

Guest Editorial

Little smiles, lasting evidences

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Received: 30-05-2026

Accepted: 25-06-2026

Published: 16-07-2026

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<https://doi.org/10.65929/JSAD.2026.1.2.001>

How to cite this article: Dagur R. Little smiles, lasting evidences. *J Sci Adv Dent.* 2026;1(2):32-34.

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1. Introduction

The term “Forensic” comes from a Latin word “forensis” which means “before the forum” referring to a place where legal matters are discussed. In modern times we are blessed with various advancements and technologies like artificial intelligence, but at the same time, we are also facing challenges of the modern era like increased terrorism, natural calamities and increasing crime rate. Forensic Dentistry is the legal field of dentistry which analyses dental evidence in the interest of justice.¹

Dental hard tissues are extremely resistant to environmental insults and are usually the only remains after an extended period of burial. If antemortem dental records are available for an individual then dental identification is as certain as that of fingerprints. Forensic

dentists are active members of medico-legal team and should be consulted on a regular basis. Pediatric dentists hold a key position in forensic odontology via their understanding in diverse fields like unintended and nonverbal abuse, child abuse and neglect.²

2. Dental Identification

It is one of the primary utilities of forensic odontology. It involves identifying humans based on their individual characteristics after incidents such as tsunamis, bomb blasts, earthquakes etc. where highly mutilated and dismembered dead bodies are recovered. In such cases, Disaster Victim Identification (DVI) involves identification through teeth and other oral structures. When other means of identification such as fingerprints and facial features are destroyed, teeth have been known to withstand severe environmental conditions and high temperatures.³

2.1. Comparative identification

It is done when the identifier has two sets of data- antemortem and postmortem. According to American Board of Forensic Odontologists recommends only four conclusions when reporting dental identification (1994) a) positive identification, b) possible identification c) insufficient evidence, d) exclusion. Postmortem enamel lives with antemortem dental data. Comparisons are usually made on individual tooth and enamel recuperation related to presence or absence of teeth, enamel decay, current eruptions and eruptive situations.⁴

3. Dental Age Estimation

As teeth follow a reliable and predictable developmental sequence starting from 4 months in utero to the third decade of life, so dental age estimation through dental radiographs is more accurate than skeletal age estimation through radiographs like hand wrist etc. because tooth development is more controlled by genes than environmental factors. Determining dental age can be

important in variety of situations like felonious and dangerous scenes; in case of unknown delivery records etc.⁵

4. Identification of Child Abuse

Pediatric dentists play a crucial role in the early identification of child abuse, as many abuse-related injuries occur in the head, face, and oral cavity. Owing to their regular contact with children, they are often among the first healthcare professionals to recognize suspicious injuries such as bruises, torn labial frenula, fractured teeth, burns, and bite marks. Careful examination, accurate documentation, and prompt reporting of these findings to child protection authorities are essential for ensuring the child's safety and supporting medicolegal investigations.⁶

5. Forensic Bite Mark Analysis

Bite mark analysis is an important component of forensic odontology and is commonly used in the investigation of cases involving homicide, sexual assault, physical violence, and child abuse. Detailed Bite Mark analysis is extremely important in crime investigation and is helpful in differentiating bite marks of humans from animals and further differentiating marks of one individual from another. While analyzing bite marks, we need to take a detailed record of History, extraoral and intraoral radiographs, impressions, sample bites and study casts. Recent advancements like three-dimensional (3D) imaging, digital bite mark analysis, epiluminescence microscopy, and DNA profiling from saliva, have enhanced the scientific validity of bite mark examinations.⁷

6. Forensic Orofacial Radiology with Recent Advances

Forensic orofacial radiology has become an indispensable tool for identifying unknown individuals, for estimation of age and sex, and also for comparing antemortem and postmortem dental records. Various advancements in imaging technologies, like Computed Tomography (CT), Cone-Beam Computed Tomography (CBCT), Magnetic Resonance Imaging (MRI), three-dimensional (3D) imaging, and digital radiography, have enhanced the pace and accuracy of investigations. In addition, integration of artificial intelligence (AI) and dental DNA analysis has enhanced the precision, consistency, and efficiency of forensic identification.

7. Recent Advances in Forensic Odontology

There has been significant advancement in the field of forensic odontology with the advent of advanced radiographic methods, molecular diagnostics, and

artificial intelligence technology. These innovations have led to more accurate and reliable investigations with considerable efficiency. Three-dimensional imaging and Cone-Beam Computed Tomography (CBCT) allow accurate comparison of antemortem and postmortem records. Detailed facial reconstruction is possible along with assessment of craniofacial skeletal structures. Digital intraoral scanners and electronic dental records facilitate the storage, retrieval, and easy sharing of patient information which further adds to enhanced pace and convenience to identification of victim identification

Artificial intelligence is increasingly being incorporated into forensic practice which has led to improved diagnosis and reduced human error.⁸

As hard tissues of the tooth protect DNA from environmental damage, dental DNA profiling remains one of the most dependable methods of human identification

Innovations like nanobiochips, laser-engraved dental prostheses, palatal rugoscopy, and digital cheiloscopy have strengthened the role of forensic odontology in routine as well as medicolegal investigations

8. The Expanding Role of The Pediatric Dentist in Forensic Odontology

Pediatric dentists can contribute significantly to forensic odontology. In cases where abuse or crime against a child is involved, intervention by a pediatric dentist can be of utmost help. As pediatric dentist provides oral healthcare to children through their childhood upto adolescence, their dental records can be very helpful. Pediatric dentist can wisely apply their knowledge and experience in pediatric forensic investigations where dental age estimation or assessment of development of occlusion, is required.

9. Conclusion

Forensic Odontology is gaining its due importance with changing times. The medical and dental sciences include forensic dentistry as a crucial component. Dental evidence plays an important role in general identification and crime investigation as well. More trained professionals are needed in this field to aid in better identification and diagnosis of complicated cases such as mass disaster, abuse, criminal cases etc. The role of pedodontists becomes important when a child is involved. The present review is an attempt to highlight areas of interest from a pediatric dentist view which might be of help while dealing with cases involving children. Forensic dentistry has lot of scope and further researches and updates will only pave pathway towards

better investigation results and enhanced prevention of cases of abuse and neglect.

Authors' Contributions

The author monitored, drafted, and finalized the entire editorial.

Ethical Approval

Not applicable.

Informed Consent

Not applicable.

Financial Support and Sponsorship

None.

Conflict of Interest

None.

Acknowledgment

None.

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