

Denture Identification Marking: A Contemporary Review

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ABSTRACT

Background: Denture identification is one of the innovative techniques used in forensic dentistry. Earlier the surface methods were used to mark the denture as they were easy to perform and affordable by the patients. Those were done with the help of two spirit solvent based fiber tip pens and graphite pencil covered with an appropriate solvent. Marking made by using these pens tends to fade rapidly. There are many literatures on denture marking and different techniques. Mainly they comprise two main methods surface method and inclusion method. This article represents all the surface methods and inclusion methods in detail with their advantages and disadvantages.

Keywords: Denture identification, dentistry, forensic.

INTRODUCTION

Forensic dentistry is the modern branch of dentistry which involves management, examination, evaluation and presentation of dental evidence in criminal or civil procedures for the justice.¹ Every person has unique features such as colour of eyes, hairs, skin colour, marking's on the body like mole, scar, tattoos and facial deformities which is helpful in identification of the individuals also some id proofs like passport, voter ID card, pan card and Aadhar card are used for identity purpose but in case of natural disasters like fire, floods like tsunami, cyclones, draughts, earthquake, major accidents in railways, factories, mines and road traffic accidents, hurricane, landslides the identification of humans get difficult as the bodies get humiliated beyond recognition by visual or any other methods in these situation for the identification of individuals forensic odontology is of great importance.² Particularly prosthodontist plays an important role in forensic dentistry by

identifying the victims with dental prosthesis like crowns, bridges, implant's, partial and complete denture's.^{1,3,4}

Denture marking is one of the methods to identify the elderly individuals, hospitalised patients and patients in geriatric institution. Confusion in identification of denture or loss of denture is most common while cleaning the dentures by nurses.⁵ With the help of marked or labelled denture it is easy to trace or determine the location of patient suffering from neurodegenerative disorder such as Parkinson's disease, Alzheimer's disease.⁶

Dr Robert H. Griffiths, the president of American Dental Association was first to describe the importance of denture identification.⁷ Denture identification has great importance and number of advantages like it enables the identification of lost or misplaced denture, which is helpful in hospitals and nursing homes. Also valuable in post-mortem identification of the individuals with denture.

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Denture marking is a worthwhile procedure in the persons who are suffering from the dementia.⁸

Denture marking is recommended by forensic odontologist and international dental associations. In Sweden and some states of USA, the labelling of denture is managed by constitution. Common sites for denture marking are posterior palatal slopes in maxillary denture and lingual flange in mandibular denture. These areas are selected because in case when body is decomposed or badly burned, this area remains safe.^{9,10}

Denture marking should be simple, easy to perform and aesthetically pleasant. Different methods for denture marking have been tried over past few decades. Earlier spirit pens, commercial and experimental sealant were used for marking of the dentures as they were not permanent marks gets faded while cleaning the denture to avoid this various method are proposed for denture marking by different authors in number of literatures.^{2,11}

This review article represents the various methods used for denture marking and recent advancements in the material's and newer methods being used from past years to the todays date. Also disseminates the awareness of denture marking among dentists and patients.

Requirements for Denture Marking:^{2,12,13}

American dental association has prescribed some requirements for denture marking, which are:

1. Strength of the denture must not be compromised.
2. Markings should be efficient and durable.
3. Markings should be visible.
4. Procedure should be inexpensive and inert.
5. Marking material should resist the temperature, humidity and disinfecting agents.
6. It should be aesthetically acceptable.
7. Markings should be readable.
8. Should be easy to remove from the denture after an accident.

Methods for denture marking:

Number of methods are described for denture marking in the literature from past few decades. Two main methods are Surface method and Inclusion method.

1. Surface methods are;

- I. Scribing or engraving method
- II. Embossing method

2. Inclusion methods are;

- I. Lenticular card method
- II. ID Band method
- III. Paper Strip method
- IV. Denture Bar Coding
- V. T- Bar method
- VI. Laser Etching
- VII. Electronic Microchips
- VIII. Photographic method
- IX. RFID Tags
- X. Lead Foil

1. Surface methods

I. Scribing or engraving:¹³

In this method letters or numbers are carved with a small round dental bur on fitting surface of complete denture. This method is economical & easy to perform. The disadvantage of this method is food lodgement due to scribing of denture surface leading to bacterial infection.

II. Embossing:¹³

In this method initials of name and surname are scratched on the surface of the master cast with the help of dental bur. After processing it produces embossed letters on impression surface of denture. This method is economical. There are chances of malignancy due to continuous irritation by the embossed surface.

2. Inclusion methods

I. Lenticular card method^{14,15}

In this method a lenticular lens is used to produce images with an illusion of depth, morph or an ability to move or change as the image is viewed from different angle. Images are printed on the back of a synthetic paper and laminated on the lens.

Advantages:

- Simple, cheap and quick method.
- Store large amount of information.

- The lenticular card shows no degradation when placed in water for up to four months.
- Does not require special glass or device to read. the data, like computer or hand-held reader.
- As lenticular card is of small size, it does not interfere with oral function.
- Stores large amount of data.

Disadvantages:

- Information can never be changed
- Does not withstand the fire until placed in posterior most part of the denture.

II. ID Band: method¹⁶

- In this method dentures are marked with a stainless-steel metal band.
- For preparation of the ID band fire resistant materials used which are Titanium foil and HO Matrix Band which contains the coding system representing the patient's details.
- A shallow recess for metal band is prepared in denture base measuring 6mm in length longer than the band and 3mm deeper than thickness of the metal band.
- For proper fit of metal band, a small amount of clear acrylic resin is placed on the bottom of prepared recess.
- After proper fit, band is covered with clear acrylic resin, then it is trimmed and finished.
- Stainless steel has a good biocompatibility, high corrosion resistant and does not cause any allergies.
- International standard among ID band is Swedish ID Band which is resistant to very high temperatures, up to 1100⁰ c.

Advantages:

- Inexpensive and quick method.
- No special equipment or training needed.
- Band is radiopaque and aesthetically acceptable.
- Can withstand temperature up to 1100⁰ c.

Disadvantage:

- Metal insert will be inevitably causing weakening of denture at the point, creating a plane of cleavage.

III. Paper Strip method:^{13,14}

- In this technique a piece of "Onion Skin" paper is incorporated in the complete denture.
- The fitting surface is located palatally and center of palate is moistened with monomer.
- The strip of typed paper is laid on this surface and the paper is moistened with monomer.
- Clear or pink polymethyl methacrylate (PMMA) is then placed over the paper before final closure of denture flask.
- Pink paper and red inscription is used in the Vestermark's method.

Advantages:

- Economical.
- Easy to perform.

Disadvantages:

- The paper strip may not survive the high temperature or fire.

IV. Denture Bar Coding:^{5,17}

- A bar code applicable to dentures consist of a machine-readable code of a series of bars and spaces printed in a defined ratio.
- Procedure for bar coding is to print a number code on paper, photographing the paper, making and transferring the negative to the piece of silk.
- An image of the bar code appeared on a prepared faience, by a machine that forced the pain through the silk, when heated to 860⁰ degree centigrade for 30 minutes in an industrial porcelain oven.
- The bar code was then read with a reader, and incorporated on to the denture and then sealed with acrylic resin.

Advantages:

- In case of crown and bridge restoration denture bar coding is useful.
- Denture bar coding survive in high temperatures above 600⁰ centigrade.
- Denture bar coding gives exact information every situation regardless of whether fire or water is involved.

- Easy to perform.

Disadvantages:

- Denture bar coding requires special equipment's.

V. T- Bar method:¹⁸

- A T-shaped clear PMMA resin bar is constructed by cutting baseplate wax and then is flaked, packed, cured and finished in clear PMMA.
- An identification printed label is reduced in size and fixed against the flat section of T-Bar.
- The surface is polished to produce a clear window displaying the ID label.

Advantages:

- This procedure is inexpensive and time effective.

VI. Laser Etching:¹⁹

- Copper vapour laser is used to etch the patient's information into the metal surface of partial denture.
- A copper vapour laser (CVL) can label the cobalt chromium components of denture easily, legibly and reduce the font size of data.
- The CVL beam is focused and delivered to material surface by the two-axis scanner mounted with mirrors.
- The firing of CVL and the movement of scanner is controlled by computers.

Disadvantages:

- To perform this technique specialized equipment and experienced technicians are required.

VII. Electronic microchips:^{20,21}

- The patient's information is etched onto a chip measuring 5×5×0.6mm.
- Tests conducted on chips embedded in acrylic resin performed well under high temperatures that is 600⁰ degree centigrade.

Advantages:

- Chip has an excellent acid resistance.
- Can be bonded well with acrylic resin.

Disadvantages:

- Main disadvantage of the chip is that it could be inscribed only by the manufacturer and not by the dentist.
- This method requires additional equipment to transfer details to computer.

VIII. Photographic method:²²

- In this method patients' photographs are embedded in clear acrylic denture base.

Advantages:

- This method is particularly useful in countries with low literacy rate where a photograph is the easiest method of identification.
- Useful in countries with diverse scripts.

Disadvantages:

- Only resistant to temperature around 200-300⁰ c.

RFID Tags:²³

- The radio-frequency identification system consists of data carrier or tag and an electronic handled reader that energizes the transponder by means of an electromagnetic field emitted via the reader's antenna.
- It then receives coded signal returned by the transponder and converts into the readable data.

Advantages:

- This method is cosmetic, effective labelling method permitting rapid and reliable identification of the denture wearer.
- They are preferred because of their small size which is 8.5×2.2mm.
- Large amount of denture user data that can be stored into the RFID tags.
- Adjusting these tags in complete denture does not require special training.

- Solutions such as 1% hypochlorite, 4% chlorhexidine, 4% sodium perborate has no effect on chip.
- As the tags used are of small size, there are no chances of denture weakening.
- In case of laboratory relining or rebase of the denture, there is no need to remove device before finishing procedure.
- The chip remains intact and readable in sub-zero temperature as well as after burning for 1 hour at 1500⁰ c.

Disadvantages:

- RFDI's are not widely used due to the high cost of manufacture and data incorporation and may not be available in most dental set-ups.

IX. Lead Foil:²⁴

A piece of lead foil from used IOPA radiographic film is cut and patients details are carved with sharp instrument or pen and is embedded in denture with the help of clear acrylic resin.

Advantages:

- This technique is easy to perform.
- Economical.
- Radiographically visible.

CONCLUSION

Denture marking is performed at very low rate/incident in Indian population. Dentist should spread the awareness and motivate the patient about denture marking. Inclusion methods are long lasting. Not all the inclusion methods are technique sensitive which requires skilful hand, and special equipment there are some methods that are simple, practical, affordable and universally accepted. This review article presents different methods of denture marking with their procedure, advantages and disadvantages.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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