

Literature Review

Role of Antemortem Data in Forensic Odontology: A Literature Review

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ABSTRACT

Forensic odontology is a growing branch of dentistry which deals with the identification of individuals from mass disasters with help of comparison of antemortem (AM) and postmortem data. The dental tissue is one of the most durable organs in the human body which is preserved even after when the deceased person is skeletonized, decomposed, or burnt. Forensic odontology also plays a role in the assessment of cases of child abuse, sexual assault, and age estimation. This article deals with the importance of collection of AM data in forensic odontology and the current trend in India.

KEY WORDS: Antemortem data, forensic odontology, mass disaster, personal identification

INTRODUCTION

Forensic odontology or forensic dentistry was defined by Keiser-Neilson in 1970 as “the branch of forensic medicine which in the interest of justice deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of the dental findings.” As of history, forensic dentistry originated at 49 A.D from Agrippina, the mother of Roman Emperor Nero, when she recognized her rival Lollia Paulina’s discolored front tooth after her assassination.^[1] As natural teeth are the most durable organs in the human body, it is very helpful in the identification of people in mass disasters, accidents, or where the bodies cannot be recognized by visual methods. A comparison of antemortem (AM) and postmortem (PM) dental records is considered to be a reliable method in determining human identity. Disaster victim identification (DVI) is the method used to identify victims of mass disaster incidents such as natural calamities, bomb blast, and aircraft crashes. Forensic odontology has a role in determining age, race, previous dental history, and socioeconomic factors of unidentified individuals.

ANTEMORTEM DATA

Different methods employed in forensic dentistry include radiographs, dental casts, dental photographs, cheiloscopy, bite mark analysis, tooth prints, and dental DNA analysis.^[2] The dental record contains legal document and contains subjective and objective information about the patient. Physical examination of the dentition and supporting oral and surrounding structures must be recorded. Clinical and radiographic records must be kept for minimum of 7-10 years. Pediatric dental patients’ records should be retained until the patient reaches the age of maturity.^[3] In 2008, the International Committee of the Red Cross (ICRC) launched its AM/PM Database to ide large quantities of data on missing

persons and unidentified human remains. Development of the AM/PM Database by the ICRC began in 2005 in consultation with numerous organizations and experts worldwide. The AM/PM Database was made available for use in 2008.

METHODS

Review of literature from PubMed indexed, Medline indexed, and Embase database articles was done. A total number of 464 articles from the time period 2000–2018 were reviewed and the review of these articles suggested a definitive role of AM data collection and its significance. Most of the articles were from the US, Europe, the Middle East, and Southeast Asia. However, the record maintenance and AM database with regular updating were found lacking in India. The different methods of AM data collection and materials are discussed below.

DISCUSSION

METHODS OF ANTEMORTEM DATA

1. Personal information data – It is the data that could potentially identify a specific individual. It consists of medical, physical, dental data.
2. Radiographs – AM radiographs play a major role in the identification of the deceased one. Various pathological and morphological alterations can be identified from the radiographs. These alterations can be compared with that of the PM dental records. Crown and root morphology aids in the identification. The presence of decayed tooth, missing tooth, restored tooth, fractured tooth, and impacted tooth are some of the common aids in the identification

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3. Dental casts, photographs, and case history sheet – These can be used as a positive identification of the deceased when compared to PM findings. People who often visit dentists and get restorative and prosthetic treatments are more likely to be identified by this method. AM records are collected and then compared with PM record
4. Lip prints (cheiloscopy) – This method is based on the analysis of wrinkles and grooves on the lip. Lip prints are unique for each individual as of fingerprints. Grooves can be classified as vertical grooves, branched grooves, intersected grooves, reticular grooves, etc.,. One common problem encountered during the cheiloscopy studies is that of smudging leading to unidentifiable marks when the grooves are not clear, individual identification is extremely difficult using this method.^[4]
5. Bite mark analysis – Bite can be defined as the mark made by human or animal teeth in the skin of alive people, cadavers, or unanimated objects with relatively softened consistency.^[5] Bite marks are the impressions left on food, skin, or other items left at a crime scene. It can be classified as tooth pressure marks, tongue pressure marks, and tooth scrape marks. Besides the agent identification, it can also be used to identify the kind of violence and the elapsed time between its production and the examination.
6. Dental DNA analysis – Dental structures are relatively more resistant to extreme conditions. Techniques involving DNA in forensic dentistry offer a new tool when traditional identification methods fail due to the effects of heat, traumatism, or autolytic processes as well as in distortions and difficulties in analysis.^[6] DNA can be extracted from pulp, cementum, dentin, etc.,. Extraction can be done by cytogenetic grinding. Obtained DNA is amplified by polymerase chain reaction.

AM data include all information on missing persons, such as personal, physical, medical, and dental information, as well as information on the circumstances of the disappearance of the person. Detailed DNA profile data for missing persons and persons (family members) can be manually entered or electronically imported. Multiple AM data interviews can be entered per missing person and consolidated.

The ICRC constructed a forensic information management tool (database) for use by other actors to effectively compile, manage, centralize, and process files on missing persons and unidentified remains. Development of the AM/PM Database by the ICRC began in 2005 in consultation with numerous organizations and experts worldwide. The AM/PM Database was made available for use in 2008. The AM/PM Database is an electronic tool for the management of information on missing persons and human remains. It manages information about missing persons and the events related to their disappearances, as well as recovered bodies (or body parts) and the sites where they were found. The AM/PM Database is highly configurable for use in a large variety of contexts. It is delivered in English but is fully translatable. In the DVI scenario, one of the tasks of the AM team is to maintain an AM record system according to the established protocols and to operate forensic dental software.^[7]

BASED ON ONLINE MEDLINE SEARCH OF MEDICOLEGAL CASES

1. Distribution of sex – 60% of cases belong to male and the remaining 40% belong to female
2. Types of death and crimes – 40% of cases were sexual assault, 10% were accidents, and 50% were criminal cases. The rest 12.14% of cases were suicide
3. Type of forensic report – Among 197 cases, 150 (75%) cases were solved by forensic medicine and 47 (25%) were solved by forensic odontologists in world literature. In total of 48 forensic cases which were solved by forensic odontology, only 2% of cases were solved in India
4. Total number of cases – The least number of forensic odontology cases were solved from the year 1453–1998. A moderate number of cases were solved from the year 2000–2012. The highest number of cases were solved from 2013 to 2017.^[8]

CONCLUSION

Forensic dentistry plays an important role in the identification of victims following mass disasters. In developing countries such as India, forensic dentistry is not developed up to the mark. Unawareness is one of the major reasons for this situation. Maintenance of dental records is still not proper enough, and services of forensic dentists are not being utilized. Extensive AM data collection, proper networking between dental offices through software, and proper awareness are essentially required for the growth of forensic dentistry. Forensic odontology should be properly educated and trained among dental curriculum.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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