

Denture identification system based on Swedish guidelines: A Forensic Aspect

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Abstract

Over the years various denture marking systems have been reported in the literature and have been broadly divided into surface marking and inclusion methods. The surface marking methods include engraving the casts, scribing the denture or writing on the denture surface while the inclusion methods involve incorporation of metallic or non metallic labels or microchips into denture. In the case described in this paper the metallic bands are placed in the palate surface of the maxillary denture and the lingual flange of the mandibular denture during trial packing. In this case the dentures have been marked in Sweden with a stainless steel metal band incorporated into the acrylic and containing the personal number of the patient. The resulting metallic marker was cosmetically appealing, cost effective and was able to satisfy all the forensic requirements for a suitable denture marker.

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. The field of Forensic Odontology has existed for many years. Throughout history, it has been our interest to investigate the identity of deceased human beings. Because of events beyond our control, many humans do not die of natural causes or in their familiar surroundings. The task of determining the identity of these persons becomes of paramount importance. 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 ¹.

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 ². 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, but it is essential in such cases to demonstrate that the denture had been worn by the victim and was not discarded at the scene by someone else. The material from which a

denture has been made sometimes assisted in identification, and the type of the teeth fitted to the denture and the standard of workmanship may also be found useful pointers ³.

In 1986 the "National Board of Health and Welfare" of Sweden, which is the supervising authority on the health sector in Sweden, legislated and made it mandatory for all dentists to comply with the following requirements: "The patient shall always be offered the opportunity to have his/her dentures marked with a personal number". In addition to the above the dentist should always inform clearly and motivated the patient as to the benefits of the denture marking. This offer does not include small partial dentures which lack space denture marking. The dentist, before delivering the denture, should verify by referring to an identity card that the correct personal number is marked on the patient's denture. The denture marking may not be inserted if the patient refuses ^{4,5}.

The Swedish ID-Band has become the international standard and FDI accepted denture marking system, but recent research has indicated that this metal band was not resistant to very high temperatures ⁶. According to the standards for identification, the requirements for denture markers outlined by the Council on Prosthetic Services and Dental laboratory Relations ^{7,8,9} and listed below:

- The strength of the prosthesis must not be

jeopardised.

- It must be easy and inexpensive to apply.
- The identification system must be efficient.
- The marking must be visible and durable.
- The identification must withstand humidity and fire.
- The identification mark should be cosmetically acceptable.
- The identification mark should be biologically inert (when incorporated into the denture) 10 .

The purpose of this article is to present a case of denture marking with an inclusion method, using metallic band.

CASE REPORT

At this case the dentures of a 69-year –old woman, of Greek origin who lived in Sweden, were marked. The patient was fully informed and gave her written consent. The metallic bands were placed in the palate surface of the maxillary denture (Fig.1) and the lingual flange of the mandibular denture (Fig.2) during trial packing. A heat-processed acrylic resin (Kerr Syborn Corp., Romulus, Mich., USA) block was trimmed to approximately 2 to 3 mm thickness. The printed metal band was placed in a depression cut into the resin block and soaked with an autopolymerizing acrylic resin monomer. The metallic band was covered by clear acrylic resin (Hygienic Dental Mfg. Co., Akron, Ohio USA). The dentures were then polymerized according to the manufacture's instructions and then were trimmed and polished to complete the procedure. At this case, the dentures have been marked in Sweden with a stainless steel metal band incorporated into the acrylic and containing the personal number of the patient. The personal number consists of a letter (S) and a ten-figure number. The letter S stands for Sweden. The first six digits are the patient's birth date, date month year with zero as a prefix to numbers smaller than ten ₁₀ . The next three digits was the birth number and the last digit indicated the sex. It was even for females and odd for males. The personal identification number contained in the metallic band of our case was S-370720-9643 (S=Sweden, 37=year of birth, 07=month of birth, 20=day of birth, 964=birth number, 3=control digit) all of which were not less than 1.5 mm. The personal number of the patient was appeared in the identification card (Fig.3), the passport, the hospital card, the unemployment card (Fig.4).

In the inclusion method a label containing the information was included within the denture. The marker can be placed either in the tissue surface during trial packing or in the polished surface after processing, each offering both advantages and disadvantages. The marker can be made of a variety of both non metallic and metallic materials ^{3,6,10} .

Figure 1

Figure 1: The metallic band was placed in the palatal surface of the maxillary denture.



Figure 2

Figure 2: The metallic band was placed in the lingual flange of the mandibular denture.



Figure 3

Figure 3: The ID of the patient.



Figure 4

Figure 4: The unemployment card of the patient with the personal number appeared.



DISCUSSION

Many deceased persons in single accidents as well as in mass disasters could have been identified if their dentures had been marked ¹¹, and from an ethical point of view this was enough to justify the world wide implementation of ID-marking of dentures. Only one marked denture could lead to the identification of a deceased when all other means have failed ⁶. Authorities such as “The Swedish National Board of Health and Welfare” of Sweden recommend that the procedure and its quality of denture marking may vary widely and some control has to be exercised. On the contrary, there were ethical problems which inevitably occur in any possible infringement of the liberty of the individual. Some may see a considerable threat in this, and they would perhaps consider identification of persons by means of artificial dentures to be in this category ¹². Borrmann et al ¹³ evaluated patients and dentists attitudes to denture marking in Sweden and have found that very few persons had objections to ID-marking of their dentures. Stenberg and Borrmann ⁴ showed in a study that only about 35% of the complete dentures in Sweden were ID-marked. The patients have even stated that they are willing to pay the cost of marking. Nowadays, Denture marking is regulated by law only in Sweden and Iceland. In the U.S.A, denture marking is mandatory in 21 States, while in New York State denture marking is performed only after request of the patient. Several states impose the obligation to mark dentures on long-term care facilities and denture marking is compulsory for the Army.

Metallic markers have been found to be the most durable form of marker in cases of severe conflagration ¹⁴. The Swedish ID-Band (SDI AB, Sweden) has become the international standard. It is a stainless steel metal band. Studies have shown that ID-Band is not resistant to very high temperatures ^{15,16}. Olsson et al ¹⁷ tested three different types of steel bands (Jasch, Remanit, ID-band) exposed to temperature levels of 1100, 1200 and 1300 °C. At 1100 °C only the ID-band and the Jasch band were readable but none of them at 1200 and 1300 °C. Thomas et al ¹⁷ tested ID-Band, Ho-Band (stainless steel matrix) and Titanium foil at 700 and 900 °C. The performance of ID-Band and Ho-Band was similar, meaning that Ho-Band could be used as a cheaper alternative.

A cosmetically discrete way to mark dentures in which a small round heat-resistant micro-metal chip embedded in the denture and covered by clear acrylic has been described ^{18,19}. The chip remained intact and readable after burning for one

hour at 1500 ° C. It should be noted however that other heat resistant and discrete methods to mark dentures have been previously mentioned^{20,21,22}.

When using nickel-containing materials there is always a danger of allergic reactions. However, while this problem should not be ignored attempts to avoid nickel containing materials such as stainless steel and nickel aluminides (that form stable protective oxides in atmosphere) for denture marks seem to be over-cautious and an over-reaction since the marker is well embedded in the acrylic and in all likelihood will never affect the body⁶. Stainless steel is of course a well established material for dental appliances and there is no documented case of it causing allergies, while even nickel containing materials used in prosthodontics have been tested and found to have negligible effect^{23,24}.

Denture marking is not a new concept. There are various methods, divided in two big categories: surface methods and inclusion techniques. Some of them are easy to make having their advantages and disadvantages. Marking by inclusion methods is more persistent, but the need for new marking materials exists. Microchips could be an answer. Accurate dental records should be taken and kept carefully for a long time. The need of an international consensus about denture marking for clinical and forensic purposes is obvious.

CONCLUSIONS

There is a strong need to adopt an international policy for denture marking and international collaboration should be encouraged, with different opinions from the world-wide community of forensic odontologists discussed and with the aim of reaching some kind of consensus for the future.

We, the authors of this case report, suggest that dental associations of European Union countries should seriously consider bringing the issue to the attention of governments and populations, so that quality assurance programs also involve the issue of denture marking for clinical and forensic purposes.

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