



Carta ao editor

Personal identification using QR Code incorporated in dentures

Identificação pessoal usando código QR incorporado em próteses totais

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Abstract

Forensic dentistry is finding increased application in identifying deceased individuals. Incorporating patient identification system in dentures is one of the measures taken in this regard. There are several denture identification measures, each having their own merits and demerits. This article describes a new denture identification system using Quick Response Code incorporated in dentures. This identification system can be very cost-effective, store lot of patient-related information and be easily accessible to the dentist.

Keywords: Forensic sciences. Forensic Odontology. Denture identification.
Personal identification. Denture marking. Complete denture.

Resumo

A identificação de indivíduos falecidos é uma demanda crescente em Odontologia. A incorporação de sistemas de identificação na prótese total de pacientes é um procedimento de possível. Existem vários sistemas de identificação em próteses totais, cada um com seus próprios méritos e deméritos. Este artigo descreve um novo sistema de identificação de dentadura utilizando o código QR incorporado em próteses totais. Este sistema de identificação é de baixo custo, armazena grande quantidade de informações relacionadas ao paciente e é de fácil acesso ao dentista.

Palavras-chave: Ciências forenses. Odontologia Forense. Identificação por prótese dental.
Identificação Pessoal. Fabricação de próteses. Prótese total.

Introduction

Forensic Odontology is finding increased application in modern dentistry through crime investigations and in identifying deceased individuals. Forensics was born when the body of Charles was identified in the battle of Nancy by the absence of a tooth in the lower arch (1). Later, in 1835, prosthetic importance in forensics came into picture when a burned body was identified by the gold denture of the victim (2). There are few other situations when patients, dentists or dental technicians in dental office/laboratory misplace their dentures where denture identification systems could be crucial. In addition, identification of a dead or missing person can be easily made with denture identification system (3).

After World War II, out of 3,000 bodies of unidentified soldiers, 27.3% of the bodies were found to have dental prosthesis, but only 0.3% of these could be identified. In a survey conducted in United States in 1977, the total population wearing a dental prosthesis, whether a single crown or a removable partial denture, was very large (4). Several states have passed legislation that insists on having the names of patients incorporated in the dentures. But a large printing on a denture can be unsightly and unacceptable to the patient and such a procedure may require additional laboratory time and expense (5). In view of this, various denture-marking systems have been reported to create denture identity using direct and indirect techniques (5, 6-9).

QR (Quick Response) is the latest system in denture identification. This system can be very popularly used and can prove invaluable in forensics. The QR code was invented in Japan by the Toyota subsidiary Denso Wave in 1994 to track vehicles during the manufacturing process, and originally was designed to allow components to be scanned at high speed. Since then, it has become one of the most popular types of two-dimensional barcodes. Unlike the older one-dimensional barcode that was designed to be mechanically scanned by a narrow beam of light, the QR code is detected as a two-dimensional digital image by a semiconductor image sensor and is then digitally analyzed by a programmed processor. QR codes can be used in Android operating system and iOS devices (iPhone/iPod/iPad) or third-party barcode scanners. A Smartphone with Android operating system and an average digital

camera can be used to scan these QR codes. The scanning will be completed in seconds and the data will be displayed. Free QR code software should be downloaded to the Smartphone to use this application. This way an individual can be identified by just simply scanning the QR code in the denture using a Smartphone. As a QR code system can incorporate large amount of data, the data pertaining to the history of the patient, diagnosis and treatment procedure can be stored as a record. This way QR help track and store information about individuals and form a useful aid in medico-legal aspects and forensic odontology. This digital system provides many advantages as compared to manual entry of the information. Manual tracking may lead to human errors, whereas QR codes are considered very accurate. The speed of the system allows tracking to be done quickly. They are least expensive and a reliable method of entering data. This sort of verification is the best way to ensure 100% scanning (10). The various sites where QR codes can be incorporated are the buccal surface of dentures, palatal portion of maxillary denture and lingual flange of mandibular denture.

This article describes a report of incorporation of QR code in dentures as a denture identification system.

Method

1. Enter the details of the patient in the website and get a corresponding unique QR code. (Figure 1)



Figure 1 - QR code printed and laminated

2. A high resolution print of this code has to be made in a photo paper and cut into desired size and laminated.
3. This laminated code can easily be incorporated in the denture during the packing procedure (Figure 2).



Figure 2 - QR code incorporated in the heat polymerized denture base

4. Compression molding technique of denture fabrication can be used. First, a heat-cured clear acrylic resin (Dental Products of India) is applied on the palatal surface of the maxillary mold and distolingual region of mandibular mold. Following this, the laminated QR code is applied in the inverted fashion. Over the QR code, regular pink acrylic resin (Dental Products of India) is applied and the denture is polymerized. The palatal surface of the maxillary denture and distolingual region of lower denture were chosen for incorporating the QR code because of their larger surface area, avoiding distortion.
5. Alternatively, a putty (addition silicone) shaped into desired form can be placed into the tissue surface of the denture and flask trial closed. Once the resin has reached rubbery stage, the flask can be reopened and the putty removed. Then, the code can be placed in the cavity created and the rest of the cavity can be filled with the heat cured clear acrylic resin and polymerized.

6. In another procedure, a cavity of desired shape can be created in the polymerized denture. The code can then be placed in the cavity, filled with the heat cured clear acrylic resin and polymerized.

Discussion and conclusion

The importance of denture identification brought into focus by Dr. Robert H. Griffiths during his tenure as president of the American Dental Association has been a landmark (11). These denture-marking systems can broadly be classified into engraving and inclusion methods. Engraving with a bur is the simplest and commonest method of marking prosthesis. The durability of this technique has been proved time to time (2). Wecker (4), further in this direction, described a technique of using “electropen” to engrave on metal partial dentures and crowns. Many patients object to these visible identification marks on their dentures. For this purpose, an invisible ink can be used for identification on acrylic dentures. These denture markings will be rendered visible only by UV light (12). Engraving/marking the existing denture is more tedious when compared to incorporating an identity marker within the body of acrylic resin during packing and curing procedures (11).

Kruger-Monson (13) describes a technique of incorporating metal foil matrix band beneath the surface of the tissue of a denture by placing it during the packing of the resin material or by cutting a suitable cavity in the processed denture, placing the foil and then filling the cavity with clear acrylic resin. Harvey (2) cites several materials for inclusion as an identification mark in dentures: waxed paper, onion paper, cloth, nylon and metal inserts. Barcode system has recently found application as a denture identifying device due to its uniqueness. It is an optical machine-readable representation of data relating to the object to which it is attached. However the amount of data/characters that can be incorporated in each barcode is limited and it requires special equipment to scan and read these barcodes. QR codes can be used instead of barcodes, which can incorporate sufficient data that enables even a short dental/medical history of the patient to be incorporated in the denture. This system is easy to

use and is cost-effective because it only uses a readily available Smartphone. Unlike barcodes, it doesn't require special scanners. In addition, the amount of data that can be stored is way beyond what a barcode can do. The QR code can easily be obtained by simply typing the patient details and then the code can be incorporated in the denture. Scanning the QR code also takes only a few seconds. Thus, this system can prove to be one of the latest advancements in denture-marking system and can easily and cost-effectively be used in day to daily practice.

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References

1. Humble BH. Identification by means of teeth. *Br Dent J* 1933;54:528-35.
2. Harvey W. Identify by teeth and the marking of dentures. *Br Dent J* 1966;121:334-40
3. Todo J, Lukens EM. A technique for placing names in dentures. *J Prosthet Dent.* 1977;37(4):469-71.
4. Wecker. K. Personen-identifizierung durch kennzeichnung von zahnersatz und kronen. *Zahnarztl Mitt* 1969 59:629-33.
5. Toolson LB, Taylor TD. Method for denture identification. *J Prosthet Dent* 1989;61(1):114-5.
6. Todo J, Lukens EM. A technique for placing names in dentures. *J Prosthet Dent* 1977;37(4):469-71.
7. Coss P, Wolfaardt JF. Denture identification system. *J Prosthet Dent* 1995; 74(5):551-2.
8. Ibrahim WM. Denture microlabeling technique. *J Prosthet Dent* 1996;76(1):104.
9. Ling BC. Computer-printer denture microlabeling system. *J Prosthet Dent* 1998;79(3):363-4.
10. Nalawade SN, Lagdive SB, Gangadhar S, Bhandari AJ. A simple and inexpensive bar-coding technique for denture identification. *J Forensic Dent Sci* 2011;3(2):92-4.
11. Stevenson RB. Marking dentures for identification. *J Prosthet Dent* 1987;58(2):255.
12. Johns LD, Boone ME, House JE. Use of in vitro test method as applied to denture surface identification. *J Prosthet Dent* 1975;33(4):454-7.
13. Kruger-Monson A. Marking au plate proteser for identifikasjon. *Nor Tannlaegeforen Tid.* 1962;72:226.

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