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Forensic odontology: An analysis of challenges met by the Indian odontologist

Megha Dutta

School of Bio Sciences & Technology (SBST), Vellore Institute of Technology, Katpadi, Vellore, Tamil Nadu, INDIA

Baishali Ghosh

School of Bio Sciences & Technology (SBST), Vellore Institute of Technology, Katpadi, Vellore, Tamil Nadu, INDIA

Anannya Biswas

School of Bio Sciences & Technology (SBST), Vellore Institute of Technology, Katpadi, Vellore, Tamil Nadu, INDIA

Danie Kingsley *

School of Bio Sciences & Technology (SBST), Vellore Institute of Technology, Katpadi, Vellore, Tamil Nadu, INDIA. Corresponding author email: daniekingsley@gmail.com

> **Abstract**---The idea of using dental evidence in forensic investigations has aroused so much interest in the past that forensic odontology has even been suggested as one way to identify specific criminal cases. Forensic odontology plays an important role in situations where routine diagnostic procedures, such as finger printing and visual acuity, can be performed, in cases of decomposed, burnt or skeletal bodies. The lack of proper dental record and lack of the current practice of maintaining dental record, insufficient training in the field of dentistry for oral pathologist, lack of standard techniques, and lack of antemortem data are some serious problems faced in this field. This review articles deals with providing some solutions to the problems and assess the awareness regarding the dental record maintenance among dentists and create a national database for odontology.

> *Keywords*---Dental records, database, facial recognition, ant mortem data, visual acuity.

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Introduction

Forensic odontology is a branch of dentistry that applies dental science in order to provide evidence in the interest of the law It plays a vital role in identifying the remains of victims, not only those who have their limbs mutilated, burned and rotted, but also victims of natural terrorism and major disasters. Disaster events also underscore the importance of medical examiners in identifying industrial victims, aircraft accidents, natural disasters, and terrorist attacks including explosives, chemicals, radiological or nuclear, and they may occur as a single catastrophe or catastrophic event. Forensic odontology plays an important role in situations where routine diagnostic procedures, such as finger printing and visual acuity, can be performed, in cases of decomposed, burnt or skeletal bodies. Dentists are requested to assist in the event of a major disaster, which includes diagnostic and monitoring, referral, decontamination, infection control, monitoring and evaluation, vaccination, medication, testing, and additional medical care. [1]



Tooth size is an important tool that predicts the sex of each individual. Certain dental indicators such as the incisor Index, the mandibular canine index (MCI) and the Crown Index were taken from precise dental measurements indicating sexual dimorphism in the teeth. Studies show significant differences in the size of the male and female dental crowns. The mandibular canine shows a large dimensional difference with larger teeth in males than females. Incisors, premolars, first and second molars also shows significant differences. The width of the crown and the combination of root lengths are also used in determining gender. Dental age can be used as a tool for identification as dental maturity is not affected by nutritional and endocrine status. [2]

Problem Statement 1

The lack of proper dental record and lack of the current practice of maintaining dental record.

Defining The Problem

Dental implants are usually the last to be destroyed between body parts after death. It can be helpful in identifying a person in the event of a major catastrophe and with unknown rotting bodies. Dental records can help identify suspects in criminal investigations and medical cases. Dental record keeping is a legal obligation in many European and American countries. Unfortunately, the law is not very clear in India, and awareness is very poor.[3]

Dental records play a key role in identification of persons who are beyond visual recognition. It is essential for clinical practitioners to produce and maintain accurate dental records which includes detailed document of the history of the illness, diagnosis, treatment, physical examination, and management of a patient and is essential for good quality patient care as well as it being a legal obligation. The primary purpose of maintaining dental records is to deliver quality patient care and follow-up. Thorough knowledge of dental record issue is essential for a practitioner as there is an increasing awareness among the public of legal issues related to healthcare and increase in malpractices of insurance claim cases. With the increasing awareness among the general public of legal issues surrounding health care, in forensic purposes, and with the worrying rise in malpractice of insurance claim cases, a thorough knowledge of dental record issues is essential for any practitioner. [4]

There is a need to keep legal and professional records to protect any commercial, legal, and medical claims. All records must be up-to-date, and must be signed and dated. Legally, the dentist's written records weigh more than the patient's memories.[5]

Under Section 17-A of the Dentists Act, 1948, there are a lot of benefits for those who are competent in record keeping in order to maintain professional respect and dignity. The Indian Dental Association (IDA) recommends that in order to do so, a physician may keep records for up to 5 years in order to satisfy clients and the law, in order to protect them from medical negligence and complications. These records are related to the consent form, diagnosis, d, and medical follow-up records and allergies recorded to protect the patient's health. But the Indian Dental Council has not said anything specific and there is no effective regulation of professional management. [6]

Dental anomalies are also important in dental identification because they are relatively rare and offer a unique feature of tooth extraction without caries and dental procedures. As the incidence of caries decreases in more developed countries, the anomalies of dental diagnoses will increase even more. [7]

Solution

The only way to solve the problem is to create a national database for odontology and record maintenance among dentists. The information in the dental record should be primarily of clinical nature. This file contains a patient registration form with all the basic personal information. The information should not be ambiguous or contain many abbreviations. In clinical practice with multiple practitioners, the identity of the practitioner performing the treatment must be clearly stated in the file. All entries in the patient record must be dated, initialized, handwritten in ink, or printed on a computer. In the written note, the following are examples of what is normally included in dental records: [8]



Maintenance of record

Many dental clinics use traditional paper charts, but electronic recording has significant advantages in terms of quality and patient safety and can increase as more dental clinics and hospitals are computerized. [9]

10-step process to ensure that your records are correct:

- 1. Use a consistent style for your entries. Using the same colour and pen type improves the appearance of the record and uses the same abbreviations, spellings, and so on.
- 2. If the record is manipulated and displayed in some way. These mysterious corrections can compromise the overall record and the credibility of the treating dentist
- 3. Use Ink-The pencil may fade and ask if the record has changed.

- 4. Write Easy to Read Unreadable records can be as bad as no records at all. Hard-to-read entries can lead to guesswork from others, which can be bad for you.
- 5. Express Concerns about Patient Needs-This shows that you have listened, empathized, understood, and responded to your wishes.
- 6. Use citations to distinguish between patient comments and your own.
- 7. Don't write derogatory statements in the log extra entries are only useful to convey a non-professional feel and can question the overall reliability of the rest of the log.
- 8. Negative attitudes towards the patient, such as failure to follow your advice or keep promises, should be recorded in a calm and objective manner. Fully Documented No need to skim your notes.
- 9. Detailed explanations are always better than lack of information. Use only accepted abbreviations for treatment. This is useful both in malpractice situations and when transferring records to another dentist for referrals, pre-approvals, or dentist changes.
- 10. Document Verification Insurance details and other third-party materials should be kept separate from items directly related to patient care.
- 11. Keep Time Series-A hole punch and a metal retaining clip at the top of the record will help you organize loose leaves. By following these steps, you can create accurate and defensive records. [10]

Retention and storage

There is often a distinct requirement for the retention of data of children. These data ought to be stored for a positive duration after the kid will become a major. The dental workplace must have a data retention coverage and all of the workforce must apprehend it. The workplace's expert legal responsibility coverage organization will probably have tips approximately retention. The storage location for these records must be secure and access must be tightly controlled.

Confidentiality

The dentist is in a privileged position to know a lot about the patient, and this knowledge is acquired on the assumption that it is confidential. Confidentiality promotes open and honest communication, strengthens the relationship between the dentist and the patient, and promotes patient autonomy and respect for privacy. Forensic dentistry is the intersection of dentistry and legal profession. The most common element of forensic dentistry that a general practitioner is likely to encounter is the provision of prenatal (pre-death) records to facilitate individual identification. Forensic dentists are often called to identify the bodies of individuals who are not visually identifiable. This includes a variety of situations, such as incinerated, severely disassembled, or severed debris. Identification is usually done by comparing pre-death (pre-death) and post-death (post-mortem) records. [11]

- 1. Disclosure of relevant information to other medical professionals involved in the care of the patient.
- 2. Information may be disclosed, for example, to a third party with the consent of the patient or legal counsel.

- 3. In writing, insurance company Requesting information about a deceased patient and obtaining consent from real estate or relatives, and investigating sudden, suspicious, or unexplained deaths
- 4. Legal opinion including only relevant dental treatment Information required to create Dental Consultation Records by police.
- 5. Search and seizure warrants may not contain dental records and should be carefully reviewed according to the clinical research protocol and peer review procedure.
- 6. The patient's name must be kept secret. If the information is used for educational purposes, it is necessary to obtain the consent of the patient. [12]

Problem Statement 2

A current survey shows that the low confidence of oral Pathologist in dealing with forensic cases is mainly due to insufficient training in the field of dentistry, insufficient exposure to the subject, low value given to the subject in the degree curriculum and lack of practical exposure to forensic cases and no clear outline or format is provided in the postgraduate curriculum. [13]

Solution

The need for accurate forensic research will expand the scope of this exciting science in India. Based on the results of a current study, recommendation was made towards development of plan, which should be implemented in three phases. In the first phase, the student degree program should be developed by including preclinical odontology forensic presentation, followed by clinical training. There must be a detailed system to ensure exposure to case trials. Forensic medical training and other branches of forensic science should include the forensic aspects of dentistry. Teachers need training to teach forensic dentistry.

In the second phase, a systematic graduate training program should be developed, with significant clinical exposures for a variety of skills, especially oral pathology and microbiology. The graduate must develop sufficient knowledge of proper reporting in the police department, record keeping, crime, legal intelligence, computer use and forensic photography. In the third phase, they recommended that postgraduate diploma / certificate courses / short courses begin in a specialized field of dentistry. They also recommended the establishment of well-equipped dental laboratory referral centers (at least at regional level), strategic planning and, most importantly, the improvement of record keeping as mentioned above in the first case. [14]

Problem Statement 3

Dental identification with antemortem data is primarily based on two factors- one is the availability of antemortem dental records and the accuracy and completeness of those records. However, there are people who have never visited a dentist in their lifetime and do not have dental records. In addition, some institutions are not accustomed to keeping records, or they will discard their old records after some time due to the availability of space, so even if someone has previously visited a dentist, the records may have been discarded, which may contain helpful information. [15]

Solution

If antemortem dental records can be easily found or accessible, then the work of a forensic odontologist in this case will be made easier. The results of physical examination of the teeth and surrounding oral and surrounding structures should be recorded. In addition, the results of clinical, laboratory tests, research simulations, photographs and radiographs become part of the record and should be kept for 7-10 years and the records of paediatric dentists are maintained until the patient reaches the age of maturity. In young people, age estimates are found to be accurate because most teeth are growing and the interval between morphological stages is shorter, and therefore more accurate. However, this is not the case in adults. After 15 years, all permanent teeth are fully grown, and age testing causes a significant difference between the dental age and the sequence of periods. [16]



Keeping an electronic record can be easily connected to the network and transmitted for consultation with general practitioners or forensic cases that require dental records to be identified. Computer-assisted management technology (e.g., WinID3 dental comparison software integrated with Dexis digital radiography) has been instrumental in speeding up comparisons of pre- and postmortem dental record information. Additionally, software such as Adobe Photoshop and Mideo systems case PACS, enable digital scanning of digital radiographs and images for comparison. [17]

Case Study

The Skulls of Annigeri (Karnataka)

When a drainage withinside the village of Annigeri in Hubli-Dharwad in northwestern Karnataka became being desilted on August 29, 2010, several skulls have been discovered. Over the following few days, greater digging across the area discovered four hundred to six hundred such skulls. There have been few clues as to wherein the skulls got here from, such a lot of theories have been proposed: a few ideas they belonged to infantrymen killed in beyond wars, at the same time as others idea they have been the stays of a genocide; nevertheless, others speculated that they will be the stays of human sacrificial rituals that have been not unusual place in that area on the time, at the same time as the opportunity of a herbal catastrophe became now no longer dominated out. The Office of the Deputy Commissioner, Dharwad, and the Directorate of Archaeology and Museum of Karnataka made a proper request to the Department of Forensic Odontology at SDM College of Dental Science & Hospital in Dharwad in May 2011 for help in estimating the age, figuring out sex, and figuring out if the skeletal samples confirmed symptoms and symptoms of trauma. Because the samples have been given blanketed status, they needed to be tested at a website 60 kilometres away. Dr. Sudeendra Prabhu of Oral Pathology and I visited the web website online in June 2011 to have a look at the stays. Over the path of a seven-hour period, the samples have been very well evaluated on-web website online. Dr. Abhijit Joshi, an Oral Surgeon from SDM College of Dental Sciences & Hospital, assisted with the trauma evaluation offsite.

The findings have been documented in an 18-web page report, which said that the pattern covered a various organization of kids and adults, men and females, showing signs of blunt and sharp pressure injuries. Radiocarbon relationship evaluation achieved at a US laboratory confirmed that the web website online might be a hundred and eighty years old. The dentist's end that our bodies contained a heterogeneous aggregate of fellows and women, in addition to kids and adults, helped to disprove a selected theory, with skeleton specimens from 1792 to 1792. It contributed to the authorities' end that they have been maximum in all likelihood sufferers of famine 1796. It is likewise recorded with the aid of using the Gazetteer of the Bombay Presidency. In fact, the Faculty of Archaeology recounted that conclusion have been drawn primarily based totally at the evaluation and reporting of radiocarbon relationship supplied with the aid of using Derwad's Faculty of Law and Dentistry. This is simply one in all many examples and makes use of of tooth to remedy historical and contemporary-day mysteries. [18]

The Nirbhaya case

On January 1, 2013, Delhi police requested Dawad's School of Law and Dentistry to assist in examining the bites found on victims in the "Nirvaya" case. The next day, a deputy inspector at the Vasant Vihar Police Department in New Delhi flew to Dwad's SDM Dental Science Hospital, presenting a photo of the bite found in the victim and a dental model of five accused adult men. case. Bites are usually found in sexual assault crimes and may reflect the criminal's intention to control the victim. Criminals can also enjoy chewing. Such bites can be very similar to the teeth that made them, like fingerprints.

It was determined that the victim's body had 56 bites, which were thoroughly analyzed and compared to the teeth of five defendants. This study used computerbased 2D digital analysis. After five days of analysis and investigation, police received a detailed report concluding that the teeth of the two suspects may be associated with a bite.

On May 6, 2013, I was summoned to the Saket Court in New Delhi, where I was cross-examined by three lawyers for about an hour and a half to review the report. Of course, all of this was kept as secret as possible, and most of my colleagues and students only learned through media coverage after the Sackett Court's decision that they were involved in September of that year. The Honorary Judge accepted my testimony and contributed to the conviction of two of the defendants. [19]

The Ajnala Assemblage (Punjab)

In 2016, Dr. Ashith B Acharya was asked by Panjab University in Chandigarh to help analyze age, death, gender, population affinity, etc. from skeletal material recovered from obsolete wells in Ajinara, Punjab. He did. These sites were considered historically important, given that they are likely to belong to Indian soldiers killed by British troops during the rise of 1857. After a detailed analysis, a report will be submitted and some of the results will be published in the Journal of Forensic Odonto Stomatology in 2021. [18]

Sheen Bora

Dr Sunil Kumar Tripathi, 72, became an indictment witness on Friday, January 3, the first witness in 2020 at the Sheena Bora Murder Trial held at Court 51 in Mumbai City, South Mumbai Citizens and Session Sessions since 2017. became. On Friday, both winter and New Year danced cheerfully in this courtyard. No. 51 had fans. The window just opened a crack. Defendant No. 4 wore a slightly wrinkled charcoal jacket by Star India and former CEO of INX Media, Peter Mukelja, to counter Mumbai's unusual, small but low mercury decline. rice field. and 2020 emerged unexpectedly, quickly plunging its vibrant head into these boring courts, like politicians, offering incredible promises of new beginnings and hopes. Originally from Varanasi, Tripasi, who was the director of forensic medicine at the University of Benares Hindu until his retirement in 2018, has been called to the witness stand as an expert by a prosecutor who is usually silent and calm. rice field. Special Counsel Manoi Charadan. The forensic

scientist performed a skull photo overlay test in 2015 using four images of Sina and a skull photo found in the Rigad district of Maharashtra. The Skull Overlay Test uses computer software to sequentially map the similarity of various facial features between a photograph of a deceased person and the skull. Through a series of frames and the magic of a high-tech computer, you can view your photos to match the skull perfectly. So, in just 18 frames, the petite Sina's photo, with a victorious smile and starry eyes, flesh falls from the bones of the face, blends into what the CBI claims, and dents in the corresponding yellow, swollen skull. there is. An unforgettable eye socket. The purpose of these tests was to re-prove that the skull found in the Gagodcard region of Rigad in 2015 matches Sina's photo (although unlike the body found in the same location, this is 2015. It is not specified whether it is a skull excavated in) 2012 site.



Extracted from: https://www.rediff.com/news/special/sheena-bora-case-and-then-sheena-disappeared/20200104.htm

Dr Tripathi had found out this method after he had attended a solitary workshop on facial reconstruction in 2004 performed through "a global professional of fame on this discipline" Mehmet Yasar Iscan at Punjabi University at Patiala. Iscan, a forensic anthropologist at Istanbul University's Institute of Forensic Sciences, specialized in human facial photo identity and has written books on reconstruction of existence from a skeleton. Since then, Dr Tripathi has been running withinside the discipline of craniofacial identity, has written a few eighty papers at the concern in each Indian and global journals and regarded in 5 courtroom docket cases, inclusive of the Sheena Bora trial, as an professional in cranium-picture graph superimposition. Dr Tripathi's language become frequently convoluted, tortuous and difficult to fathom, in particular considering he continuously referred picturesquely to the pictures of Sheena, that he used for his process, as "stay pictures" as though the sufferer had been over again alive sitting withinside the court docket among us. He instructed the courtroom docket: "I commenced my superimposition paintings through taking numerous virtual pictures of cranium from exceptional angles with exceptional facial profiles. Simultaneously, I (have) selected 4 stay pictures of Sheena Bora. These stay pictures had been (having) very unique characters -- having a grin face with seen enamel." "These pictures and virtual cranium pictures had been processed as consistent with the want of the software program and superimposition made." "Finally, whilst all characteristics (which) belongs to the face of Sheena Bora and the furnished cranium, suit every other. Then I take into account the seen smiling face, enamel and the cranium's the front enamel to suit the diverse variables, for

example, shape, size, teeth direction, hole among teeths etc." "Those variables additionally observed to suit every other, having all comparable characteristics. Thus, I concluded that, all 4 units of stay pictures and the furnished cranium of virtual pictures belongs to every other..." "Therefore, whole character identity become made -- of the pictures of Sheena Bora and the furnished cranium.

Conclusion

Producing, and maintaining clear and accurate patient records should be an important part of the dentist's responsibility. Success in this work will assist the dentist in making a legal claim and can assist the police and case providers in properly identifying people. The principles applicable to handwritten records also apply to computer records, for example, entries must be date, time, and operator stamp, all changes made must be tracked, and any codes used should be easily translated into common language. Records should be easily accessible and sensitive data needs to be controlled, for example, by using passwords. A systematic training program and well-equipped dental laboratory should be developed for betterment.

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