

Comprehensive Evaluation of Specialized Complete Dentures with Labelled QR Code in Medically Compromised Geriatric Patients: An Original Research Study

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ABSTRACT

Background: Geriatric patients need special care when it comes to dental treatment. When the patient is medically compromised, the concern and treatment protocols change accordingly. This study was attempted to comprehensively evaluate the specialized complete dentures with labelled QR code in medically compromised geriatric patients.

Materials & Methods: This study was completely performed on completely edentulous medically compromised geriatric patients. Total ten patients were selected in which complete dentures were fabricated using conventional compression molding technique. The final denture fabricated consisted of a QR code embedded which could be scanned easily with the help of any QR code scanner and necessary details that were incorporated in the PDF were visualized. Satisfaction related to specialized complete dentures was also evaluated. The response was collected, and data were processed statistically to assess the outcomes.

Results: Statistical analysis was completed using the statistical software 'Statistical Package for the Social Sciences (SPSS)'. The complied data was subjected to suitable statistical tests to obtain p values, mean, standard deviation, standard error and 95% CI. $P \leq 0.05$ was considered as statistically significant. Out of 10 patients, males were seven, and females were 3. Total 1 patient as belonging to age group >70 years. 2 patients were belonging to the age range of 50-54 years. 2 patients belonged to the age range of 55-60 years. P-value was significant in the first and fifth age groups.

Conclusion: Within the limitations of the study, the authors concluded that these specialized complete dentures with QR code could be easily scanned to obtain relevant information instantaneously. This is particularly true for medically compromised patients wherein patient need to be assisted with another person to furnish the detailed information. In our study, all the studied patients and their companions were totally satisfied with the fabricated dentures.

Keywords: Geriatric patients, QR code, Handicapped Patients, Forensic Odontology.

INTRODUCTION

Geriatric patients need special care when they come for dental treatment. Moreover, when the patient is

medically compromised, the concern and treatment protocols changes accordingly. When such a patient

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enters the clinic, they are usually followed by an assistant or family member who carry all his prescription details and tries to communicate with the dentist.^{1,2,3} However, in the majority of such situations, there is a clear-cut miscommunication between the dentist or clinician and the family member. There have been studies regarding the use of QR code in modern dentistry to a forensic level and identification. Even forensic odontology has established very imperative millstones in these perspectives. Many clinicians have also gathered reports on the reliability of QR code its importance in a technical field. Many of the pioneer workers have shown that incorporation of QR code in the denture not only helps the clinician but also aids in providing efficient knowledge to the patient.^{4,5,6} This study was attempted to comprehensively evaluate the specialized complete dentures with labelled QR code in medically compromised geriatric patients.

MATERIALS & METHODS

The present study was planned, finalized and conducted in the department of Prosthodontics. The basic aim was to comprehensively evaluate the specialized complete dentures with labelled QR code in medically compromised geriatric patients. Authors had selected a total of 10 medically compromised completely edentulous geriatric patients who visited the department for the fabrication of completed dentures. Only the patients with chronic systemic diseases, physically and mentally handicap situations were included in the study. At first, the QR code was generated using QR code generator software. After selecting the type and format of code, operators had enabled an option to incorporate PDF in it. Now, all relevant detail was filled into this code or pdf. This information was including personal information, dentist detail, consent form, any past medical and dental history, allergic reaction, covid precautions, dose or medication he/she is following. The operator can also add dietary chart and pictorial figures for illiterate patients of how to clean the denture and other dental patient education detail. After the necessary information's are placed, authors finalized the file and put it on the QR code. After all the procedure is done, authors got a code which, when scanned, will decode all those information's in PDF format. Now, after getting the code authors to customize the size to get easily fit

on to denture at processing phase. Complete dentures were fabricated using conventional compression moulding technique. After this QR code's print out was taken and cut into desired length. A clear film is used to place over it so as during the time of acrylization, it does not get hampered. After dewaxing of maxillary denture, the laminated film code was placed on the palatal surface, and some clear acrylic was also placed on the corner. This was performed to maintain the position of code at the time of packing. Final processed dentures were finished and polished with code labelled on to the palatal surface (figure 1-4). Satisfaction related to specialized complete dentures was also evaluated in all ten studied patients. Total of seven questions related to complete denture satisfaction was asked to all studied patients. This was performed in the post-delivery phases of denture wearing. Informed consent was taken from the patients those were ready for participation. The significance of this study was explained in detail to all participating patients and their companions. Results thus obtained was tabulated and subjected to basic statistical analysis. P-value less than 0.05 was considered significant ($p < 0.05$).



Fig 1: QR code with clear film.



Fig 2: Clear film attached to QR code.



Fig 3: Placing of QR code over dewaxed denture before acrylization.



Fig 4: Final denture with labelled QR code

STATISTICAL ANALYSIS AND RESULTS

Significant responses were gathered and sent for statistical analysis using statistical software Statistical Package for the Social Sciences version 21 (IBM Inc., Armonk, New York, USA). The resulting data were subjected to suitable statistical tests to obtain p values, mean, standard deviation, chi-square test, standard error and 95% CI. Table 1 and Graph 1 showed that out of 10 patients, males were seven, and females were 3. Total one patients belonged to the age group >70 years. 2 patients belonged to the age range of 50-54 years. 2 patients belonged to the age range of 55-60 years. P-value was significant in the first and fifth age groups. The questionnaire was having a total of 7 questions related to complete denture satisfaction. Questionnaire responses showed remarkable

outcomes with positive responses for labelled dentures. Table 2 shows a fundamental statistical description with the level of significance evaluation using a Pearson chi-square test [questionnaire assessment for all ten patients]. Question no 1, 4 and 6 showed significant levels ($p < 0.05$ significant).

Table 1: Age & Gender Wise Distribution of Patients.

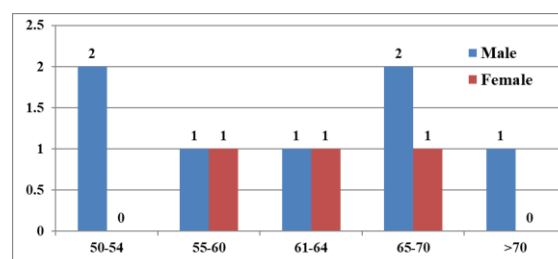
Age Group (Yrs)	Male	Female	Total %	P value
50-54	2	0	2 [20 %]	0.02*
55-60	1	1	2 [20 %]	0.06
61-64	1	1	2 [20 %]	0.09
65-70	2	1	3 [30 %]	0.80
>70	1	0	1 [10 %]	0.01*
Total	7	3	100%	*Significant

* $p < 0.05$ significant

Table 2: Basic Statistical Description with Level of Significance Evaluation Using Pearson Chi-Square Test [Questionnaire Assessment For All 10 Patients]

Question No.	Mean	Std. Deviation	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
1	1.65	0.738	0.837	1.82	1.728	2.0	0.001*
2	1.34	0.930	0.234	1.98	1.029	1.0	0.080
3	1.92	1.829	0.544	1.62	1.826	1.0	0.070
4	1.90	0.029	0.528	1.72	1.452	2.0	0.002*
5	1.53	1.933	0.928	1.98	2.826	1.0	0.080
6	1.02	1.929	0.526	1.96	1.426	1.0	0.009*
7	1.88	1.527	0.938	1.63	1.089	1.0	0.930

* $p < 0.05$ significant



Graph 1: Age & gender-wise distribution of patients.

DISCUSSION

Literature has identified denture labelling as a very significant procedure for numerous reasons. Complete denture patients usually belong to an older age group. This fact advocates that many of these patients exhibit compromised cognitive and motor functions, memory loss or dementia. In addition, many of them live in old age homes, either full time or part-time. Moreover, there might be a high prevalence of health issues that may necessitate hospitalizations.^{7,8} It is common under these circumstances to expect a loss of removable prostheses or confusion regarding which they

belong to. For this reason, the positioning of recognition elements within the dentures will simplify the companions work and remarkably reduce the risk of denture loss for the patients.^{9,10} Denture labelling has also been advocated in forensic odontology as a satisfactory way to identify fatalities during catastrophic events. As per the literature, one method of the most popular identification method in forensic odontology is the labelling of dentures.¹¹ The exact cause for selecting QR Code inclusion in our study over the other methods has also been well worked out by the authors. QR Code has many beneficial characteristics, such as simpler and handy technique, cost-effectiveness, and large data storage capacity. QR Code, like any other marker, is accurate as of such, but its effectiveness in unfavourable conditions determines the clinical application.^{12,13} The size of the QR Code was carefully selected for ease of inclusion in dentures. Instead of clear auto polymerizing acrylic resin, clear acrylic sheets were used to cover the label as the probability of QR Code getting distorted by the monomer content is high and the porosity of auto polymerizing acrylic resin would affect the scanning result. Acrylic sheets of varying thickness are available, and these were cut according to the groove and placed. Certain ideal requisites of a denture marker exist: That it should be biologically inert, easy to apply, esthetically acceptable and readable, inexpensive, possible to retrieve after an accident, acid-resistant, durable without jeopardizing the strength of the prosthesis, resistant to everyday disinfecting agents, and able to survive elevated temperatures.^{11,14,15}

CONCLUSION

Within the limitations of the study, the authors concluded that these specialized complete dentures with QR code could be easily scanned to obtain relevant information instantaneously. This is particularly true for medically compromised patients wherein patient need to be assisted with another person to furnish detailed information. Complete dentures with embedded QR code can also be used as identification for handicapped patients who somehow get vanished in an accident. Moreover, these dentures can also be used in case of any forensic testing. In this study, all the studied patients and their companions were totally satisfied with the fabricated dentures. Our study inferences should be considered as indicative of presuming

prognosis for similar clinical conditions. Nonetheless, we expect some other large scale studies to be performed that might further establish a certain standard and concrete guidelines in these perspectives.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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