

Latest Advances in Antimortem Dental Records: A Contribution to Forensic Medicine

Vishwas Bhatia

Garima Bhatia

Nitul Jain

ABSTRACT

What better can be the thought to reviving an individual's identity even after death. identification of individuals not known is of utmost importance in this world. moreover personal identification is important in investigating criminal cases, attaining legal documents of death and also settling of insurance policies. every individual is unique, so is his identity and similarly his dentition as well., Forensic odontology plays an important role in retrieving evidence and identifying an individual and that too with a conclusion that is genuine and can be relied upon., People might feel what role could a dentist play in reviving a person's identity after death. but it is for us to bring it to their notice that the tooth is the hardest structure of body and its unique composition makes it resistant to various mechanical, thermal and chemical insults., Keeping in view the above thoughts in mind, one can understand what role can a dentist play in investigations regarding death. dental records can be a boon in the progress of investigations that sometimes need a clue for identification of an individual along with other proofs, thus helping in confirmation of any doubt which arises., The aim of this paper is to present not only the various kind of dental records but also some of latest dental advancements that can greatly help in recognizing an individual. this would be a step forward from us dentist in making all practitioners aware about these records. such an effort would collectively make all practitioners, dental and medicine in making people understand the value and importance of keeping an individual dental record.

Key words: forensic odontology, dental records, dental identification

INTRODUCTION

Forensic odontology is the study of dental applications in legal proceedings. The subject covers a wide variety of topics including individual identification, mass identification, and bite mark analysis. The study of odontology in a legal case can be a piece of incriminating evidence or an aspect of wide controversy.

Author's Affiliation: *Senior lecturer, Department of Prosthodontics and Crown and Bridge, Eklavya Dental College and Hospital, Kotputli, Rajasthan.

Reprint's request: Dr. Vishwas Bhatia, MDS, Prosthodontics, Senior Lecturer, Department of Prosthodontics and Crown and Bridge, Eklavya Dental College and Hospital, Kotputli, Rajasthan. Email: vishwas211@yahoo.co.in, Tel: :0124-408239.

(Received on 25.02.2011, accepted on 24.03.2011)

"unique is an individual, unique is his/her dentition!!" Yes the saying really means what it says. it can be understood by the fact that each tooth has five surfaces making it a total of 160 surfaces, each surface having different shapes, size and they too may have fillings, crowns, extractions, bridges, orthodontic brackets, metal dentures and the latest, intraoral implants and dental jewels used nowadays as a dental accessory. Criminal investigations, insurance settlements, military proceedings and legal certification of death are some of the areas of interest in person identification ⁽¹⁾.

Though fingerprints, dental comparisons and biologic methods such as dna profiling are the most reliable means of identification, but unfortunately many times conventional forensic techniques don't provide any conclusive means of identification.

In such scenarios, forensic odontology may play an important role in the retrieval of evidence and identification, having a high degree of reliability and simplicity. Tooth, the hardest organ, because of their composition and anatomic location are resistant to various mechanical, thermal and chemical insults ^(1, 2, 3).

A question may arise- why would forensic odontology be so important? An answer to this possibly is the fact that teeth are the least destructible part of the body and may remain more or less intact for many years beyond death. They contain information about the physiological and pathological events in the life of the individual which remain as markers within the hard tissues of the teeth "somewhat similar to osteobiography of an individual". Therapeutic activity by a dentist in the form of restorations and prostheses may modify an individual's dentition in a more or less unique manner. Various restorations may survive incinerations of more than 1600°C ^(2, 3).

The Alfred P. Murrah federal building bomb blast ⁽²⁾, which happened at Oklahoma City on April 19, 1995, is an interesting example to prove so. It has been considered as the "gold standard of disaster response". The forensic teams worked for 16 days for 12 hours shifts daily. Their hard work led to recovery of 168 victims, and simultaneously 168 positive identifications were made out. Out of these cases, 45 cases were identified on the basis of dental identifications, 77 cases by a combined dental ID & fingerprints identification techniques and remainders by footprints, palm prints, visual, radiological, and DNA means.

In another exceptional case, where forensic odontology proved to be of immense value is the Asian tsunami which struck off the shores on 26th of December 2004.

In this unfortunate event, there were more than 2,00,000 casualties involving more than 58 nationalities victims. More than 20 countries were involved in identification process. Among all means of identifications, dentistry proved to be the most valuable ID's mean in up to 85% of cases ⁽⁴⁾.

Also, talking statistically, Fellingham and coworkers have calculated that there are 1.8×10^{19}

possible combinations of 32 teeth being intact, decayed, missing or filled. Rawson and associate mathematically calculated that the biting edge of 12 anterior teeth can be arranged in 1.3×10^{26} different ways ⁽²⁾.

Among individual cases, most notable ones are those of Adolf Hitler and Eva Brown, who were identified because of a telephonic bridge worn by Hitler in his lower arch ⁽⁵⁾.

All of the above said examples are just a few among thousands. This highlights how important a dentist can be as a good source for much needed information arising out of death investigations. Besides identification, forensic odontology has also important contribution towards age estimation, sex and race determination, bite mark analysis, collection of DNA from pulp or entrapped cementocytes in cementum, during mass disasters etc to name a few ^(2, 6).

Dental records- past to present day

Latest treatments

1. Dental implants- nowadays many patients are turning up for dental implants as a replacement for missing natural tooth. These implants are osseointegrated in the dental arch and thus can serve as a permanent marker to identify the human body, as it is impossible to remove them from one's body unless removed by a dental surgeon. Also, as these implants are mostly made up of titanium like materials, they may survive virtually any sort of insults.

2. Dental jewellery- dental jewels, commonly used nowadays like diamond studs can be permanently fixed on the facial surface of the tooth, thus adding on to a sparkling twinkle in the smile adding to the beauty of an individual. These jewels are permanently fixed on the tooth and cannot be removed without a prosthodontist. This can significantly contribute to the identification of an individual.

3. 2d poly line method-it uses Adobe Photoshop. Use of the 2d polyline method entails drawing straight lines between two fixed points in the dental arch and between incisal edges to indicate the tooth width. Identification for this method is

based on canine-to-canine distance, incisor width, and rotational angles of the incisors. This method relies heavily on accurate measurements.

4. Painting method- it too uses adobe photoshop. Use of the painting method entails coating the incisal edges of a dental model with red glossy paint and then photographing the model. Adobe photoshop is then used to make measurements on the image. Identification for this method too is based on canine-to-canine distance, incisor width, and rotational angles of the incisors. The painting method depends on precise overlaying of the images.

There can be numerous types of dental records for patients who are attending dental clinics. These can simply range from an intra oral photograph to cast and full mouth radiographs. Some of the potential dental records, which can be very useful in case the need arises, are as follows.

5. Case history documents containing all pertaining information about charting of dentition, the inter-occlusal relationship (class i, ii and iii) and any specific type of information about the oro-facial structures.

6. Photographs: particularly intra-oral ones, which can show individual traits specific to a person like, mesiodens, rotated tooth, stained or discolored tooth etc for example.

7. Radiographs: these can be in the form of iopa's, occlusal views, opg's or cephalograms in case of an ortho or surgical dental patient.

8. Study casts or casts fabricated for the purpose of fixed or removable partial dentures or ortho appliances. These are the simplest possible record of the patient containing all necessary details about their individual dentition

9. Denture: as it has been found in various studies, the palatal rugae pattern of every individual patients are different, as it will be correspondingly in the maxillary denture of these patients. Denture of these patients can be a useful indicator of their identity in case of mishaps. Recently there has been stress on engraving the denture with patient's and clinic identity who fabricated it as well. In fact, the brazilian

aeronautic minister demands palatal rugoscopy of all its pilots, in order to ensure their identification in case of accident ⁽⁷⁾.

10. Any kind of appliance in the form of a removable or fixed restoration which has been preserved for the patient can also serve as dental record in cases where the need arises.

11. Lastly even bill books used to charge the patients after the treatment can also be a valuable source of information, which may contain the kind of treatment and when it was done like.

THE INDIAN SCENARIO

India is 7th most populated country in the world with enormous men power. Unfortunately our country also happens to be mostly affected by disasters, terrorism, accidents and air or train crashes, resulting in loss of thousands of lives every year, some of these innocent people are never identified either because of their bodies are mutilated beyond recognition or there are no or fewer ante-mortem information if any, available.

India has around 260 dental colleges of a total of 960 in entire world, making country as containing 26% of world's dental colleges, graduating around more than 20000 thousands of students every year ⁽⁸⁾. This means we have enormous men power of dentists working in government/ private or corporate sector. Therefore, simultaneously much potential regarding forensics, but still we are lagging behind.

THE LACUNAE

These lacunas regarding this aspect are of two folds, dependent upon both the treating dentist and the general public as well. Some of these potential lacunae are.

Not many people in india visit dentist even once in their life. Even if they do so, that will be in dire situation of pain, for which they would like the offending tooth to be pulled out of their oral cavities. So such patients treated on emergency basis may have few records to none at all.

A large number of patients are treated by roadside quacks, which has to be legally stopped. Also, as of now there is no law making it mandatory to store and keep the dental records

The patients which are treated for routine dental treatments like, fillings/ root canals, crown and bridges also may not have any sort of dental records. And in case records are kept, they may not be kept for a longer time. In cases where, patients had been to a dentist and might had some sort of dental records, many a times it is almost impossible to locate & obtain any records

POOR QUALITY AM RECORDS/ NON AVAILABILITY

Also, as of now there is no separate specialization at graduate or post graduate levels in the forensic odontology in India. And general public is also largely unaware of this potential arena.

Lastly the most important aspect is funds and economy. To be able to maintain all these data, it takes lots of stresses, pain and funds, which we are already struggling for. But still that can not be an excuse in dire situations of life and death.

Thus, when nothing remains out of a body, except for a fragment of tooth, identifying the person to whom it does belong to, may at least make something at last to be returned to the grieved families. With above considerations, it is clear that a dentist can be an important source for providing valuable data to answer questions that arise during a death investigation.

CONCLUSION

As a tooth can withstand insults where all other tissues may not survive to be recognized, the importance of such tooth can be of interest in

identification of persons, provided good ante mortem records are available "there are fewer any records available particularly in our set-ups, we need to keep an accurate & ordered dental records of all the patients which may be of immense value in unfortunate events, thus making us to serve people even better with more responsibility and care"

Henceforth, this review paper primarily aims at making general practitioners aware about "the importance of keeping the various types of dental records & urging the concerned authorities to enforce a law making it mandatory to maintain dental records"

REFERENCES

1. Pretty ia, sweet d. A look at forensic dentistry- part 1: the role of teeth in the determination of human identity. *British dental journal*, 2001; 190: 359-366.
2. Fixott rh, forensic odontology: the dental clinics of north america, 2001; 45(2): 2001.
3. Savio c, merlati g, danesino p, fassina g, menghini p. Radiographic evaluation of teeth subjected to high temperatures: experimental study to aid identification processes, *forensic science international*, 2006; 158: 108-116.
4. Valck de. Major incident response: collecting ante-mortem data, short communication. *Forensic science international*, 2006; 159s: s15-s19.
5. Brogdon bg. *Forensic radiology, chapter 2: forensic radiology in historical perspective*. Crc press llc, 1998.
6. Stmson pg, mertz ca. *Forensic dentistry*. Crc press llc, 1997.
7. Caldas mi, magalhaes t, afonso a. Review: establishing identity using cheiloscopy and palatoscopy. *Forensic science international*, 2007; 165: 1-9.
8. *Indian dentist research & review*, 2007; 2.