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Identification of Deceased Individual Using Forensic Odontology Techniques

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This case study documents the critical role of Forensic Odontology in the identification of a severely decomposed body discovered in a remote forested area in April, 2023. Traditional Identification Methods, such as- Fingerprinting & Facial Recognition were unfeasible due to the advanced decomposition of the remains. The body was referred to Forensic Odontologists, who utilized detailed dental examinations, radiographic analyses, & comprehensive comparison with Ante-Mortem Dental Records to achieve a positive identification. The initial examination revealed that, despite extensive decomposition, the dental structures were well-preserved. The Forensic Odontologist conducted thorough Photographic documentation, Dental charting, & Radiographic analysis, Specific features such as- Restorations, Wear Patterns, & Tooth Alignment. High-resolution photographs & Detailed dental charts were created, Intraoral & Panoramic Radiographs were taken to capture the internal & external structures of the teeth. Law enforcement provided Ante-Mortem Dental Records for three potential matches from recent missing person reports. One set of records, belonging to a missing person identified as- John Doe, exhibited distinct dental characteristics that closely matched the Post-Mortem findings. Key matching features included the presence of several amalgam fillings, a gold crown, on the upper left first molar, unique wear patterns indicative of bruxism, rotated & crowded teeth. Radiographic superimposition confirmed the alignment of dental restorations, root structures & bone patterns between the Post-Mortem & Ante-Mortem Records. The convergence of these multiple lines of evidence led to the positive identification of the deceased as John Doe. The durability & individuality of dental structures make them invaluable in forensic investigations, providing crucial evidence for resolving missing person cases & offering closure to families. The findings highlight the importance of maintaining comprehensive dental records, the need for adequate training & resources for Forensic Odontologists, & the significance of interdisciplinary collaboration in forensic investigations. This case study demonstrates the effectiveness of Forensic Odontology & its essential role in the field of forensic science.

INTRODUCTION

1Forensic Odontology involves the application of dental science to legal investigations, primarily for the identification of human remains. Teeth are highly durable & can survive extreme conditions that may destroy other body

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parts. This case study focuses on a scenario where forensic odontology was pivotal in identifying a decomposed body.

Most High Profile Cases where Forensic Odontologists showcase their talent

1. **Ted Bundy Case (1970s) –** Forensic Odontology played a significant role in the conviction of serial killer, Ted Bundy. Bite mark analysis on Ted Bundy's victims matched his dental impressions, which helped establish his guilt in several murders.[6]
2. **John Wayne Gacy Case (1970s) –** Dental records were instrumental in identifying victims of John Wayne Gacy, a serial killer who targeted young men in the Chicago area. Dental evidence played a key role in linking Gacy to his crimes.[8]
3. **World Trade Center Attack (2001) –** After the September 11 attacks, Forensic Odontologists used dental records to identify many of the victims whose remains were recovered from the site.[9]
4. **Bali Bombings (2002) –** Forensic Odontologists assisted in identifying victims of the bombings through dental records & comparative analysis, aiding in victim identification & family reunification efforts.[10]
5. **Indian Ocean Tsunami (2004) –** Dental records were crucial in identifying victims of this devastating natural disaster, helping to provide closure to families & facilitate the repatriation of the remains.[11]
6. **Nirbhaya Gang Rape Case (2012) –** Forensic Odontology was highlighted & utilized in the investigation of the brutal gang rape & murder of a young woman in Delhi. Dental evidence was part of forensic examination that contributed to the identification of the perpetrators& provided crucial evidence during the trial.[7]

Case Background

1. **Discover of the Body:**

- On April 15, 2023, a hiker discovered a body in a remote forested area near the outskirts of a small town. The local authorities were notified, & a team of investigators arrived at the scene.
- The body was found partially buried under leaves & debris, indicating it had been there for an extended period. Due to the advanced state of decomposition, it was evident that the individual had been deceased for several months.
- The location was densely wooded & known for its challenging terrain, which is frequented by Hikers & Outdoor Enthusiasts.
- Hiker's Observations – The hiker, Mr. James Smith, was trekking through an off-trail path when he noticed a strong, unusual odor.
- Upon investigating, he found what appeared to be human remains partially covered by leaves & other natural debris.
- Immediate Actions – Mr. James Smith immediately contacted local authorities using his mobile phone. He provided the GPS coordinates & stayed at the site to guide the responding officers.
- Scene Securing – Officers from the Greenvale Police Department arrived within an hour of the call.
- The area was cordoned off to preserve the integrity of the scene.
- Initial Assessment – The body was in an advanced state of decomposition, indicating it had been there for several months. The remains were partially skeletonized.

2. **Initial Investigation:**

The Initial Investigation focused on securing the scene & collecting any potential evidence around the body.

Items found near the body included –

- Torn & Weathered clothing, which offered no immediate clues about the identity of the deceased.
- A wallet containing several faded identification cards & personal effects, but the information was mostly illegible due to exposure to the elements.

- No immediate signs of trauma or, foul play were apparent from the initial external examination.

Given the condition of the body, the investigators concluded that traditional identification methods, such as- Fingerprinting & Facial Recognition would not be effective. The case was then referred to the forensic department for further analysis.

3. **Decomposition Stage:**

The body was in an advanced stage of decomposition, which presented several challenges, those are :-

- **Soft Tissue Decomposition –**Most of the soft tissues, including- skin & muscles, had decomposed, leaving behind skeletal remains & some mummified tissues.
- **Skeletonization –** Significant portions of the body had skeletonized, exposing the bones.
- The body's exposure to environmental elements, such as- humidity, temperature fluctuations, & wildlife activity had further complicated the preservation of identifiable features.

4. **Forensic Odontology Referral:**

- Given the state of the remains, Forensic Odontologists were called in to assist with the identification process.
- Teeth are known for their durability & resistance to decomposition, making them valuable for identification purposes even in cases where other tissues have deteriorated.

5. **Collection of Ante-Mortem Data:**

- Law Enforcement reviewed recent missing person reports in the area, focusing on cases where the time frame & circumstances matched the condition & location of the discovered body.
- Three potential matches were identified & Ante-Mortem Dental Records for these individuals were requested from their dental care providers. These records include :-
  - Dental Charts & Treatment Records.
  - Radiographs (X-rays) of the teeth & jaws.
  - Photographs of dental structures, if available.

6. **Selection of a Potential Match:**

- Among the three potential matches, one individual stood out due to the distinct dental work described in his records.
- John Doe, a 45-years-old male reported missing three months prior, had a history of extensive dental treatment, including several restorations & crowns that could provide identifiable markers for comparison.

7. **Additional Investigative Efforts:**

- **DNA Analysis –** Samples were collected from the remains for DNA analysis. However, due to the condition of the body, the extraction & analysis process was expected to be time-consuming & potentially less reliable than dental comparison.
- Anthropological Examination – A Forensic Anthropologist conducted an examination to determine the biological profile of the deceased, including- age, sex, stature & any unique skeletal features that might aid in identification.

Examination & Methods (Collection of dental Evidences)

1. **Initial Examination:**

- The body was brought to the forensic lab, where a thorough examination was conducted.
- The remains were in an advanced state of decomposition, with most soft tissues decomposed.
- However, the dental structures were largely intact.

2. **Cleaning & Preparation:**

- Before detailed examination & documentation, the dental structures were carefully cleaned to remove any debris & soft tissue remnants.
- This step was crucial for ensuring that all dental features were visible & could be accurately recorded.

3. **Photographic Documentation:**

- High-resolution photographs of the teeth & jaws were taken from multiple angles.
- These photographs served as a permanent record of the dental structures & were essential for comparison with Ante-Mortem records.
- Specific aspects captured in the photographs included :-
  - Occlusal Surfaces (Biting Surfaces) of the Teeth.
  - Buccal & Lingual Surfaces (Cheek & Tongue Sides)
  - Overall Alignment & Spacing of the Teeth.

4. **Dental Charting:**

- A detailed Dental Chart was prepared, noting the condition of each tooth.
- The chart included information on :-
  - Presence of type of restorations (Fillings, Crowns, Bridges).
  - Condition of the Enamel & Dentin.
  - Signs of Wear Facet, Caries (Cavities), or, other dental pathologies.
  - Unique features, like- Rotated Teeth, Malpositioned Teeth, Supernumerary Teeth, Peg-Lateral Incisors, Anodontia, Taurodontism, Fusion & Gemination, Dens-in-Denti etc.

5. **Radiographic Analysis:**

- Dental radiographs (X-rays) were taken to capture the internal structure of the teeth & supporting bones.
- The types of radiographs used included,
  - Intra-Oral Radiographs – Detailed images of individual teeth & their surrounding bone structures.
  - Panoramic Radiographs – A broad view of the entire upper & lower jaws, providing a comprehensive picture of dental alignment & bone structure.

6. **Detailed Observation:**

- **Restorations –** The presence, type, & material of dental restorations were carefully noted.
- Wear Patterns – Unique wear patterns on the occlusal surfaces of the teeth were documented.
- These patterns are influenced by an individual's diet, habit, occlusion & it can be distinctive.
- Tooth Alignment – Any deviations from normal alignment, such as- Crowding, Spacing, or, Rotation of teeth, were recorded.
- Anomalies – Any dental anomalies, like- Supernumerary teeth or, missing teeth, were noted as potential identifiers.

7. **Comparison with Ante-Mortem Records:**

- Dental charts documenting treatments & conditions of each tooth.
- Intra-oral & Panoramic radiographs taken during routine dental visits.
- Photographs of the individual's teeth & smile, if available**.**

8. **Analysis & Matching:**

- **Visual Comparison –** Examining photographs & radiographs side by side to identify matching features, such as- restorations, anomalies & wear patterns.
- Radiographic Superimposition – Superimposing Post-mortem radiographs onto ante-mortem radiographs to check for alignment & structural matches.
- Chart Comparison –Cross-referencing the dental chart prepared from the post-mortem examination with the ante-mortem dental charts to identify consistent treatments & conditions.

9. **Documentation & Reporting:**

- Photographic evidence & radiographs.
- Detailed dental chart & observations.
- Comparison analysis & results.
- Conclusion & Identification of the deceased.

10. **Positive Identification:**

- The Gold Crown on the upper left molar matched the description & radiographic appearance in John Doe's dental records.
- The Amalgam Fillings in specific teeth matched the positions & shapes noted in the Ante-Mortem Records.
- Unique wear patterns & the alignment of the teeth were consistent between the Post-Mortem & Ante-Mortem Records.

Findings

The detailed findings of the forensic odontological examination & comparison process were pivotal in the identification of the deceased individual.

1. **Amalgam Fillings:**

- **Post-Mortem Examination** – The deceased had several amalgam fillings, particularly in the molars.
- Ante-Mortem Records – John Doe's dental records indicated amalgam fillings in specific teeth: the first & second molars on the lower left back region of jaw.
- Match – The locations, sizes & shapes of the amalgam fillings in the post-mortem examination precisely matched those described in John Doe's dental records.

1. **Gold Crown:**

- Post-Mortem Examination – A Gold Crown was present on the upper left first molar.
- Ante-Mortem Records – John Doe's dental records documented a gold crown on the same tooth, placed two years prior to his disappearance.
- Match – The radiographic appearance & physical characteristics of the gold crown were consistent with those in John Doe's Ante-Mortem Records.

2. **Wear Patterns:**

- **Post-Mortem Examination –** Notable wear patterns were observed on the occlusal (biting) surfaces of the pre-molars & molars. The wear patterns suggested heavy grinding, consistent with bruxism (teeth grinding), which had led to flat & polished surfaces on these teeth.
- **Ante-Mortem Records –** John Doe's dental records & patient notes indicated that he had been diagnosed with bruxism & had been prescribed a night guard to prevent tooth grinding.
- **Match –** The wear patterns observed in the post-mortem examination were identical to those described in the Ante-Mortem Records, providing a significant point of comparison.

3. **Tooth Alignment:**

- **Post-Motem Examination** – The deceased exhibited unique tooth alignment characteristics, including slight crowding of the lower incisors & a rotated upper left canine.
- Ante-Mortem Records – John Doe's dental records noted the same alignment issues, including the specific rotation of the upper left canine & the crowding of the lower incisors.
- Match – The alignment & positioning of the teeth in the Post-Mortem Examination were consistent with the Ante-Mortem Records, further supporting the identification.

4. **Radiographic Analysis:**

- **Post-Mortem Radiographs –** Intraoral & Panoramic Radiographs were taken of the deceased's dental structures, revealing detailed information about the teeth & supporting bone structures.
- Ante-Mortem Radiographs – John Doe's dental records included several radiographs taken during routine dental visits, showing the internal structures of his teeth & jaw.
- Match – A radiographic superimposition technique was used, overlaying the post-mortem radiographs with the Ante-Mortem Radiographs.

  Key Matches included;

  - The shape & position of dental restorations. (Fillings & Crowns)
  - The root structures of the teeth.

- The overall bone structure & sinus patterns in the upper jaw.

5. **Unique Dental Features:**

- **Po**st-Mortem Examination – The deceased had a unique dental feature: an impacted third molar (Wisdom tooth) on the lower right side that had not erupted.
- Ante-Mortem Records – John Doe's dental records included notes on an impacted lower right third molar that had been monitored but not extracted due to its asymptomatic nature.
- Match – The presence & positioning of the impacted third molar in the Post-Mortem Examination matched exactly with the descriptions in the Ante-Mortem Records

Conclusion

The convergence of multiple lines of evidence from dental restorations, wear patterns, tooth alignment, radiographic analysis & unique dental features led to the positive identification of the deceased as John Doe.

Each finding independently supported the identification, but together, they provided an irrefutable match.

Significance

This detailed examination underscores the robustness of Forensic Odontology in the identification of human remains, particularly when other methods are not viable.

The durability & individuality of dental structures make them invaluable for forensic investigations, contributing to the resolution of missing person cases & providing closure for families.

References

1. Avon SL. Forensic odontology: The roles & responsibilities of the dentist. J Can Dent Assoc. 2004;70(7):453-458.
2. Pretty IA, Sweet D. A look at forensic dentistry 1: The role of teeth in the determination of human identity. Br Dent J. 2001;190(7):359-366.
3. Sweet D. Forensic dental identification. Forensic Sci Int. 2001;122(2-3):224-230.
4. Rothwell BR. Principles of dental identification. Dent Clin North Am. 2001;45(2):245-259.
5. Bowers CM, Bell GL. Manual of Forensic Odontology. American Society of Forensic Odontology; 1995.
6. Forensic Odontology & Bite Mark analysis: Understanding the debate. Available from: https://doi.org/10.1080/19424396.2023.2210332. Accessed July 23, 2024.
7. Nirbhaya case: Dharwad college helped with forensic analysis. Times of India. Available from: https://timesofindia.indiatimes.com/city/hubballi/nirbhaya-case-dharwad-college-helped-with-forensic-analysis/articleshow/22528229.cms. Accessed July 23, 2024.
8. John Wayne Gacy victim identification. CNN. Available from: https://www.cnn.com/2021/10/25/us/john-wayne-gacy-victim-id/index.html. Accessed July 23, 2024.
9. Golden G. Lessons Learned from the WTC Disaster: A First-Person Account. J Calif Dent Assoc. 2004;32:675-680. doi:10.1080/19424396.2004.12224014.
10. Lain R, Griffiths C, Hilton JM. Forensic dental and medical response to the Bali bombing. A personal perspective. Med J Aust. 2003;179(7):362-365. doi:10.5694/j.1326-5377.2003.tb05594.x.
11. Schuller-Götzburg P, Suchanek J. Forensic odontologists successfully identify tsunami victims in Phuket, Thailand. Forensic Sci Int. 2007;171:204-207. doi:10.1016/j.forsciint.2006.08.013.