Case Report

Forensic Prosthodontics: A Novel Perspective for Vigilance in Alzheimer's Disease

Shivani Priyadarshini, Sumit Kumar Misra*, Shivani Sing and Sameera Mahmood

Department of Prosthodontics, Crown and Bridge, Sarswati Dental College Lucknow, India

*Corresponding Author: Sumit Kumar Misra, Department of Prosthodontics, Crown and Bridge, Sarswati Dental College Lucknow, India.

Abstract

Alzheimer's disease represents a highly complex and enigmatic neurodegenerative disorder that impedes a person's ability to function independently. The associated dementia may lead to a peculiar tendency of wandering. This unwarranted habit may cause the patient to land in uncanny circumstances. This case report amalgamates the use of conventional prosthodontics with simple denture bar-coding in such patients. Thus, it enriches the realm of vigilance in Alzheimer's disease through forensic prosthodontics.

Keywords: Forensic Prosthodontics; Alzheimer's Disease; Neurodegenerative Disorders; Denture Bar-Coding

Key Messages: Elderly individuals often bear the brunt of neurodegenerative disorders. One such condition is Alzheimer's disease which hampers life in multitude of ways. The problem of these patients going astray can be tackled through denture identification techniques such as denture bar-coding. Thus a close vigil can be maintained through forensic prosthodontics.

Introduction

The role of dentures to establish the wearer's identity has been an evolving process ever since its advent in forensic prosthodontics [1-4]. Its spectrum of application is evident in plethora of scenarios. It has started to carve out a niche for an improved patient care in complex neurodegenerative conditions. It includes Alzheimer's or Parkinson's disease besides fulfilling the dental needs [1].

Alzheimer's disease is one of the most debilitating and incurable neurodegenerative disorder in mankind. The likelihood increases substantially with age and accounts for 60-80% of dementia cases [5]. It frequently involves a continuous decline in thinking, behavioral and social skills. This circumscribes disorientation to time and place, misplacing things, poor judgement and cognitive skills. Often it accompanies the habit of wandering which at times might be perilous [6,7].

This case report exemplifies the role of denture identification in forensic prosthodontics. It includes simple incorporation of a 2-Dimensional QR (Quick Response) code in the complete denture of an Alzheimer's patient [1].

Case Report

A 60 years old female patient reported to the Department of Prosthodontics with the chief complaint of replacement for her missing teeth. The patient had a history of Alzheimer's disease since 4 years and was on medication for the same.

Patient Management

The consent was duly taken by the concerned physician before commencing the treatment. The primary impression was made using putty impression (Aquasil, DENTSPLY/Caulk, Germany) and poured with type III dental stone (Kalabhai Dental Pvt. Ltd., Mumbai, India to form the primary cast.

Single-step border molding was performed using polyvinyl siloxane impression material of putty consistency (Aquasil, DENTSPLY/Caulk).

The final impression was recorded using light-bodied polyvinyl siloxane impression material (Aquasil, DENTSPLY/Caulk) [1].

Thus all the conventional procedures were followed till the process of denture curing.

Integration OF 2-D QR Code

- A QR code was generated by a website 'the-qrcode-generator.com (w69b GmbH, Schwabstr. 41,72108 Rottenburg, Germany)'. (Figure 1).

Figure 1: Generated QR code encrypting the demographic details of the patient.

- It encrypted the credentials of the patient like name, age, address, UIDAI no (Unique Identification No. issued by the Govt. of India) [8-10].

- A 10 x 10 mm size QR code label was printed and laminated.

- The denture was cured in a conventional manner (post-fabrication technique used) [1].

- 1mm depth groove was laid in a square form on the palatal polished surface of the maxillary denture.

- A recess was created by extending the groove uniformly (Figure 2).

- The QR code was positioned in the recess

- The clear auto-polymerizing resin was poured onto the code.

- Thereafter denture was finished and polished in a conventional manner.

- A smartphone enabled app named 'QR and Barcode Scanner' was projected over the code area (Figure 3).

- The scanner diplayed all the credentials which established the identity of the patient (Figure 4).

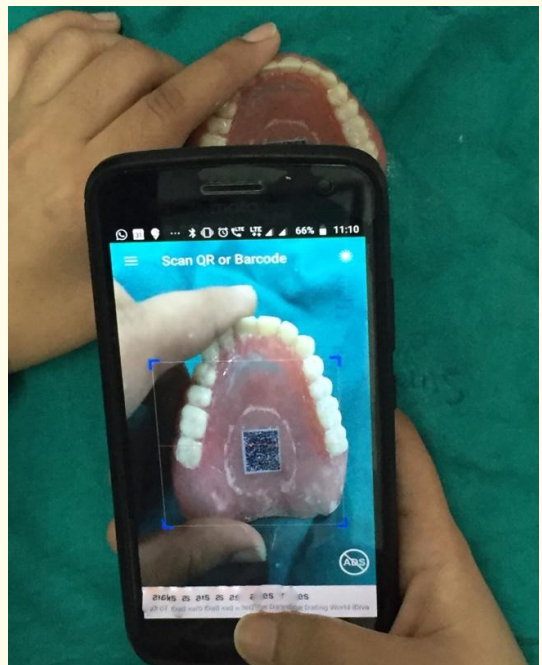**Figure 2:** Recess created on the palatal aspect of the maxillary denture.

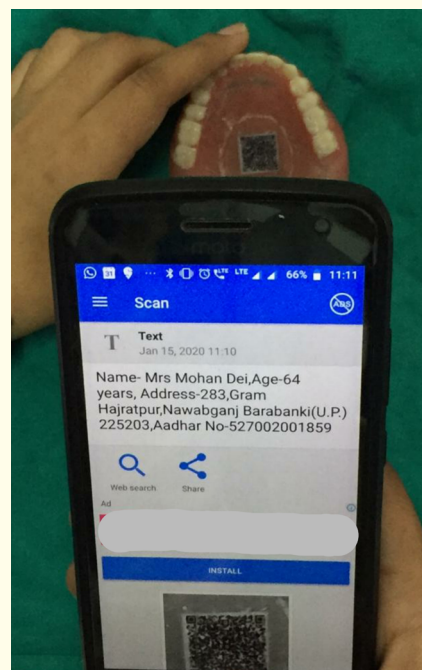**Figure 3:** Smartphone enabled with QR code scanner held against the code on the maxillary denture.

Figure 4: Scanned QR code displayed all the encrypted credentials of the patient.

Discussion

Denture identification pertains to the centennial leap of advancement in forensic prosthodontics. Dentures have now overtly been recognized to manage patients suffering from neurodegenerative disorders. Alzheimer's disease can inadvertently impair a patient's lifestyle to precarious levels [6]. The case report presented a simple and reliable technique to establish the identity in such patients by a 2-D QR code. Thus caretakers can be made wary of their patient's movements in abrupt wandering circumstances.

Much emphasis can be ascribed to the need for denture coding in such patients for an improved way of life. It may also be resourceful in old-age homes/hospitals where the elderly residents might tend to mislay or swap their dentures with one another.

Hence denture identification techniques have gained immense momentum. They are highly advocated to be incorporated in routine denture cases by most of the international dental authorities and forensic odontologist worldwide. Consequently, it serves the purpose of easy and quick identification.

Some of the other modalities like RFID tags, barcode, GPS locators, microSD chip, lenticular paper, fluorescent materials, inclusion markers can also be incorporated [1,8,11-13].

The post-fabrication technique used in the clinical trial consisted of creating a recess on the cameo surface of the palatal aspect. A laminated paper of 1mm^2 area consisting of the QR code was incorporated in it. (Figure 5) The post-fabrication technique is efficient and quick with the only downside of being less reliable in the long run as it may tend to wear off with prolonged use. Contrarily, this can be overcome by replacing the old QR code thus considered the most economical method of all.
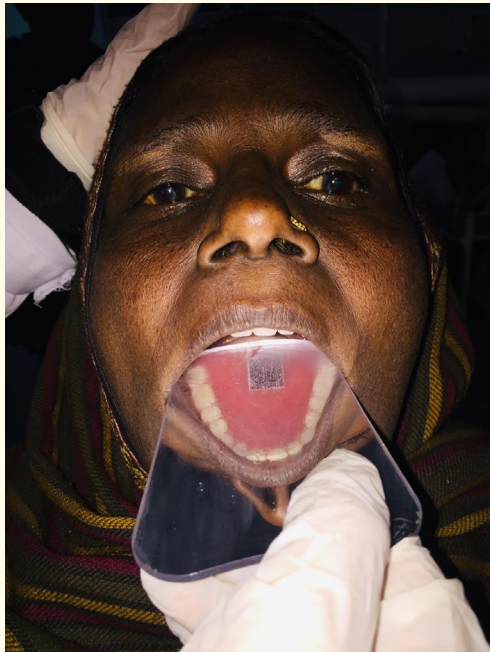

Figure 5: Embedded QR code in the maxillary denture visualized through an occlusal mirror.

Conclusion

Denture coding is an innovative method for identification of its wearer with much ease. Its usefulness in various scenarios has led to its application in cases pertaining to natural calamities, crimes, or accidents.[14] Further elaborating its scope of application, this case report illustrates its use in the management of neurodegenerative disorders. A plethora of denture identification systems have been introduced till.

Here, a simple 2-D QR code was used in the denture of an Alzheimer's disease patient. It is one of the simplest and economical way of denture identification. Hence it renders impetus to an ever-evolving field of forensic prosthodontics.

Patient's Declaration of Consent

The authors verify the obtainment of suitable patient consent form. It permitted her to share the information and images pertaining to her clinical condition. It is intended to be used for documentation and reporting purposes. The patient had been assured of confidentiality maintenance. However, the incognito identity cannot be fully guaranteed.

Bibliography

1. Basavanna J., *et al*. "Denture barcoding in forensic dentistry: A future option". *Journal of Forensic Dental Sciences* 8.1 (2016): 52.

2. Lamb DJ. "A simple method for permanent identification of dentures". *Journal of Prosthetic Dentistry* 67.6 (1992): 894.

3. Agülolu S., *et al*. "Denture barcoding: A new horizon". *British Dental Journal* 206.11 (2009): 589-590.

4. Murugesh M and Ganesh SS. "Denture labeling in forensic dentistry". *Journal of Forensic Dental Sciences* 6.1 (2014): 67-69.

5. Greenblat C. "Dementia" (2020).

6. Soria Lopez JA., *et al*. "Alzheimer's disease". *Handbook of Clinical Neurology* 167 (2019): 231-255.

7. Fauci AS., *et al*. "Harrison´s Manual of Medicine". 19th edition (2010): 1263.

8. Datta P and Sood S. "The various methods and benefits of denture labeling". *Journal of Forensic Dental Sciences* 2.2 (2010): 53.

9. Mahoorkar S and Jain A. "Denture identification using unique identification authority of India barcode". *Journal of Forensic Dental Sciences* 5 (2013): 60-63.

10. Sikka N., *et al*. "Momentousness of denture labeling using Aadhaar number in Indian population". *Journal of Family Medicine and Primary Care* 8.9 (2019): 2760-2762.

11. Colvenkar SS. "Lenticular card: A new method for denture identification". *Indian Journal of Dental Research* 21.1 (2010): 112-114.

12. Naito Y., *et al*. "Recording of Individual Identification Information on Dental Prostheses Using Fluorescent Material and Ultraviolet Light". *The International Journal of Prosthodontics* 26.2 (2013): 172-174.

13. Colvenkar SS and Gopal S. "Micro secure digital card: A novel method for denture identification". *Journal of Forensic Dental Sciences* 6.3 (2014): 183-186.

14. Bathala LR., *et al*. "Prosthodontics an "arsenal" in forensic dentistry". *Journal of Forensic Dental Sciences* 8.3 (2016): 173.