

*Review Article*

## Forensic Odontology: Another Leap Ahead For Identification

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### ABSTRACT

There may be various situations where human body cannot be identified by the relatives of the victims because to various reasons inspite of medical examinations in such cases forensic odontology may play a vital role in accordance with medical department to reveal accurate conclusion of the victim during crimes and mass disaster. This article reviews how various branches in dentistry can help solve the identification of the victim with forensic medicine with the separate branch in dentistry known as forensic odontology.

**Key words:** Dentistry; Forensic Medicine; Forensic Odontology.

### INTRODUCTION

All possible means should be applied to achieve scientific identification which sometimes extremely difficult particularly in mass disaster situations such earthquakes, accidents or in matters of genocide crimes. [1,2] The identification of an unknown body is more reliable if it is based on the physical evidence derived from the body itself when compared to circumstantial evidences. Hence, the victims' naked body should be described including sex, estimated age, height, built, color of skin, hair, and eye color. Taken together with other details, they can lead to a positive identification.

Forensic dental identification may be classified as a comparative method to determine an individual's identity. For didactic purposes, it may be divided into three phases: (1) exam of the cadaver's

dental arches; (2) exam of dental records; (3) and forensic dental comparisons. [3] In the first phase, all the particular characteristics found in the cadaver's dental arches are recorded and associated with present or missing teeth, restorations (surfaces and materials), prosthesis, endodontic treatments, pathologies, anomalies, and other features. During the exam of dental records, experts collect all data about treatments performed or planned that were recorded by the dentist in the dental charts, associated with the information produced by complementary tests, such as radiographs, photographs and impressions. During the last phase, the data obtained in the first two phases are compared using the same reference points (surface, tooth, quadrant) and a qualitative

and quantitative analysis of the particular dental characteristics.

Specific features, such as scars, moles, tattoos, and abnormalities, are often unique and thus extremely important if they can be matched with antemortem data use of orthodontic bands, dentures and various other techniques for forensic dental identification has been reviewed in this article.

#### **IDENTIFICATION PROCESS:**

Reconstructive identification is a prerequisite to comparative identification. [4]

During the reconstructive identification process, all necessary information (physical attributes, medical and dental clues, deoxyribonucleic acid (DNA), and fingerprint) is gathered from the unknown body of the victim so that an objective reconstructed profile can be established.

This reconstructed post mortem (PM) profile can then be matched with missing persons.' [5]

The definite establishment of identity of a body essentially comes from a detailed comparison and matching of tangible antemortem records and PM findings. [6]

The final identification results depend mainly on the presence and quality of information and in particular availability of evidences such as antemortem X-rays, [7,8] fingerprints [9] dental records, [10-12] and of course DNA. [13]

#### **ENDODONTIC IMAGING AS AN AID TO FORENSIC PERSONAL IDENTIFICATION:**

The number of root canals within a root canal system is not always consistent; the mesiobuccal root of maxillary molars will usually have a second canal, [14,15] the mandibular central incisor may have two root canals, [16] the mandibular premolars may have multiple canals as may the mandibular molars and much variability exists in the root canal morphology of the maxillary premolars. [17]

In addition, variability in root canal lengths, curvatures, and other root canal configurations such as the C-Shaped canals. [18]

An endodontically-treated tooth potentially contains more individuating information than a non-endodontically treated tooth, and as a result is a richer source of comparative image data. The basic root filling consists of a cement sealer and a core filling material, most commonly gutta-percha. Other root fillings are silver points and most recently resin- based core filling materials. Zinc-Oxide Eugenol, resin, glass ionomer, silicone and calcium hydroxide are group classifications for endodontic sealers. [19]

The obturation of root canals, and hence post-preparation anatomy, will be demonstrated by the radio-opacity of these materials in a post treatment radiograph. Teeth that require endodontic treatment often also have substantial loss of coronal tooth structure henceforth also require complex restorations. Due to the loss of tooth structure associated with pathology or endodontic treatment, posterior teeth are commonly indicated for cusp coverage restorations. [20,21] Endodontic posts may be indicated in some circumstances.

These posts may be active or passive, tapered or parallel, and prefabricated or custom cast. Nickel-Chromium alloy, stainless steel, titanium alloy, ceramic, zirconium and carbon fibre are materials commonly used in post fabrication. [22] The complexity of the coronal restorations and variability in post and core material, design and placement provide further individuating features to each such treated tooth.

Endodontic procedures will commonly necessitate radiographs for diagnosis, treatment and evaluation of post-treatment success. The most useful of these for forensic purposes are the post-treatment radiographs, and these are of particular value in that endodontic restorations are less likely to be retreated or augmented than intracoronal restorations. Good radiographic technique produces radiographs which

visualize individual root canals and reduce the superimposition of anatomical structures allowing a significantly improved image against which to evaluate or compare a post-mortem root canal radiograph. Root canal treatments provide a wealth of morphological detail, providing rich data for the comparison of radiographs from a known missing person and an unknown deceased person, to answer the question of whether the two images are derived from the same person.

**DENTAL PROSTHESIS AS FORENSIC TOOL:** Labeling of all dentures is recommended by most international dental associations and forensic odontologists. In fact, in some countries and certain states of the USA, the labeling of dentures is regulated by legislation. [23] Positive identification of the denture is usually done with a tiny, discreet identification code which is embedded in the denture base. [24]

The standard requirements for denture markers are that they should be biologically inert when incorporated into the denture, inexpensive, easy and quick to apply, possible to retrieve after an accident, acid resistant and survive elevated temperatures. [25]

The marking must also be esthetically acceptable, visible (readable) and durable without jeopardizing the strength of the prostheses. After the Second World War, 819 of the 3000 of the unidentified dead soldiers were denture wearers. However unfortunately, only nine persons of those who wore dentures could be identified. [26]

Bagi BS mentioned in 1977 that the bodies of Hitler and his mistress Eva Brauma were identified by his dentist, using dental records. Sansare mentioned in 1995 that general Zia-Ul-Haq, late president of Pakistan, died in 1988 in a plane crash. His body was identified by his dentition. [27]

**ORTHODONTIC APPLIANCES IN FORENSIC ODONTOLOGY:** Other dental appliances, such as removable orthodontic braces have also been used for

identification purposes. Whittaker describes a case where a removable orthodontic appliance was used to identify a victim of a house fire. [28]

**BITE MARK ANALYSIS:** Bite mark analysis is important in criminal cases in which a suspect or a victim has left his or her teeth marks on another person or on a non-living object such as a candy bar, an apple, cheese or even a beer can seem to occur more frequently. It has been indicated that teeth once used as weapons, they can be due to the person inflicting the wound. However, bite marks can be encountered in various cases including murder or rape with sexual motives. [29]

## CONCLUSION

In this era of natural calamities along with growing incidence of crimes forensic odontology is been highly useful for the identification of catastrophic victims along with the medical field. It also allows the different branches in the dental fraternity to help identifying the victims of massive destruction.

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