentations
c. Plaque and calculus deposits.

Periodontal ligament morphology and pathology

a. Thickness
b. Widening
c. Lateral periodontal cysts and periodontal abscess.

Status of alveolar bone

a. Height, contour, and density of crestal bone
b. Thickness of interradicular bone
c. Pattern of lamina dura
d. Bone loss (horizontal/vertical)
e. Trabecular bone pattern and bone islands.

Periodontal cosmetic surgeries

a. Crown lengthening procedure
b. Root hemisection along with regenerative surgery
c. Periodontal microsurgery.
   - Age estimation
   - Periodontosis (gum recession)
   - Root transparency and root length.[1]

Saliva in Forensic

Use of saliva and mouth swabs as sources of DNA shows some technical advantages over the use of blood. These include the following.

1. Collection will be easier
2. Painless Method in collection
3. Can be done on children and elderly subjects
4. Does not have any religious implications which are present while using blood
5. Safe method as compared to the blood which has higher potential risks of contamination.[6]

Two Techniques for Saliva Collection

- Single-swab technique
- Double-swab technique.[6]

Uses of Saliva in Forensics

Sex determination in bitemarks.

Role of Dental Implant

Dental implants are usually classified depending on implant design, properties, and attachment mechanism.[7] Dental implants are made of titanium, which has high melting temperature of around 1650°C. In dental implants, identifiable features include the grooves, holes, and threads on the implant's surface. These potentially enable forensic odontologists to determine the implant's made and design. While metals like titanium may not melt at high temperature, they may 'sag'; a slight warping of the object's shape. The natural teeth may be incinerated at high temperatures; dental implants are likely to survive.

Implant Recognition Software

Implant Recognition Software was developed by G. Michelinakis to work on the principle of a dataset being stored in a database. Internet searches for implant manufacturing companies worldwide identified, all relevant information including images regarding dental implant products were collected for all products. A program was then devised using key design factors to enable the identification of individual implants. The searches produced details for 87 implant manufacturers based in 21 countries with 231 different implant designs. The program has been successfully trailed and used in both general dental practice and for forensic identification. The program developed provides a valuable adjunctive to the identification of the implant systems present in patients' mouths.[8]

Conclusion

Maintenance of dental record is very important in the critical situations. It is important to know the knowledge about forensic science and dental role in it and scope of periodontics and implantology should be understood in detail.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Periodontics perspective in identification and age estimation Thorakkal Shamim. Eur J Forensic Sci 2014;1:18-22.
2. Silva RF, Franco A, de Castro MG, Dumant JA, Garcia RR, de Souza JB. Dental human identification using radiographic records of oral implant placement – A case report. Austin J Forensic Sci Criminol 2014;1:1-3.
3. Kanaparthy A, Kanaparthy R. The dental role in forensic medicine. IOSR J Pharm 2013;3:14-17.
4. Gattani DR, Deotale SP. Forensic dentistry: Adding a perio 'scope' to it! J Indian Soc Periodontol 2016; Doi: 10.4103/0972-124X.184034.
5. Spencer DE. Forensic odontology. CDA J 2015;43:292-330.
6. Mago J, Sidhu L, Kaur R, Kamal, Anurag T. Saliva in forensics. World J Pharm Med Res, 2016;2:196-8.
7. Byraki A. Morphological analysis of dental implants – Forensic significance. Rom J Leg Med 2010;18:207-12. Doi: 10.4323/rjlm.2010.207
8. Michelinakis G. Identification of dental implants through the use of Implant Recognition Software (IRS). Int Dent J 2006;56:203-8.