

## Denture Identification Methods: A Review

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**Abstract:** Denture marking is accepted as a means of identifying dentures and persons in geriatric institutions, during war, crimes, and civil unrest, natural and mass disasters, post mortem and medico-legal investigations. This paper reviews the various methods of denture marking and highlights the significance of placing identification marks on dentures. Various methods have been proposed for denture marking but it is important to use a method that is simple, practical, affordable and universally acceptable.

**Key Words:** Denture identification, Forensic odontology, Prosthesis identification.

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### I. Introduction

Forensic Odontology is the branch of dentistry which deals with the proper handling and examination of dental evidence and the proper evaluation and presentation of dental findings in the interest of justice. Forensic Odontology has been a very important part of the development of the identification of human remains. Most dental identifications are based on restorations, caries, missing teeth and/or prosthetic devices, such as partial and full removal prostheses, which may be readily documented in the record.<sup>1</sup> Identification of a body is made more difficult if some or all of the teeth are missing, a situation which is all too commonly found in older age groups. Fortunately, some dentures are marked and can be traced to a particular owner.<sup>1</sup> Denture marking is accepted as a means of identifying dentures and persons in geriatric institutions, or post-mortem during war, crimes, civil unrest, natural and mass disasters.<sup>1</sup>

Due to the lack of a comprehensive fingerprint database, dental identification is growing as an essential part of forensic investigation. Prosthodontists are playing very important role in forensic dentistry as they are concerned with fabrication of various prostheses which can serve as an important tool for identification.

The denture marking is important for the following reasons<sup>2</sup>:

- a. It serves to identify an unknown denture wearer in cases involving amnesia or senility, loss of memory, psychiatric cases, homicide, suicide, victims of fire, explosion, floods, earthquake, plane crash, or war.
- b. In cases of lost and found, the denture can be returned to the owner.
- c. A rapid and accurate method other than finger printing is essential for identification of the individuals.
- d. In the laboratory, the dental technicians will find it easy to identify a denture, especially at the deflasking stage, if it is marked / labeled.
- e. To ensure the correct denture delivery to the respective patient.

### II. Historical Background

Identification by teeth is not new. During the US Revolutionary War, Paul Revere (1775), a young dentist, identified war casualties by their bridgework. Dental identification is possible under extreme circumstances, also since teeth are extremely resistant to destruction and decomposition. It was used in various instances on Adolf Hitler and Eva Braun<sup>2-8</sup>, the late Indian Prime Minister, Rajiv Gandhi and the late President of Pakistan, Zia-ul-Haq<sup>8</sup>; in the New York City World Trade Center bombing, in the Waco Branch Davidian siege, and innumerable airplane crashes and natural disasters.<sup>2-8</sup>

### III. Requirements of denture identification

Some proposed requirements for marking dentures are<sup>1</sup>:

- a. The strength of the prosthesis must not be jeopardized.
  - b. It must be easy and inexpensive to apply.
  - c. The identification system must be efficient.
  - d. The marking must be visible and durable.
  - e. The identification must withstand humidity and fire.
  - f. The identification mark should be cosmetically acceptable.
  - g. The identification mark should be biologically inert (when incorporated into the denture).
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- h. In addition, the marking should be permanent and resistant to everyday cleansing and disinfecting agents.

### 3.1 Position of the Denture Marker

Some denture materials, especially the posterior part of acrylic dentures and metal-based dentures, outlast because of the tongue.<sup>2,7</sup> The most common possible area where the markers can be placed, as recommended by some authors, is along the posterior lingual flange, under the teeth for the mandibular dentures<sup>2,9</sup> and posterior buccal surface to tuberosity region and palate area in a maxillary denture.<sup>10</sup> These areas are accessible to reader, there is often sufficient thickness of resin to incorporate without any technical difficulties without affecting the aesthetics of the denture. Usually Cameo or polished surface of denture is preferred but if esthetics is concerned, intaglio or impression surface is used. If the denture label is placed on intaglio surface, they become invisible when relining is done.<sup>11-13</sup>

### 3.2 Methods of denture identification

Various methods of denture marking have been reported in the literature. However, there are two main methods in marking dentures, namely the surface method and the inclusion method. As compared to surface methods, inclusions methods are permanent but require more skills and are time consuming.

S.No.	Method	Advantages	Disadvantages
1	<u>Surface Methods</u> <sup>14</sup> : a.) Scribing or engraving method <sup>15</sup> : In this method letters or numbers are engraved on the denture surface with the help of a small round dental bur.	a.) This technique is easy to operate. b.) It is economical.	a.) It can cause food entrapment, bacterial infection and irritation.
	b.) Embossing method <sup>11</sup> : In this technique name and other particulars of the patient are scratched on the master cast. After processing it produces stamped or embossed letters on the impression surface of dentures.	a.) This technique is economical.	a.) This technique has been associated with malignancy due to continuous irritation of tissues.
2	<u>Inclusion methods</u> <sup>14</sup> : a.) Denture Bar coding <sup>16-19</sup> : A bar code applicable to dentures consists of a machine-readable code of a series of bars and spaces printed in defined ratios.	a.) Denture bar coding can be used with crown and bridge restorations and can survive temperatures above 600°C, which can be encountered in plane crashes. b.) Denture bar coding gives exact information in every situation regardless of whether fire or water is involved. c.) Denture bar coding is easy to perform and not very expensive.	a.) It requires expensive special equipments.
	b.) Lenticular card method <sup>20</sup> : In this technique a lenticular lens is used to produce images with an illusion of depth, morph, or the ability to change or move as the image is viewed from different angles.	a.) Lenticular printing is a simple, cheap and quick method. b.) This method can store a large amount of information. c.) The labels showed no sign of fading or deterioration. d.) The lenticular card stores the patient's information has two or more images that can be viewed by changing the angle of view.	
	c.) ID band method <sup>21</sup> : In this method stainless steel metal band containing an identifiable coding system representing patient details is placed in a shallow recess prepared in the denture base. The band is covered with clear acrylic resin, trimmed and finished in the usual manner.	a.) It is easy to perform and not very expensive. b.) The ID band method can withstand deterioration by fire.	
	d.) Paper Strip method <sup>22</sup> : It utilizes onion skin paper. The acrylic resin fitting surface situated adjacent palatally between the ridge and the center of the palate is moistened with monomer on a small brush. The strip of typed paper is laid on this surface and the paper is moistened with the monomer. Clear resin is then placed over the paper before final closure of the denture flask.	a.) This method is economical. b.) This method is easy to perform.	
	e.) T bar method <sup>23</sup> : A T-shaped clear PMMA resin bar is constructed by	a.) This procedure is easy, inexpensive and time-effective.	

	cutting baseplate wax and then is processed and finished in clear PMMA. An identification printed label (reduced in size, print-face inward) against the flat section of the bar is fixed. It is then surface polished to produce a clear window displaying the ID label.		
	f.) Laser etching <sup>24</sup> : Copper vapor laser is used to etch the non impression surface of denture with patient's information.		a.) This method is expensive and requires specialized equipment and technicians to perform the procedure.
	g.) Electronic Microchips <sup>25-27</sup> : The patient's information is etched onto an electronic microchip measuring 5×5×0.6 mm.	a.) Tests conducted on chips embedded in acrylic resin performed well under high temperatures (600°C), had excellent acid resistance, was radio-opaque and bonded well with acrylic resin.	a.) The main disadvantage of the chip was that it could be inscribed only by the manufacturer and not by the dentist. b.) This method required additional equipment to transfer details to a computer.
	h.) Photographic method <sup>27,28</sup> : In this technique patient's photograph is embedded in the denture with the help of clear acrylic resin.	a.) This method is particularly useful in the countries with low literacy rate where a photograph is the easiest method of identification. b.) This method is also useful in countries with diverse scripts.	
	i.) RFID Tags <sup>9,29</sup> : The radio-frequency identification (RFID) system consisted of a data carrier, or tag, and an electronic handheld reader that energizes the transponder by means of an electromagnetic field emitted via the reader's antenna. It then receives the coded signal returned by the transponder and converts it into readable data.	a.) This method is a cosmetic, effective labeling method permitting rapid and reliable identification of the wearer. b.) They are preferred because of their small size (8.5×2.2 mm). c.) A large amount data can be stored in them. d.) No special training is required to set the tag in the denture. e.) The chip is resistant to disinfectants and solutions of 1% hypochlorite, 4% chlorhexidine, and 4% sodium perborate.	
	j.) Lead Foil <sup>30</sup> : A piece of lead foil from a used IOPA radiographic film is cut and patient's details are engraved with a sharp pointed pen or instrument and is embedded in the denture with the help of clear acrylic resin.	a.) This technique is easy to operate. b.) It is economical. c.) It is radiographically visible.	

#### IV. Conclusion

With any major disaster, the reliance on dental identification becomes essential because teeth and restorations are the most lasting parts of the human bodies.<sup>31,32</sup> This paper reviews the various methods of denture marking and highlights the significance of placing identification marks on dentures. Various methods have been proposed for denture marking but it is important to use a method that is simple, practical, affordable and universally acceptable. The identification of unknown or missing persons by means of denture marking is a very successful method of identification in forensic investigation. It is also useful for patients residing in hospitals and community homes where dentures could be misplaced, particularly during cleaning by personnel where there is a chance of loss or mix-up. The importance of denture marking should be emphasized by all law-enforcing authorities and should be promoted among all dentists, towards making it a compulsory routine dental procedure throughout the world. The dentist should always inform clearly and motivated the patient as to the benefits of the denture marking. The denture marking may not be inserted if the patient refuses.

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