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THE ODONTOLOGICAL IDENTIFICATION

Lăcrămioara BĂLAN¹

Abstract:

Forensic Odontology is a fascinating and challenging field .Are multiple areas in which a forensic dentist can interact with police investigations. Human identification is the forensic odontologist's primary duty: Who is the victim? Forensic Odontology are the responsibility of investigating the evidence from cases involving violent crime, child abuse,elder abuse, missing persons and mass disaster scenarios and the new threats to urban centers from terrorist attacks.

Dental evidence can be used to identify both the people who were present during the commission of a crime or witnesses to an accident. . use dentists to testify on dental evidence obtained

from a crime scene or crime victims. Occasionally, a perpetrator of a crime leaves evidence at a scene. Bitten food, gum, or chewed objects may berecovered by law enforcement. Autopsy investigations may notice bitemarks on the skin of a deceased victim. Tooth shapes, appearances, tooth fragments,metal restorations, pieces of skulls, and jawbone fragments may possess features that can be associated with just one person. The robust identification value of DNA, obtained from the inside of teeth and oral fluids, has created an entirely new level of identification: the biomolecular identification of individuals.

Keywords:

Forensic odontology; tooth; bitemarks; biomolecular identification of individuals; criminal cases.

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Human identification is the forensic odontologist's primary duty: who is the victim? This involves the dentist as a team member working along with law enforcement agencies. This team is charged with the responsibility of investigating the evidence from cases involving violent crime, child abuse, elder abuse, missing persons, and mass disaster scenarios. In each context, dental evidence may produce compelling associations to aid victim and suspect identity and to establish facts that can affect the direction and ultimate outcome of investigative casework.[5] Dental evidence can be used to identify both the people who were present during the commission of a crime or witnesses to an accident. The forensic dentist interacts with other forensic and medical disciplines like anthropology, pathology, human anatomy and biological science.

The aspects of proper forensic evidence recovery require a knowledge base in the following steps:

- *Recognition (detection)*: Teeth and related physical evidence derived from the oral cavity must be observed by responding crime scene and accident investigators. These professionals must also be familiar with common objects that may contain transfer evidence such as saliva or tooth impression evidence. These objects include human skin, clothing, duct tape, envelopes, chewing gum, telephone receivers, and foods such as cheese and various types of beverage containers.

- *Documentation (recording)*: Physical evidence obtained from a crime or accident scene should be left in place, properly lighted, and photographed. This establishes its condition and context with the location prior to investigative measures that may disturb or somehow alter its condition. The photographer must take the time to place size-reference scales or rulers in some of the evidence photos. This allows the pictures and the evidence to be later made into life size via photographic or digital processing. Written notes or log sheets with pertinent descriptions should be kept by the investigator who is responsible for the evidence collection.

- *Collection*: The intent is to capture the dental evidence for later analysis. This commonly includes bagging biological objects (saliva stains, loose teeth, or foodstuffs) in labeled paper bags. Bitemarks in skin, if observed on a victim at a crime scene, should be rigorously photographed and then swabbed. Recreating the position or posture of the person bitten should be considered, but in the absence of a victim's statement or reliable witnesses, all alternatives should be considered.

- *Preservation*: Protocols for the capture and preservation of biological evidence (tissue, blood, semen, or saliva) must be stringently followed. Foodstuffs cannot be preserved for long periods of time without drying and deteriorating. The method of choice for preserving bite impressions in food

is to take modeling impressions of the objects as soon as practical after swabbing for saliva. Bite-marks in skin can be impressed with dental molding materials. This permits later creation of a three-dimensional model of the bitten area.

- *Interpretation:* The recreation of a human's identity by their teeth or via DNA taken from a tooth or saliva requires scientific training and should be performed by a board-certified forensic dentist for the former and a biologist for the latter.

I. CATEGORIES OF DENTAL EVIDENCE

The various types of dental evidence can be described as they relate to questions being asked by the investigators.

The following types of evidence should be considered:

- A human tooth or tooth fragment;
- A fragment of a human jawbone;
- DNA obtained from a tooth, toothbrush, cigarette, etc.;
- DNA obtained from a swabbing of a bite-mark, foodstuff, or object that possesses saliva transfer evidence;
- Dental restorations and appliances that can be associated to a particular person through name inscriptions, specific dental material type, composition, or unusual design characteristics;

The on-scene investigator should know six scenarios in which human remains require dental examination [1]:

1. *Intact body with little to no decomposition found with no identification.* The general sequence of multidiscipline input in this case type has the dead person's fingerprints being taken by law enforcement and then uploaded to regional or national databases. The absence of personal effects will inhibit the association of the body with local information. The absence of a timely missing person's report may inhibit developing leads. The dental exam should be done to allow maximum data collection early in the process. In many of these scenarios, the collection of DNA samples for later testing may occur.

2. *Decomposing human remains.* The possibility of fingerprints will be remote in this case. The use of dental information at the onset of the case may quickly add to the profile of the decedent and should be correlated with personal effects, DNA, or circumstantial information on identity.

3. *Skeletonized human remains.* Law enforcement in this scenario should use both a forensic dentist and a forensic anthropologist. Forensic anthropology is a specialty recognized by the AAFS. These individuals have special training in human osteology (bone science), excavation, and recovery methods and analysis of bones for forensic information.

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4. *High-energy accidents, terrorist acts, biological agents.* These events cause severe trauma, dismemberment, and fragmentation of human victims. The forensic team assigned to these cases must include a trained forensic dentist.

5. *Homicide cases.* The autopsy team should include a highly trained forensic dentist to lend experience with analysis of bruises and marks on crime victims that may have been caused by teeth.

6. *Sexual assault and domestic violence cases.* Victims and suspects will bite in the course of a violent assault. The patterns produced by teeth in biting must be photographed and sometimes impressed for three-dimensional modeling by a trained technician or forensic dentist. The analysis of the pattern's possible link to a particular biter (i.e., bite-mark identification) is dependent on proper evidence collection at the beginning of the case. An experienced forensic dentist should do this analysis based on the scientific literature.

These types of cases are difficult to quickly or even successfully reach the determination of human identity. This is where the forensic dentist is available for vital assistance to answer the important questions. The dentist can estimate the age of the deceased, help to reconstruct the person's dental profile, and run out leads of potential identities using dental comparison techniques. The dentist can indicate whether the person was dentally healthy or showed signs of self-neglect or indigence. The dentist will also note indicators of the person's appearance. In bite-mark identification, answers may be provided as to the appearance of a specific bite pattern in skin or foreign object recovered from a crime scene. In all of the preceding scenarios, it is paramount that the forensic dentist be included in the process from the very first phase in order to optimize results [3].

An incident that has the potential for large amounts of human remains should have a dentist in the disaster plan to assist in the discovery and recovery phases. There will only be one chance to properly process such a scene. A dentist's familiarity with highly fragmented dental and human remains will accelerate the recovery process and help organize the identification process at the morgue or laboratory.

Besides the environmental factors that work to destroy, distort, or diminish the physical characteristics of a deceased body, there may be animal or insect activity that will further degrade the evidence. Fully skeletonized remains require specific steps in ensuring preservation of the human material.

The chances of compromising an investigation increase exponentially with the decrease in available forensic information. The steps at the scene must center on preservation of obvious human material and a thorough review of the surface underlying the body part, be it solid ground, brush, gravel, or a muddy stream bed.

Investigators need to know *why* a person died. *Who* that person is allows them to backtrack to *where* the person was last seen or known to be alive.

Without the *who*, there is *nowhere* for the case to go, unless a missing person's report is filed in the same jurisdiction, a nearby jurisdiction, or a jurisdiction that is networked with a functioning and reliable area or national database.

When the person died is important as well. Case investigators should consider experts of entomology, pathology, and other fields in attempting to reconstruct time since death. The dentist can provide the *who* portion of the puzzle.

All of the preceding factors are not controlled by the investigator. Other people and elements at the scene - the perpetrator, the weather, and so on - take their toll on the outcome. The investigator, conversely, has total control over the scene upon arrival. The following specific areas of control must be maximized [2]:

1. Control your assumptions regarding the *who*, *why*, and *how*, and wait longer than you feel it is necessary to answer those burning questions.

Once stated, they are very hard to erase if wrong. Outside pressures from media, supervisors, politicians, and so forth may seem to be overwhelming for an impressionable investigator. To counter this, just keep in mind how bad your feelings and other sensibilities will be if you misidentify the deceased.

2. An equivocal crime scene (whether a natural death, a homicide, or an accident) must be initially treated as a homicide. There is no way to recover from making a mistake at this stage of the activities. You cannot back up if the scene is released too early because of a mistake. Evidence will be lost.

3. The overall conditions of the scene will determine how you will recover the remains and its associated evidence. For example, a scene initially investigated outdoors at night should be thoroughly processed during the day. A wet and marshy area will take special equipment to control moisture and bacterial contamination of trace evidence. Burned human remains in an incinerated car will require a thorough search of the vehicle for lost teeth (very fragile and brittle) and metal dental restorations (they may be partially melted). Honestly assess your personnel and equipment resources, and be flexible regarding what your plan's limitations may be.

If possible, think backward from the final location of the evidence (crime lab or autopsy suite) to the crime scene's original location of the evidence.

This will create a better awareness of what needs to be done at the scene. Write your plan using these steps. If you still have questions, ask for

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help from people who have more experience in successful scene analysis before you process the scene.

4. The documentation of the scene should include all of the basics, including written notes, drawings with measurements, and mapping. This is done before removing any remains or evidence. Put dirt and material removed from around the remains in a specific neutral place near the scene to

allow the possibility of a future return and reevaluation. This does not mean throwing the dirt in close proximity to the body over a cliff. Carefully remove it and put it in a safe place. Soil underneath the remains should be sifted. Tag all objects, take photographs, and map before removal. Take orientation photographs of the general scene showing these tags before bagging individual pieces of evidence.

5. Consider how a perpetrator or accomplice may have entered and left the scene, before transporting the remains.

6. Take each step very slowly.

7. An experienced forensic dentist could answer specific questions about dental evidence present at a scene.

Concepts involving recovery of dental remains should concentrate on all of the preceding, as well as the following concerns:

1. Teeth are small and may be broken into smaller pieces by high-energy impacts (plane crashes or automobile accidents).

2. Burned or incinerated teeth are extremely fragile. After documentation, the investigator should spray the tooth with a clear lacquer to help stabilize the ashen tooth structure before removal.

3. Bitten objects must be carefully collected and placed in paper bags that are properly labeled. This type of packaging lessens the chance of bacterial growth on the object, which may inhibit later recovery of salivary DNA at the lab.

4. Metal dental work may be misshapen due to heat damage. Gold crowns will look gray or black, and metal partial dentures can appear twisted and blackened.

5. Bite-marks on skin may look like round or almost circular bruises. The investigator must look for a series of small bruises or cuts that are arranged in a half-circular shape. Many times markings of both upper and lower front teeth will not be apparent. This is called a “single arch” bite-mark and is of low forensic value due to its lack of complete dental information. This may be caused by some object blocking one jaw from marking the skin and also raises the issue of whether the mark is caused by teeth. As always, swabbing of the bite site for epithelial DNA is the best method to identify the biter.

II. THE USE OF TEETH BY FORENSIC SCIENCE

The investigator should know that during the stages of development from child to adult, humans possess 20 deciduous (baby teeth) and 32 adult teeth. Some of this total complement of 52 teeth may be present in a 1-year-old infant or a 90-year-old person. There is a transition period during the ages of about 6–12 years where adult teeth and deciduous teeth are both present. Twelve is the average age where all deciduous teeth are gone and the adult teeth are present. Wisdom teeth (third molars), if present, may start erupting into the oral cavity at the age of 18 [5].

Teeth may also tell a story. In a real sense, there is a dental profile that can be developed from a person's mouth and teeth. Some teeth can give us an idea of racial characteristics. Asian and Native American populations can have upper front teeth that are scooped out in back (aka shovel-shaped incisors).

Teeth can tell us if an unidentified person was lucky enough to have her teeth straightened as a child or as an adult.

This also indicates a certain social status or income level, since orthodontics is usually an elective procedure. Old gold dental fillings show that the person has received dental work over many years.

New dental fillings show recent visits to a dentist. Whitened teeth and white caps show that the person was concerned about his appearance and had the financial resources to receive cosmetic dental work. Gold fillings and caps also show that the person could afford expensive dental care. Large silver fillings show that less-expensive dental care was received. Decayed or missing teeth show that the person was not getting regular dental care. Stainless steel or chrome caps are more economical than fancy porcelain (glass-covered) caps and white fillings [4].

Certain dental metals and materials are used and traceable to geographic regions or countries. Cells in the nerves and roots of undamaged teeth possess the biological makeup (DNA) of an individual.

Even teeth fragments may allow investigators to determine an individual's DNA code via genetic testing. The sex of the person is proven by the presence or absence of a Y chromosome (male feature) in a tooth's genetic profile.

The comparison of past x-rays and dental records to the dental features of an unknown dead person is the primary step in dental identification. Finding these old records (both dental and medical) is vital for a completion of any identification case.

III. CASE TYPES THAT CAN POSSESS DENTAL EVIDENCE

1. Homicide
 - Sexual assault with bitemarks;
 - Unknown victim of a crime found in a skeletonized or decomposed condition;
 - A deceased attacker may have bitemark injuries that can be used to corroborate the victim's statement;
 - A deceased child may have bitemark injuries that indicate current or past physical abuse. The identity of the biter may be supported by a dentist and by obtaining swabbings of the injuries for DNA analysis of deposited saliva.
2. Child abuse
3. Spousal abuse
4. Elder abuse
5. Mass disaster
6. Age determination of a juvenile offender

A death investigation of unidentified human remains requires professional determination of all physical evidence available from the body. The unknown person's gender, age, medical status and cause of death are vital information for a forensic autopsy report. Dental information was important to confirm his age and give insight to his health history at the time of his death [2].

The threshold question for any investigator at a crime scene or autopsy is "What is the dental evidence?"

This might seem to be begging the obvious question, but the purpose of this book is to clearly describe the gamut of evidence that is either directly related to human dental anatomy or derived from the oral environment. The survivability of teeth in catastrophic conditions is the feature that makes forensic odontologists regular participants in the autopsy suite [1].

Tooth shapes, appearances, tooth fragments, metal restorations, pieces of skulls, and jawbone fragments may possess features that can be associated with just one person.

The robust identification value of DNA, obtained from the inside of teeth and oral fluids, has recently created an entirely new level of identification: the biomolecular identification of individuals.

Knowledge, training, and experience are the keys to successful law enforcement casework. What might be considered as plain good luck in an investigation is really the effect of hard work, thoroughness, and preparation.

REFERENCES:

- [1] Bowers CM., Pretty IA. Expert disagreement in bitemark casework, J. Forensic Sci. 54 (4), 2009: 915–918.
- [2] Pretty IA., Sweet D. The scientific basis for human bitemark analyses—a critical review, Sci. Justice 41 (2), 2001: 85–92.
- [3] Pretty IA., Sweet D. The judicial view of bitemarks within the United States Criminal Justice System, J. Forensic Odontostomatol. 24 (1), 2006: 1–11.
- [4] Reynolds, M. The ABA Card® Hematrace® - A Confirmatory Identification of Human Blood Located at Crime Scenes, IABPA News, Vol. 20, No. 2, 2004: 4–10.
- [5] Sweet D, Pretty IA. A look at forensic dentistry - Part 2: Teeth as weapons of violence—identification of bitemark perpetrators, Br. Dent. J. 190 (8), 2001: 415–418.