

HISTORICAL PERSPECTIVES OF FORENSIC ODONTOLOGY: A REVIEW

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ABSTRACT:

The field of forensic science has come a very long way. The technique applied in modern dentistry has evolved through the evolution of humankind, starting way back from the Garden of Eden to the modern scenario in the identification like DNA profiling .Forensic odontology provides information of physical characteristics, ethnicity and sex determination. The aim of this paper is to give a brief overview of the evolution and the historical perspectives of forensic odontology in identification and other medicolegal issues .Summarizing such incidents might serve to progress the development of international standards in both DVI practices and the use of forensic odontology for identification in multiple fatality incidents. They are gradually implemented and utilized in today' s services . Now forensic odontology is contributing the best practice to disaster victim identification and solving other medico legal matters. This article will create a general awareness to the future and present generation about the incidents of the past that dental evidences have solved . Advances are based on the previous researchers and finding.

Key-words: Forensic dentistry, Forensic identification, Forensic Odontology. Identification.



INTRODUCTION

Today forensic odontology is consider to be a specialized and reliable method of identification of the deceased, particularly in multiple fatality incidents. Forensic odontologists are involved in all phases of disaster victim identification. While this reputation has been gained from implementation of the works and inventions of great researchers and dentist and the application of forensic odontology in both single identification and disaster situations done ,over a number of years .Studies by the pioneers throughout the ages has help us in paving the way for a successful and fruitful life.

Forensic odontology is an interdisciplinary filed between forensic

medicine and dentistry.^[1] It is that branch of odontology which is concerned with the proper evaluation, interpretation and presentation of dental findings in the interests of justice.^[2] Forensic dentistry has always had a role in the identification and however the role has changed in recent years, as advances in forensic odontology, genetics and anthropology have improved the chances of identifying victims beyond recognition.^[3] Dr. Oscar Amoedo was considered as the father of the forensic odontologist. The thesis done by him entitled 'L' Art Dentaire en Medicine Leagale' to the faculty of medicine earned him a doctorate. This book is the first comprehensive text on

forensic odontologist.^[4] Dental evidence have been used in the situations like identification of human remains in mass fatalities and in assessment of bite mark injuries and age estimation and sex determination ,cases of abuse (child, spousal, elder) and civil cases involving malpractice.^[5]

Adam's bite mark in forbidden apple from the Garden of Eden marked the begging of forensic odontology.^[6,7] Earliest accounts of the use of forensic odontology in identification have been driven by external agencies rather than from within the dental profession. Later it were characterized by inexperienced practitioners and little procedural formality. An organised and semi-formal service commenced in most states in the 1960's although its use by police forces was spasmodic. Service provided by qualified and experienced forensic odontologists is highly professional and regularly utilised by police and coronial services. Later the value of forensic odontology was recognised by dentists, the obligation to demonstrate efficacy through scientific rigour was embraced and has seen the evolution and maturity of what is now. From that time forensic odontology has been a major contributors to the identification has been a major contributor to the identification.

Advances are based on the previous researchers and finding, they are gradually implemented and utilized in today's services thus paving the way for a successful and fruitful life. Now

forensic odontology is contributing the best practice to disaster victim identification and solving other medico legal matters. This article brings a general awareness to the future and present generation about the incidents solved by using dental evidences.

EVOLUTION

According to the Old Testament, Eve convinced Adam to put a bite mark in apple. It was told that "It is always tempting to suggest that the history of bite mark evidence (forensic dentistry) began with the eating of forbidden fruit in the Garden of Eden.^[7]

2500 B.C: First dental evidence found in pyramid at Giza-a skull with gold wire holding molar together.^[8]

45-70-Rome Nero: First evidence of dental findings used in Forensic manner. Nero's Mistress (Sabina) had Nero kill his mother was identified by two Maxillary Canine teeth.^[8]

1453 : the first formally reported case of dental identification was that of the 80 years old warrior John Talbot, Earl of Shrews bury, who fell in the battle of Castillon.^[9]

1477 : Battle of Nancy, body of Charles the Bold was identified by the absence of a lower tooth.

1193 : Indian monarchy was destroyed by Muhammad's army and Jai Chand, Raja of Kanauji was murdered and he was identified by his false teeth.^[5]

66 AD: During 66 AD with Agrippina and Lollia Pauline case. Agrippina after her marriage with Claudius, emperor of Rome, Agrippina tries to secure her position. She feared about rich divorcee Lollia Paulina may still be a rival for her husband. She decided that it would be safer if Lollia Paulina was dead. She instructed her soldier to kill Lollia Paulina and further instructed to bring the head back. She was satisfied by Lollia Paulina death by the identification of dental alignments and certain distinctive characteristics. It was the first use of dental identification where there is a record.^[10]

1700's

1758 : Peter Halket was killed in wars in a battle near Fort Duquesne. His son identified his skeleton by an artificial tooth .^[11]

1776: First mention of dental forensics in American history concerns the Paul Revere who identified the body of General Joseph Warren by a missing Maxillary Canine tooth which was replaced by a piece of Walrus Tusk as Pontic.^[.8]

1795 : Prince Louis XVII died in prison at the age of 10 years 2 months in Paris on 1795 due to tuberculosis of lymph nodes. A plan was made to erect a monument to the young prince. But many rumors were generated regarding the prince that he was still alive, and another child was buried in his place. The story continued in 1846, in the reconstruction of a church. The skeletal

of a child containing a lead coffin was found near the side entrance. A physician, Dr. Milicent examined the bone of the body and concluded that he had died of bad breath and neglect.^[4]

1800's

1814 : Use of a dentist as an expert witness was well documented in 1814 in the case of Mrs. Janet Mc Alister in Scotland. A lecturer of anatomy Dr. Granville Sheep Pattison and two of his students was charged at the high court in Edinburgh for the violation of Mrs. Mc Alister grave. They have moved the body of Mrs. Alister after the burial to the nearby college. It was found by dental evidence in the form of the maxillary denture that was found in the heads in the dissecting room. Dr. James Alexander, Mrs. Alister's dentist, was the witness for the prosecution. He tested that a set of her denture fit in only one of the head in the dissection room.^[12]

1831 : Caroline Walsh moved in with Irish married couple after that she was never seen again. It was stated that the missing woman was found on the streets in a 'squalin' condition, and it was stated that her name was Caroline Walsh. In the trial, it was pointed that Caroline Walsh had perfect teeth. But this Caroline Walsh had lost her front teeth many years ago. Mrs. Walsh was never found, and the accused was convicted.^[13]

1835: Turner et al. reported that the Countess of Salisbury was burned to death and was identified by her gold denture.^[8]

1849 : Dr. **George Parkman** ,a physician failed to return from dinner .A suspicion was made on John White Webster .When his laboratory was searched, remains of the human body were found .Dr. Parkman's dentist, Dr. Nathen Cooley Keep identified Dr. Parkman body, by his teeth as a part of upper and lower denture which he was made for Dr. Parkman 3 years earlier. Dr. Keep showed the court and Dr. Webster was found guilty and hanged over. This was the first case of a dentist in giving an expert testimony in courts of United States.^[8]

1865: Abraham Lincoln was the 16 president of the United States, was shot dead on April 14th, 1865. John Wilkes Booth shot the president and escaped to Virginia. The US Cavalry surrounded the barn and set in on fire. Booth was shot dead at the spot. But after many years, the rumors spread that Booth was escaped and was still alive. So the body was disinterred and examined again in 1893. The family dentist identified Booth body by the peculiar formation of the jaw that has been noted in the dental records made by the dentist during a dental visit for restoration of a filling.^[14]

1868: William, the conquer fell from his horse and died at the age of forty-four. His tomb was erected .Those who are presented stated that bones and teeth are in very good condition, as if the king William I had died only yesterday, instead of 768 years ago. So the forensic dentist made the identification on the basis of durability and longevity of

teeth even though the bodies are severely damaged or long buried.^[15]

1870: Mrs. Robinson was murdered, and the suspicion was made on Mr. A. I. Robinson of murdering his mistress. A comparison was made on the basis of bite marks. Mr. Robinson had five maxillary teeth and the suspect was identified but was not found guilty.^[16]

1873: A body was found in the ashes of burned cottage in Maryland. The body was identified as Winfield S. Gross tentatively by Mrs. Gross and ten witnesses. Mr. Winfield s gross has insured him for \$ 25,000 prior to fire. The insurance company refused to pay Mrs. Gross. A forensic dentist was needed in time. It was stated by Mrs. Gross that Mr. Gross had never complained of pain or decayed tooth in his lifetime and there were no artificial teeth to her knowledge. He had never had a visit to a dentist in her lifetime. The body was found in the ashes was examined at Baltimore college of dental surgery. A detailed description was given by Dr. F. J. S. Gorgas of the jaws and the remaining teeth. It was stated that there was no misalignment in the lower jaw, and there were two teeth in the upper jaw. Variance was observed between Mrs. Gross and the forensic dentist. It was proven that the remains do not belong to Mrs. Gross. The body of the murdered man was found in Pennsylvania. Mr. Udderzook, who was the brother in law for Mrs. Gross, and was seen travelling with an unnamed friend to Pennsylvania. The victim was

identified, and all the other characteristics were very similar to Mr. Gross. So finally Udderzook was charged and prosecuted in 1874. The fate of Mrs. Gross was not known.^[11]

1988: Lockerbie air disaster where 209 of 270 were identified with the aid of forensics dentistry.^[17]

1897: King William I died at the age of 44 and his tomb was erected in 1868. Those who are presented stated that bones and teeth are in very good condition, as if the king had died only yesterday, instead of 768 years ago. So the forensic dentist made the identification on the basis of durability and longevity of teeth even though the bodies are severely damaged. Dr. Milicent examined and concluded that he had died of bad breath and neglect. Dr. Recamier examined and said that they were those of an individual, of aged 15 or 16 years. A relation of Louis XVII in 1897 gained permission to again research for the coffin. As a base of the tooth development, three experts aged the skeleton at between 16 plus and 18 plus years. Finally, it was concluded the remains was not Dauphin. It is documented as the first cases of forensic dental age estimation.^[6]

1900's

1903 : The famous Iroquois theatre in Chicago was burned in 1903 and for about 602 of the 1,842 patrons was died in the theatre. But no records of the identification are found today. But, Dr. Cigrant quoted in his article that

hundreds were unmistakably identified from the dental records.^[18]

1927: Ryan mentioned the identification of US Sailors from an accident in, commenting on the high quality of the dental records kept by the Navy.^[19]

1932 : US of lip prints as identification and was recommended by Edmond Locard in France.^[20]

1934: Pyjama Girl Case a murdered woman who remained unidentified for 10 years, ostensibly due to unreconciled dental information. The badly burned remains of the victim were discovered by a farmer in a road culvert near Albury in September 1934. The body was clothed only in pyjama remnants and revealed little other identifying information. A post-mortem was carried out and a local dentist, Dr Francis Jackson, was asked to complete a dental autopsy. His unorthodox procedures can best be explained by his inexperience in forensic odontology, but mitigated by the fact that few people had any experience at that time. At the subsequent Supreme Court trial he admitted that this was his only experience of forensic odontology and he found the process "revolting and unnerving".^[21,22]

1937: In Chantilly, a murder was convicted on the evidence of the bite marks that the victim inflicted during her struggle for life.^[9]

1938 : Gustafson recounted the identification of the 29 victims using dental evidence of a fire in Oslo.^[23]

1945: At the end of the World War II, rumors were rampant that Adolf Hitler had escaped with Eva Braun, his wife. But it is a fact that they both died together in 1945, and their bodies were burned and buried by Russian soldier. It was a challenge to dispel the rumor, due to lack of antemortem and postmortem records. Finally, remnants of a bridge were identified in the pieces of Hilter's jaw because of the unusual form of reconstruction and evidence of periodontal diseases. Hilter's dentist Hugo Blaschke record work was matched with dental work of Hilter and was confirmed the death of Hilter .^[24]

1945: Strom and Gustafson reported that Norway is considered to have established the first Identification Committee in. In the police orders of 1948 relating to this Committee the following was reported; "In all cases where several victims are found at the same spot, the local prefect of police should appoint an identification committee consisting of three members; a police officer, a dentist and a doctor. This committee has the whole responsibility for the procedure of identification. The committee has to give a report of all details concerning the identification in relation to each body. Each single identification certificate is to be signed by all members of the committee. A body, therefore, is not considered identified unless the committee members are in complete agreement as to a positive identification. In cases of doubt the Prefect of Police should decide either whether the body is

to be considered as identified or whether it should be buried as unknown. In the last event or in cases where it is impossible to establish the identity at that time, the body should not be buried until an exact description of the teeth is obtained." This was very forward thinking for the time, and is still sound policy sixty years later as it codifies the key principles that continue to underpin DVI today.^[23, 25]

1950 : Frykholm described a Swedish shipping accident where 15 were killed and Mercer, Reid & Uttley and Warren a rail accident in New Zealand in 1953 where 151 perished, all where dental identification made a contribution. The odontology aspects of the identification of the 118 victims of a fire aboard the SS Noronic in Toronto Harbour were described in detail by Grant, Prendergast & White in 1952.^[26]

1950 : Teare discussed the identification of the 28 victims of a plane crash.^[27]

1953 : Mercer, Reid & Uttley and Warren a rail accident in New Zealand where 151 perished, all where dental identification made a contribution.^[28]

1969:The American Academy of Forensic Sciences was established.^[8]

1970: Prior to this at accidents such as the crash of a passenger train and bus at Gawler (17 deceased) and the 1972 crash of a light aircraft at Golden Grove (8 deceased) scene recovery protocols were well established but not the use of the standardised forms to document body

recovery, ante-mortem and post-mortem information.^[29]

1972: Houston Mass Murders: Paul G. Stimson identified 27 boys in Houston mass murders using dental evidence which was marked as a great deal in Forensic identification.^[8]

1979: Airline Crashes, Chicago and San Diego: 191 Victims who died were identified by their dental records in American Airlines Flight crashes in 1979.^[30]

1981: The Victorian DVI odontology team was formed in, and over 35 dentists volunteered to help Dr Bastiaan when the need arose. Twenty two of these volunteers assisted after the Ash Wednesday bushfires of **1983** claimed 47 lives in Victoria. Fourteen of the 22 (64%) Victorian victims who could not be visually recognised were identified via forensic odontology.^[31]

1978: Spurred by a fuel tank explosion tragedy in, Spain Interpol explored the need for improved co-ordination and consistency in the identification of victims of mass fatality incidents and established a working party on Disaster Victim Identification in 1982. In this incident, a road tanker carrying liquefied petroleum gas exploded killing over 200 people from a number of countries. Victim identification had proved difficult and highlighted the need for guiding principles that would enhance international cooperation and improve the coordination of responses to similar incidents. Interpol's working party

evolved into a Standing Committee, and built on the work of Pedoussaut. The Standing Committee still meets annually and a section of its agenda is devoted to analysis of case presentations, to enable practitioners to learn from the experiences of actual incident responses.^[32,33]

1979: Chicago. American Airlines DC10 crash. 274 died. 200 ID'd with dental evidence; 1979 Antarctic in the recovery and identification of the victims of the plane crash into Mt Erebus was reported as the first use of a grid reference for recording the scene and the location of body and body parts.^[32]

1982: Contra Costa County, CA. "America's worst tunnel fire" took seven lives. Sogannaes el demonstrated the uniqueness of bite marks even in identical twins by computer comparison.^[34]

1983: The largest mass fatality incident in the recent history of South Australia was the 'Ash Wednesday' bushfires of Twenty eight South Australians lost their lives in fires in the hills surrounding Adelaide and in the south east of the state near Mount Gambier. This incident saw the first activation of the newly written State Disaster Plan. Eight (29%) of the South Australian victims were identified by dental comparison.^[35]

1991: In May 21st, the assassination of Rajiv Gandhi, a leading and dynamic person of India took place. The murdered of Rajiv Gandhi was compared with the assassination of John F Kennedy

of USA. In the investigation out of 18 bodies, 17 bodies inclusive of Rajiv Gandhi body were identified. The one body of dismembered parts which was correlated with skin, absence of body hair, same nail polish color on fingers and toe nails, and finally concluded that it was a female, who was the human bomb. And it also gave an indication the female carried the bomb in the abdominal belt.^[6]

2000's

2000: Famous case involving forensic dentistry entailed a partially eaten apple. While a gunman was waiting for his intended victim, he got hungry and took a bite from an apple. After culminating his dastardly deed the gunman fled, leaving behind his victim and the apple. Bite marks and trace organic materials left on the apple provided "a full description of the gunman, including his physical appearance, and led to his arrest and conviction".^[36]

2000 : Alaska Airlines Flight 261 crashed in California near Ventura, killing 88 passengers and crew. Forensic dentists summoned to the scene found few intact jawbones and worked with partial post-mortem records, comparing these with the full ante-mortem dental charts which were sent to them from the victims' dentists. In total, 22 of the victims were identified through their dental records.^[32]

2001: In the attacks on the World Trade Center, 501 victims by dental comparison. Dental ID's used for victims

of Pentagon and Pennsylvania plane crashes. Presa Canario dogs maul and kill woman in San Francisco, bites analyzed by forensic dentists.^[32]

2002 : After Bali bombing more than 60% of the victims were identified by dental evidence.^[31]

2004: The great disaster was seen in Indian Ocean earthquake in 2004. The earthquake was known by the scientific community as the Sumantra Andaman earthquake, and the waves are so-called Tsunami waves. The Tsunami victims in south East Asia in December 2004 was successfully identified by forensic odontology. More than 92% of non-Thai is been identified out of which 80% were identified by dental formation.^[3]

2009: In Australian bushfires that raged across the state of Victoria, 173 deaths were identified by dental comparison.^[37]

2012: In the Delhi gang rape case, a forensic dentist was able to link two of the accused to the crime. It was done by comparing the arrangement of the teeth with the bite mark which is left on the poor young victim. It was stated by a dental expert that photographs of bite mark seen on the victim and structure of the dentition of the two accused proved with some accuracy. Totally, 6 men were arrested, and one among them were juvenile. Among the 5 accused, 2 of the dentition matched with a bite mark. So it was finally stated by the dental expert that no two persons will have a similar arrangement of teeth.^[6]

CONCLUSION:

Today we consider forensic odontology to be a specialized and reliable method of identification of the deceased. However the tasks of Forensic odontologists have broadened in recent years to cover issues related to child abuse and domestic violence, human rights protection and professional ethics. This reputation has been gained from the application of forensic odontology in both single identification and disaster

situations over a number of years by the works of great researchers and dentists. This paper summarises some of early uses and incidents of forensic odontology that led to victim identification and other issues solved by forensic dentistry.

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