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Letter to Editor

Application of Forensic Odontology in Forensic Investigations

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To,

The Editor in Chief, JFMSL.

If it comes into picture that a fragment of mandible or just a single tooth, which is of few millimetres in size is found at the crime scene or at the site of a major mass disaster, how can we know to whom those remains belong??

It is in such cases that dental methods of identification play a valuable role. In fact, as dental methods are easy, reliable and cost effective; they can routinely be used in identification process. The theory of forensic odontology is based on the concept that “no two mouths are alike” same as the theory behind fingerprints. Every individual has a unique set of teeth which helps to determine a separate identity of that individual. Use of dental methods have proven significant in assisting Forensic Medicine. Dental identification plays significant role when identification of remains of deceased person is skeletonized, decomposed, burned or dismembered and is invalid by visual or fingerprint methods. Identification by dental evidence is possible because, the hard tissues are preserved after death and can even withstand a temperature as high as 1600 degree C when heated, without appreciable loss of its structure (1).

As police are the first ones to take custody of crime scenes, information regarding individual's age, gender, and race could be determined by validating the dental sample as substantial evidence by police personnel.

Increase in number of sexual assault, child abuse and homicide cases has led to bite-mark analysis as significant responsibility of the forensic dentist. The major areas of interest for a forensic odontologist are;

- Identify human remains that cannot be identified using facial recognition, fingerprints or other means.
- Identify remains in mass fatalities, such as plane crashes and natural disasters.
- Determine and analyze bite marks in cases of assault or suspected abuse.
- Estimate the age of skeletal remains as well as living individuals.
- To testify in dental malpractice cases.

Let's have a look at few of the famous cases solved in the past with the help of dental evidence. After the end of World War II, rumors were flourishing that Adolf Hitler and his wife Eva

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had both died together in 1945 after they went missing. It was thus a challenge to confirm such rumors. Few pieces of Hitler's jaw were found later that showed remnants of a dental bridge, as well as particular forms of reconstruction, and evidence of periodontal disease. Hitler's identity was then confirmed when the dental records kept by Hitler's dentist were matched with the remains. However, the first example of dental identification from India was reported back in 1193, when Raja Jai Chand, a great Indian monarch was defeated by Muhammad's army and was murdered. His identity was thus established by his false teeth (2).

We all remember the deadly terror attack of 9/11 in U.S.A. Many victims were identified in the first using their dental records. Also, in the Indian Ocean tsunami of 26th December 2004 dental data was among the primary identifiers in identification.

Our teeth can reveal much information about our age, sex, habits, occupation, and area of origin as well as the socioeconomic status. Example; brown or black stains present on teeth may indicate that the person must have habit of drinking tea and coffee frequently. More commonly seen in Indians are red or brown stains on teeth caused by chewing tobacco. Poor oral hygiene as well as poor quality of dental treatment may indicate a lower socioeconomic status. Certain occupations such as metal workers may have green, yellow or black stains on their teeth due to the exposure to metal fumes. Certain areas in our country have excess amount of fluoride in water which can lead to a condition called dental fluorosis in which yellowish or brownish discoloration of teeth can be seen.

Dental age estimation plays a significant role for determining the age of a person; living or dead. Age estimation in children and infants is based on the different stages of tooth development and eruption in oral cavity.¹ In adults, age can be estimated based on the different structural and biochemical changes that our teeth undergo during lifetime. Whereas, presence of neonatal

line is used to determine live birth in infanticide cases.

Dental radiographs prove to be significant in age and sex determination. Determining age and sex is one of the primary criteria for personal identification. Sex can be determined by certain distinguishing characteristics of male and female teeth.

Palatal rugae patterns remain stable during life and can be considered for comparison in forensic investigations. Our lips has a unique pattern of prints which like fingerprints can be used to identify a person positively and can be used to verify the presence or absence of a person at the crime scene.³

Teeth prove to be a reliable source of DNA. Hence, teeth and saliva are used commonly for determining the identity and profile of a person.² Bite marks are the result of the tooth impression on different materials. Bite marks can be found on flesh, foodstuffs and less frequently on a variety of other materials.³ The procedure for comparison of bite marks on the skin of victim to the dentition of possible assailants is well established and has been reported in historical cases, as well as in many cases to the present day. Also they can be found in child and elderly abuse cases.

Facial reconstruction comes to the rescue, when conventional identification methods are not helpful and the face of the deceased is severely disfigured. In such cases an approximate face of that person can be created. The methods may involve photographic superimposition or modeling a face on the skull replica with clay or plasticine, along with computer graphic simulations [two dimensional (2D) and three dimensional (3D) reconstruction.

The Indian scenario

In our country, this subject is still in its emerging state. It is necessary to create awareness and educate the crime investigating officers and law agencies with the correct protocols and tools of forensic dentistry.⁴ Correct knowledge about recognizing a dental sample as substantial

evidence by police personnel is certainly important to prevent the loss and tampering of evidence. Also dental records prove to be the best defense for the dentist in case of a malpractice suit.

Recent tragedies, past and present situations have increased awareness concerning the importance of forensic dentistry in identification of victims.⁵ To maximize dental application in forensic cases, it is necessary to train dentists in the practical aspects of this subject. Also there is a necessity in exposing dentists to the basic principles and techniques of the subject. The availability and accuracy of dental records determine the success of identification. All such measures would help to identify, recover, and interpret the dental evidence correctly, thus providing timely justice to all.

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