

Dental Anomalies as Identification Strategies for Unknown Human Remains: Literature Review and Application

J. S. Sehrawat*, B. Ahlawat

Department of Anthropology
Panjab University
Chandigarh, Union Territory
India

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* Contact information: Dr. Jagmahender S. Sehrawat,
Department of Anthropology, Panjab University, Chandigarh, India; +91 9988031199 (WhatsApp); jagminder@pu.ac.in.

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ABSTRACT: The unique hard and resilient nature of human teeth makes them useful for various forensic odontological examinations. Structural alterations, cultural modifications, pathological variations, and restorative material make them excellent forensic indicators about biological identity of the unknown deceased or living individuals. Variations in the anatomical details of teeth may be imprinted by defective dental development, traumatic damages, pathologies, and nonmasticatory or weaponry use of teeth during an individual's lifetime. Such imprints can be used for comparisons and identification in forensic anthropology. Deliberate dental alterations/modifications and mutilations practiced due to cultural or esthetic purposes have been reported from some contemporary human population groups as well as from some ancient documented skeletal collections. Willful dental modifications have been most commonly done by filling, drilling, grooving, grinding, staining, and chipping. These dental features may be useful only for differentiation of varied anthropological populations, but their forensic utility cannot be ignored, particularly when antemortem dental records are available for comparisons. Various dental developmental anomalies and defects, restorations, pathological signatures, and occupational markers definitely corroborate other methods of forensic identifications, but cannot be used as sole criteria for individualization of unknown human remains retrieved in medicolegal scenarios. This review article attempts to glean information about various characteristic features of teeth and their forensic significance to aid identification of unknown human dental remains found in forensic contexts; its concluding emphasis focuses on the role of such dental individualities in identification strategies for human remains excavated from an abandoned ancient well situated underneath a religious structure at Ajnala (Amritsar), India. The unique dental features, extrinsic staining of anterior teeth, low frequency of dental pathologies, and notched incisors of those excavated remains were suggestive of them belonging to slain sepoys from an historic military regiment.

KEYWORDS: Ajnala skeletal remains, alterations and modifications, biological profiling, dental anomalies, forensic anthropology, identification.

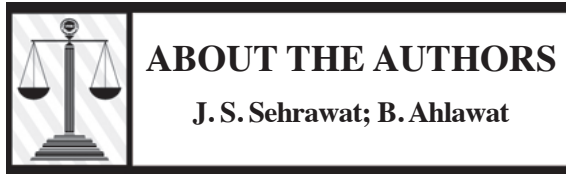
INTRODUCTION

Dental anomalies are developmental defects (in morphology, number, and arrangement) of teeth that can play a crucial role in identification of unknown human remains retrieved from medicolegal or anthropological scenarios. The individualistic dental features like color, wear pattern, restorations, implants, shape, position, and number of teeth can be used in identification like fingerprints. The localized insignificant anomalies of restoration, crowding, and spacing provide every individual a unique dental identity that may be helpful in forensic identification. Dental anomalies can help in human identification only if there are proper antemortem dental records of the deceased in the form of dental charts, radiographs, photographs, text details, or any other form [53]. Awareness of dentists about the forensic importance of maintaining antemortem dental records, state regulations, ethical, and medicolegal responsibility as a consultant, can help in proper handling and preservation of dental evidence for future use. Preserved dental records can contribute significantly toward positive identification of living or dead individuals and are often required in medicolegal death investigations.

Indeed, identification of the deceased can be very difficult in the many instances — crimes, fires, vehicular accidents, mass disasters (natural or manmade), terrorist massacres, aviation or defense accidents, war or warlike conflicts, genocides — where badly damaged and commingled human remains are retrieved from the scene of the occurrence. In such circumstances, the unique dental structures may be the only clues or sources of information available for identifying victims. It is the hardness and resilient nature of human dental tissues that make them resistant to different kinds of taphonomic degradations, chemical erosions, and biological alterations; thus, teeth can be found well preserved for exceptionally long periods of time. The unique hardness of teeth makes them excellent forensic indicators of the biological identity of an individual (living or dead).

Odontological, elemental, radiological, and molecular features, dental anomalies, pathologies, defects, implants, and restorative materials may all contribute significantly toward establishing the identity of living individuals or unknown skeletal remains retrieved in forensic scenarios. The unique dental features of tooth staining/coloration patterns, developmental defects, wear and attrition status,

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Jagmahender Singh Sehrawat was educated at Panjab University (Chandigarh, India), obtaining M.Sc. (Hons.) and Ph.D. degrees in anthropology with specialization in physical anthropology. He further pursued his postgraduate diploma in forensic science and criminology from Punjabi University, Patiala (Punjab, India). Dr. Sehrawat joined Panjab University in May 2013 as an assistant professor of anthropology in the Department of Anthropology.

Dr. Sehrawat is a principal research scientist in a core research project (animal sciences) funded by the Science and Engineering Research Board (SERB), Department of Science and Technology (DST), Government of India. The project entitled “Forensic Anthropological Provenancing of Human Skeletal Remains Excavated from a Well at Ajnala (Amritsar): Bones, Teeth and Personal Artefacts as Identity Signatures” aims to identify thousands of unknown human bones, teeth, and numerous items of personal identity recovered from an abandoned well at Ajnala (Amritsar, India). These remains are being examined in their forensic anthropological, radiographic, chemical, and molecular contexts by the scientific team under his guidance and supervision. He had also served as a forensic anthropologist in the Department of Forensic Medicine and Toxicology, Government Medical College and Hospital (Chandigarh, India) for eight and a half years where he provided significant forensic anthropological inputs to forensic pathologists in the identification of unknown human cadavers/skeletons brought by the investigating agencies for their biological profiling purposes. His major areas of research specializations include forensic anthropology, odontology and osteology, forensic biology, investigation of crimes against humanity, ancient DNA, and stable isotope analysis studies. Dr. Sehrawat has more than 17 years’ professional experience in biological profiling of unknown human remains. He was principal consultant in four social impact assessment studies executed and completed under his guidance and funded by the Chandigarh Administration and GLADA, Ludhiana (Punjab, India).

Dr. Sehrawat has published a total of 75 research papers in well-regarded journals (international: 64; national: 11) and has presented his research papers in more than 60 national and international conferences/seminars/scientific meetings in India and internationally in countries like England, Portugal, Spain, the United States, and Canada. He has delivered 39 keynote guest lectures at various scientific platforms like DST-INSPIRE programs. He is a member of some international scientific societies like American Academy of Forensic Sciences (AAFS), IUAES, Spanish Association of Forensic Osteology and Odontology, Association of Forensic Odontologists for Human Rights, and Latin-American Society of Forensic Anthropology. He has supervised many students’ Ph.D. theses in forensic anthropology and odontology, and M.Sc./MPH dissertations in the subjects of anthropology, forensic science, and public health in various departments at Panjab University. Recently, he has been awarded the “Young Progressing Career Achievement Award—2018” by the University of Delhi (Delhi, India), in recognition of his contributions to the discipline of anthropology in India.

Bhavna Ahlawat was educated at the University of Delhi (Delhi, India), obtaining her postgraduate degree in forensic science and criminology with specialization in forensic biological sciences and forensic questioned documentation examinations. Ms. Bhavna is currently working on her doctoral thesis in the field of forensic anthropology from the Department of Anthropology, Panjab University (Chandigarh, India).

She was an assistant professor of forensic sciences at Jain University (Bangalore, India) for three years; presently, she is an assistant professor of forensic sciences at Dyal Singh College (Karnal, Haryana, India) along with pursuing a Ph.D. degree at the Department of Anthropology, Panjab University. Her research interests include forensic anthropology with recent emphasis on forensic humanitarianism and disaster management. Ms. Bhavna has presented 10 research papers related to different subfields of forensic science in national seminars at the Department of Anthropology and SGTB Khalsa College (University of Delhi), and has also attended various national and international conferences/seminars.