

## Fingerprints in Prosthodontics

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### Abstract

Forensic dentistry or forensic odontology is the proper handling, examination and evaluation of dental evidence, which will be then presented in the interest of justice. It plays a major role in man-made or natural disaster, which result in fatalities that are not identifiable through the use of fingerprints and other conventional methods. In situations where skin has been destroyed, the recovery of identifiable dental structures is still possible. The teeth and dental restorations are the strongest elements in the human body and survive the destructive influences of fire and exposure to the elements. This article gives a brief overview of some of the roles undertaken by Forensic Odontologists.

**Keywords:** Forensic Odontology; Identification; Violence; Abuse.

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Forensic Odontology is the branch of dentistry which deals with the proper handling and examination of dental evidence in the interest of justice. Not all individuals die of natural causes, there are unfortunate un-natural and manmade disasters which shatter live of victims. The task of determining the identity of these persons becomes of vital importance. Forensic dentistry represents the overlap between the dental and the legal professions. Establishing a person's identity can be a very difficult process and through forensic odontology, dentistry plays a small but considerable role in this process.

### *Central dogma of dental identification*

Central dogma of dental identification is that a comparison can be carried out between the antemortem and the post-mortem records for the identification of an individual. The fact that oral tissues are unique to an individual and survive most events when other body parts

are completely disrupted of disaster makes forensic odontology of special interest.

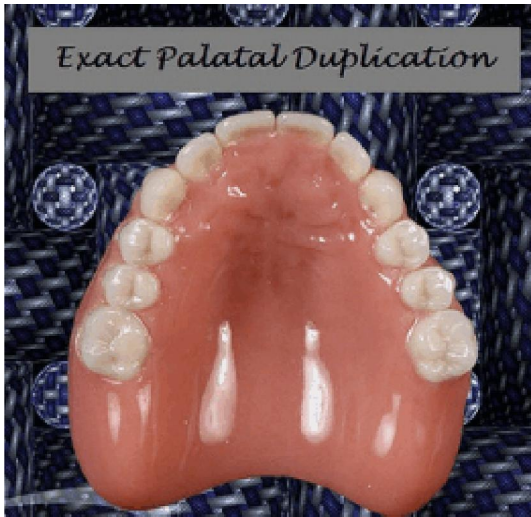
### Methods of Dental Identification

#### *Palatal Rugae (Fig 1)*

Palatal Rugae are irregular fibrous connective tissue on the anterior third of the palate, behind the incisive papilla. They are oriented completely by about 12<sup>th</sup> to 14<sup>th</sup> week of prenatal life and remain stable throughout life. They have been equated to fingerprints and have unique characteristics that can be used in circumstances when it is difficult to identify a dead person through fingerprints or dental records. Rugae are protected from trauma by their position in the oral cavity. Palatoscopy or palatal rugoscopy is the name given to the study of palatal rugae in order to establish a person's identity and was first proposed in 1932. Palatoscopy facilitates population identification as rugae pattern is specific to a racial and ethnic group.[1]

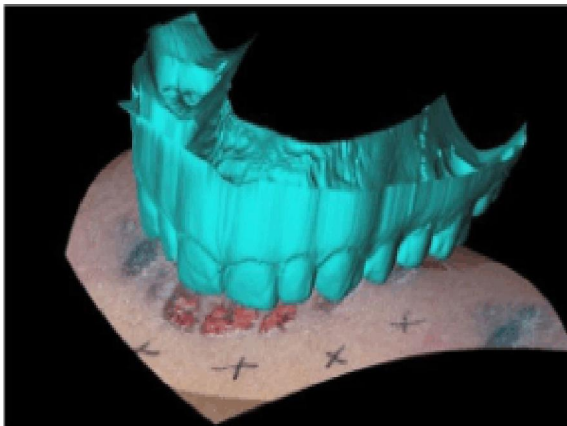
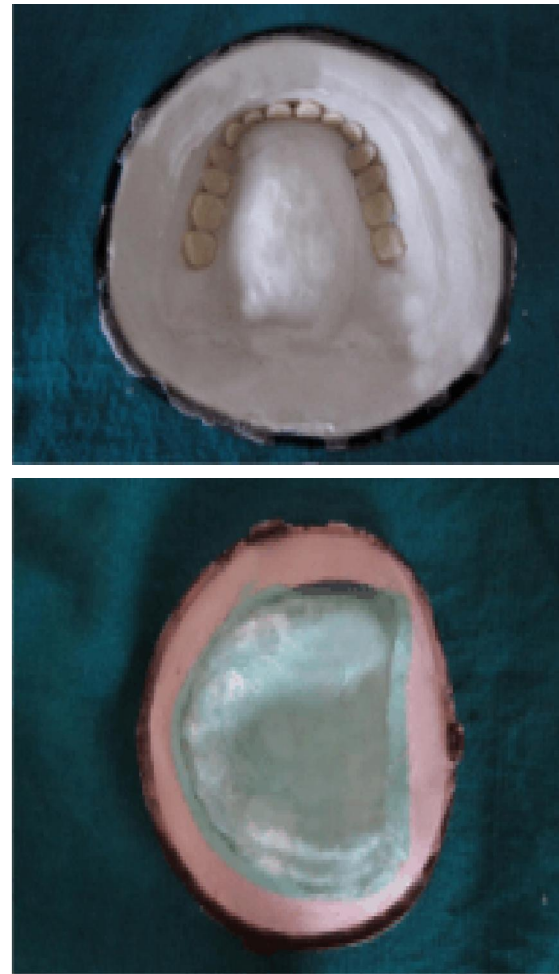
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**Fig 1: Palatal duplication in dentures**

*Use of bite mark : ( Fig 2)*

Bite marks are injury patterns made by teeth. Preservation and thorough analysis of these patterns on human tissue, inanimate objects or food helps to make a link between the victim and the assailant. Traces of saliva deposited during biting can be obtained to acquire DNA evidence to identify the perpetrator of a violent crime. Bitemark evidence is collected from both the bite sufferer and suspect, but for this it is important that the bite victim should be the suspect in the case. Analysis starts with copious photography and thorough dental examination including charting of teeth. Impression of the dental arches and interocclusal record of the suspect should be obtained. This would help to see how the individual bites together. If a DNA sample is

**Fig 2: Bite mark analysis by overlay method****Fig 3: Denture after dewaxing**

indicated a buccal swab should be taken. Overlays can be produced from the dental casts of suspects, and represent biting edges of the teeth reproduced on transparent sheets at life size. The overlays are superimposed over photographs of the bite injuries and a comparison is made. Overlays can be produced by hand tracing, photocopier technique or by digitally scanning the cast.[2]

#### *Prosthesis Labelling Procedure for Fpd's*

Only initials can be carved in fixed partial dentures due to the lack of available space. Initials can be carved on the palatal aspect of the prosthesis. Carving is done after baking of porcelain with the brush. This is followed by application of enamel porcelain which maintains the carved initials. For Fpd's made of gold or base metal alloys an electric carbide engraver can be used.[3]

**Fig 4: Patient information on lead foil***Denture Labelling*

A number of commercial methods for identifying dentures are available. There are two main methods in marking dentures, namely the surface method and the inclusion method. The less complicated procedures include simple engraving with bur, and more complicated procedures use labels or chips.

*Surface-Method*

In the surface marking method, the patient details are engraved on the tissue surface of the denture with the help of a round bur. They have the limitation that the patient details may wear off with time as the denture surface deteriorates. Also, Food lodgement in the

**Fig 5: labeled sandwiched in between layers of acrylic****Fig.6: Finished denture with lead foil incorporated**

engraved marks can lead to bacterial infection.[4]

*Inclusion-Methods*

In this method metallic (heat resistant Ti alloys can be used) or non metallic materials like printed papers, resin strips and disks are incorporated in denture on the polished or tissue surface side of the denture at the time of packing. As the information is incorporated inside the denture they are more lasting.[5]

*RFID Tags*

The acronym RFID stands for radio-frequency identification, which is a wireless electronic communication technology to identify tagged objects. All information is on a microchip that is attached to an antenna; the chip and the antenna together are called an RFID-tag or transponder. The chip transmits information to the reader through the antenna where the radiowaves are converted to digital information. These can then be passed on to a computer containing relevant software that can make use of it. RFIDs are esthetic and give great user information inspite of small size. Apart from cost main disadvantage is the chip's vulnerability to fire.[6]

### *Denture Barcoding*

It consists of a series of bars and spaces in definite ratios on which can be scanned by specific machines. The paper print can be laminated and incorporated in the denture. After scanning the bar code, the information can be accessed, added, or subtracted. The major advantage of the bar-coding technique is that it can fit in a large amount of information.[7]

### *Labelling of Cast Partial Dentures*

#### *Embossing Method*

Embossing tape is embedded in the wax pattern of the major connector. The +ve resulting casting reproduces the embossed lettering, which is identifiable through the tissue-colored acrylic denture base resin.[8]

#### *Laser-Etching*

This is used for labelling of cobalt chromium components in a partial denture. It uses copper vapour laser to etch patient details. The CVL beam is focused and delivered to the material surface by the two-axis scanner mounted with mirrors. A personal computer controls the movement of the scanner and the firing of the CVL. However, this method is not only expensive but also requires specialized equipment and technicians to perform the procedure.[9]

### *Case Report*

The purpose of this article is to introduce an easy denture labelling system that is quick, inexpensive, aesthetically acceptable and applicable in forensic casework's.

- In this case the dentures of a 69-year-old male, of Indian origin who lived in Yamunanagar, were marked. The patient was informed and consent was taken in written. Complete denture trial was done and then laboratory steps were initiated.
- Flasking and dewaxing was done ( Fig 3A & 3B). An IOPA radiographic film was

taken and a piece of lead foil of dimension was cut. The patient details (name, hospital/OPD no., name of the hospital, and the place where the work is done) were written on the film with a ball tipped pen (Fig 4)

- A small amount of heat-cure acrylic resin was mixed and placed in the posterolateral region of the palate (in maxilla). Then, the lead foil (carrying patient detail) was placed in the specified area and was again covered with acrylic. The idea was to sandwich the lead foil in between the two layers of acrylic (Fig 5).
- Over the lead foil, heat-cured pink acrylic resin DPI was applied and packed in the usual manner. The processing and acrylization was done after the standard curing cycle. Then, the retrieved denture was finished and polished. (Fig 6)
- The palatal surface of the maxillary denture was chosen for incorporating the lead foil because of its larger surface area and it's no effect on aesthetics. An IOPA radiograph of the area was taken. The radiograph revealed the complete detail of the patient.

### **Conclusion**

A quick, easy, inexpensive procedure for marking accurate identification marks on dentures with a lead foil is described here. Lead papers used in this study are easily available, not expensive and their incorporation into the denture as well as its reading don't need sophisticated techniques. In addition, it is durable and can withstand high temperature also. The label shows no sign of deterioration/fading, is cosmetically appealing, and can satisfy all the forensic requirements of a suitable prosthesis. The routine marking of all dentures by this method is advocated.

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