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REVIEW ARTICLE

Role of Forensic Odontologist in Dentistry

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ABSTRACT

Abstract: The branch of Forensic odontology has gained immense importance in examination of dental evidence and in the identification of victims of mass disaster, abuse or organized crimes. The various dental identification methods used by forensic odontologist include examination and comparison of dental remains, postmortem dental profiling, determination of age of the individual by a knowledge of eruption sequence, neonatal line information,striae of Retzius, Schour and Massler chart and Gustafson's index and radiographic assessment, determination of sex of the individual by cranial morphology and amelogenin, determination of ancestry and race, DNA isolation from teeth and comparison with antemortal DNA extracts, examination and analysis of bite mark evidence, study of lip prints and palatal rugae patterns, a knowledge of habits and analysis of previous dental records. Hence it is important for a forensic odontologist to possess an interdisciplinary knowledge of dental science and it is equally important for all dental practitioners to maintain and preserve accurate dental records for a considerable period of time

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INTRODUCTION

Forensic odontology is one of the rapidly developing branches of forensic medicine and forensic science. It has immense importance in examining dental evidence and in the identification of victims of mass disaster, abuse or organized crimes.

A forensic odontologist[1] is a highly specialized and skilled dentist who uses the teeth to identify bodies, estimate the age of skeletal remains and find the source of bite mark injuries, mainly during criminal investigations or mass disasters. To be a forensic odontologist, a person must be a qualified dentist with a postgraduate qualification in forensics. Experience is very important which can be obtained by working under a senior forensic odontologist.

A forensic odontologist should have a thorough knowledge of principles, methods, techniques and new developments in the field of pathology, particularly, as they are applied in the field of forensic odontology and also develop skill in the use of specialized equipment, instruments, and materials required in all phases of pathology. He should be able to detect, analyze, evaluate, and interpret manifestations and symptoms of physical conditions from pathological examinations.

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ROLE OF DENTIST AS FORENSIC ODONTOLOGIST

Forensic odontologists assist legal authorities by examining dental evidence in various situations. They help in the

- Examination and evaluation of injured teeth, jaws and oral tissues resulting from different cases.
- Collection and analysis of human and animal bite marks.
- Comparison of antemortem (AM) and postmortem (PM) dental records in case of individual/mass disaster.
- Examination of dental remains whether fragmentary or complete and including all types of dental restorations of unknown persons or bodies.
- They also present dental evidence as expert witness in court.

Dental identification

Dental identification[2] is very important in natural as well as man-made disasters. Identification can be done by comparing known characters of missing individual (AM) with available characteristics of unknown body (PM) data. When there is no clue for identification and if there is no AM data, a detailed PM record is prepared for further use. Forensic odontologist contributes information, such as age, sex, ancestry of the deceased, which is otherwise termed as "postmortem dental profiling".

Dental Profiling

When the dental records are not available and other methods of identification are not possible, under such condition, a picture of the general features of the

individual should be produced. This is called post mortem dental profiling[3].

It includes information, such as age, sex, socioeconomic status, and background or ancestry of the deceased. Habits, dietary pattern, and occupation are also added.

Determination of Age, Sex, Race by Forensic Odontologist

Forensic odontologist should have a thorough knowledge of eruption sequence of teeth, neonatal line information, striae of Retzius, Schour and Massler chart and Gustafson's index because these parameters are used for age estimation.

Radiographs are also an adjunct to determine the stages of mineralization, degree of formation of root and crown structures and stages of eruption. All these factors can be combined to predict the age of the individual to be identified.

Sex determination[4] is usually based on cranial appearance as there is no difference in the morphology of teeth, but sex determination can also be done by measuring the teeth. Amelogenin secreted by the ameloblasts of enamel is also helpful to determine the sex. The forensic odontologist can determine the sex and ancestry from skull shape and form. Based on skull, three major races can be found. They are mongoloid, caucasoid, and negroid races. Other features, such as cusp of carabelli, shovel shaped incisors, multicuspid premolars also help in the determination of ancestry.

Role of DNA in Dental Identification

Environmental extremes, such as temperature and decomposition do not bring about changes in dental tissues or dental restorations because of their resistant nature which make them ideal source of DNA that will be of great help in identification of the individual.

DNA[1] can be obtained from teeth, bone, saliva, mucosal swab, etc., and can also be isolated from various other sources in the crime scene. Polymerase chain reaction technique allows amplification of DNA and amplified DNA can be compared with AM samples (blood, cloth cervical smear, hair brush, biopsy specimens, etc).

Other methods include restriction fragment length polymorphism, single nucleotide polymorphism and micro assays. When nuclear DNA is insufficient, then mitochondrial DNA is collected which is rich in dental tissues, such as dentin and cementum.

Bite Mark Evidence

Bite marks are very important in case of crime and abuse. Forensic odontologist should have a thorough knowledge of arch alignment, specific tooth methodology (including of animals) to differentiate human bites from nonhuman. Normally, bite marks can be documented by taking photographs or by taking impressions.

Lip Print Identification

Study of lip prints is called the Cheiloscopy. Lip prints[5] act as markers in identification of victims and suspects. It is found that no two individuals have the same pattern of skin lip print.

Palatal Rugae Patterns in Identification

Study of palatal rugae[6] patterns is termed rugoscopy. They are the ridges in the anterior hard palate which can be straight, curved, circular or wavy. They are useful as they are the best protected soft tissue which can be accessed very easily during life and after.

Habits

Various habits of person, such as betel nut chewing, smoking can be characterized by the stains over the surface of the teeth. Other habits, such as cigarette smoking, pipe smoking, or of tailors / carpenters holding nail pins in the teeth show univocal wear pattern.

Even previous orthodontic treatment exhibits changes. Socioeconomic status of a patient can be assessed by quality, quantity and presence or absence of dental treatment.

Dental records

It is not only important to maintain the dental records but also to preserve these records. Well- recorded information helps in the identification. A problem also arises when records are lost or damaged. Dentures can be coded or marked with denturebase which can be retrieved after accident. Usually dentures are acid resistant and they can maintain their condition even in increased temperatures.

CONCLUSION

It is important for a forensic odontologist to possess an interdisciplinary knowledge of dental science. A forensic odontologist plays a vital role in the identification of victims in mass disasters[7]. Teeth, because of their physiological variation, pathoses and effects of treatment record information which can remain throughout life and even beyond. Teeth may be used as weapons in certain situations; they can leave information about the identity of the biter. A forensic odontologist plays an important role in the recognition of abuse among persons of all ages. It is important that accurate dental records are maintained and preserved for a considerable

period of time. Most necessary information contained in these records can be handed over to legal authorities to recognize malpractice, negligence, fraud or abuse and to identify unknown persons.

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