Evaluation of Oral Health Related Quality of Life in Different Telescopic Two-implant Supported Mandibular Overdenture

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Abstract

AIM: The purpose of the study was to evaluate patient's oral health related quality of life using oral health impact profile (OHIP14) in rigid and non-rigid telescopic two-implant supported mandibular overdenture patients.

METHODS: Twelve completely edentulous patients received two mandibular interforaminal implants to retain telescopic overdenture opposed by maxillary complete denture. Group I (six patients) had rigid telescopic connection and Group II (six patients) received non-rigid telescopic attachments. OHIP14 questionnaire was translated in Arabic and orally asked the patients, answers were collected soon after denture insertion and use (within 1 week), 6 and 12 months after using the overdenture to assess patient's quality of life.

RESULTS: There was no statistical significant difference regarding quality of life using OHIP14 questionnair between the two groups.

CONCLUSION: Telescopic two-implant mandibular overdenture showed high quality of life, great satisfaction, and acceptance among patients; regardless to the type of attachments rigid or non-rigid.

Introduction

Complete edentulism is a life-changing event accompanied by several comorbidities affecting all aspects in patient's life. Decades ago, complete denture was the only solution for restoring function and esthetic to the patient but it was unable to accomplish acceptable function and patient satisfaction in many patients especially those with severe bone resorption. This was particularly in the mandibular arch because its smaller surface area than the maxillary arch, leading to decreased support, and stability of the denture [1].

The introduction of implant dentistry either fixed or even removable prosthesis as overdenture greatly increased patient satisfaction and quality of life. Two-implant supported mandibular overdenture is now considered the minimum and first treatment offered to the completely edentulous patients instead of the conventional complete denture [2], [3].

There are many attachment systems available for retaining the overdenture, as ball anchor system, low-profile locators, bar and clip attachments, magnets, and telescopic attachments. Selection of the proper type depends on many factors as available inter-arch distance, shape of the arch, position of the implants and their parallelism, skills of the dentist and technician, and manual dexterity of the patient [4]. Telescopic attachments are formed of primary coping that is permanently fixed to the abutment and secondary coping picked up in the fitting surface of the denture and telescoped on the primary coping. Retention is gained by friction or wedging action, or using added attachments. The name telescopic attachments mostly used for parallel copings gained the retention by frictional fit between the two copings, so there is minimum required height about 5 mm to have adequate retention. This also provides advantage to the telescopic attachments which are stability and ease of insertion and removal which made it suitable for use in geriatric or Parkinson's' patients [5], [6], [7], [8].

Telescopic attachments are further subdivided into rigid and non-rigid types. According to Heckmann *et al*., the rigid type has a definite end position and intimate contact between the two copings. The non-rigid or resilient type has no definite end position and occlusal space about 0.3–0.5 mm and axial space about 0.03–0.05 mm to decrease implant stresses [9], [10].

Patient-centered outcomes as patient satisfaction and quality of life having increased

recognition and importance to evaluate as they are the aim of any treatment; several indices were created to measure oral health related quality of life. The OHIP14 is used mostly as it is short and easy to measure [11]. The original OHIP consists of 49 questions (Slade 1994). OHIP-14 is considered the shorter and easier version; it consists of 14 questions and covers the same seven domains. Implant supported overdenture resulted in higher oral health quality of life than complete denture regardless to the used type of attachments [12].

The aim of this study was to evaluate oral health related quality of life with different types of telescopic attachments, rigid versus non-rigid attachments, in two-implant supported mandibular overdenture.

Methods

After approval from the research ethics committee, faculty of dentistry, Minia University, Egypt no.299, September 2018; the study was conducted on 12 completely edentulous patients approved to participate in the study after thorough explanation of its purpose and steps and every possible complications and signed informed consent.

All included patients were completely edentulous, having normal maxilla-mandibular relation Angle Class I, tentative jaw relation was made to ensure adequate interarch space about 14 mm for telescopic overdenture construction. Patients were free from any systemic diseases that may interfere with bone healing as diabetes mellitus, glycosylated hemoglobin test (HBA1C) was done and patients included were having results beneath 6.5% (not diabetic or pre-diabetic). Heavy smoker patients were excluded from the study. Pre-operative panoramic X-ray was made for all patients to evaluate bone height, detect any pathological lesions, or remaining roots.

All patients received complete dentures, then the mandibular denture was duplicated into transparent acrylic resin radiographic stent with gutta-percha attached to the labial and buccal surface for cone beam computed topography of the mandibular arch. After detecting the best implant locations for each patient, the radiographic stent was transformed into surgical stent by drilling a hole in the lingual side opposite to the planned osteotomy site for placing the pilot and first drill, and then the osteotomy site was completed free-hand after removing this stent. Patients were asked to rinse with 0.12% chlorhexidine digluconate 15 min before surgery; crestal mucoperiosteal envelop flap was made from the left second premolar to the right one. Every patient received two interforaminal implants 3.5–4 mm diameter and 11.5 mm length (Neobiotech Co., Seoul, Korea) (Figure 1); the implants were covered and left for 3 months of uninterrupted healing.

The surgical procedure was done under prophylactic antibiotic coverage.
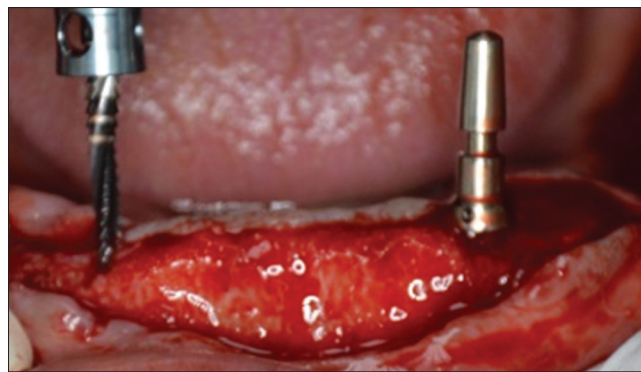

Figure 1: Osteotomy drill with parallel positioning pin in place

Patients were randomly allocated into two groups; randomization was done by putting the patients in order of receiving the implants first and allocating them by numbers, odd numbers were categorized for the first group and even numbers for the second group. After 3 months of osseointegration, implants were uncovered with a scalpel by the aid of the surgical stent to detect them, impression copings were screwed and closed tray impression was made using putty and light body addition silicon (a-silicon impression material, Zhermack S.P.A. 45021 Badia Polesine (Rovigo) Italy), the impression copings were removed and implant analogs were tightened to them and inserted in their places in the impression. The first group had rigid telescopic attachments and the second group received non-rigid telescopes, straight titanium implant abutments were used as the primary copings after milling them to have parallel walls and 5 mm height with the use of dental parallelometer (Figure 2). For both groups, a duralay verification jig was made to transfer the exact abutments position on the implants (Figure 3).

Figure 2: Parallel abutments as primary copings

Secondary titanium copings were milled by CAD/CAM system (smart optics Vinyl scanner, exocad software, and Emar ED5X milling machine) for accurate manufacturing. These copings had metal tags for retention into the denture base. Direct pick-up of secondary copings was done in the patient mouth using methyl metha-acrylate monomer free chair side self-curing rebase material (Tokuyama Rebase II Fast, Tokuyama Dental Corporation, Japan) (Figure 4).

Figure 3: Duralay verification jig

OHIP14 contains 14 questions exploring seven aspects functional limitations, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Each question has five possible answers from 0 to 4. Zero=never, 1=hardly ever, 2=occasionally, 3=fairly often, and 4=very often.

Questions were asked within one week after denture insertion, six, and twelve months post-insertion.

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0 (Armonk,NY: IBM Corp). Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution. Quantitative data were described using range (minimum and maximum), mean, standard deviation, median and interquartile range (IQR). Significance of the obtained results was judged at the 5% level. Mann Whitney test was done for abnormally distributed quantitative variables, to compare between the two studied groups.

Results

For functional limitations; the first question regarding the pronunciation of sounds and the second about taste sensation were asked, all patients in both groups responded never which was scored as zero.

Figure 4: Direct pick-up for secondary copings

For Physical pain; question was asked about having any painful ache, none of the patients experienced pain. Regarding feeling discomfort while eating, some patients from both groups experienced discomfort at first (in the first week from receiving the overdenture), then this discomfort decreased with time to score zero after twelve months using the telescopic overdenture.

For Psychological discomfort; question about self-consciousness or feeling the denture as a strange object was asked, one patient from each group continued to feel the presence of the dentures with score 4 (very often) even after twelve months of using them. Regarding the question about feeling tense, all patients recorded zero (never).

For Physical disability; question about having unsatisfactory diet, during the first week of using the denture, some patients did not experience any dissatisfaction (zero) and some reported hardly ever (1) and few responded with occasionally (2) in both groups while all patients did not have any problems or dissatisfaction after one year follow-up. Concerning the question about interrupting the meals, all patients in both groups did not face this problem after one year follow-up.

For psychological disability; the first question was about difficulty to feel relax while wearing the denture or using it, all patients recorded zero from the first follow-up. Regarding the tenth question about being embarrassed with the denture, only two patients felt embarrassed even after 1 year; they were the same patients who felt the denture as a strange object.

For social disability; feeling irritable with people because of the denture, few patients in both groups experienced hardly ever (1) soon after having the denture, but all patients recorded never (zero) in the second and third follow-ups. Concerning having difficulties in doing usual jobs because of the denture, no patient experienced that in both groups.

For the seventh and final domain, handicap; both questions about feeling life in general become less satisfying because of the denture or being totally unable to function, no patient in both groups felts that.

The mean OHIP scores for questions answered more than zero in any time of evaluation in both groups throughout the follow-up periods are shown in Table 1. There was no statistical significant difference in OHIP between both groups. Both rigid and non-rigid telescopic overdentures showed lowest total scores zero after 1 year in all questions except two patients one in each group regarding two questions the fifth and tenth one (feeling self-consciousness and embarrassed); which means that telescopic overdenture with both types shows high quality of life.

Table 1: Comparison between the two studied groups according to OHIP14

Questions answered >0	OHIP14	Group I (n = 6)	Group II (n = 6)	U	p
Q4: discomfort while eating	Baseline				
	Min. – Max.	0.0–3.0	0.0–2.0	16.50	0.818
	Mean ± SD.	0.83 ± 1.33	0.50 ± 0.84		
	Median (IQR)	0.0	0.0		
	6 months				
	Min. – Max.	0.0–1.0	0.0–1.0	18.0	1.000
	Mean ± SD.	0.17 ± 0.41	0.17 ± 0.41		
	Median (IQR)	0.0	0.0		
	12 months				
	Min. – Max.	0.0–0.0	0.0–0.0	18.0	1.000
	Mean ± SD.	0.0 ± 0.0	0.0 ± 0.0		
	Median (IQR)	0.0	0.0		
Q5: self-consciousness	Baseline				
	Min. – Max.	0.0–4.0	0.0–4.0	18.0	1.000
	Mean ± SD.	0.83 ± 1.60	0.83 ± 1.60		
	Median (IQR)	0.0	0.0		
	6 months				
	Min. – Max.	0.0–4.0	0.0–4.0	18.0	1.000
	Mean ± SD.	0.67 ± 1.63	0.67 ± 1.63		
	Median (IQR)	0.0	0.0		
	12 months				
	Min. – Max.	0.0–4.0	0.0–4.0	18.0	1.000
	Mean ± SD.	0.67 ± 1.63	0.67 ± 1.63		
	Median (IQR)	0.0	0.0		
Q7: unsatisfactory diet	Baseline				
	Min. – Max.	0.0–2.0	0.0–2.0	15.50	0.699
	Mean ± SD.	0.67 ± 0.82	0.50 ± 0.84		
	Median (IQR)	0.50	0.0		
	6 months				
	Min. – Max.	0.0–0.0	0.0–1.0	15.0	0.699
	Mean ± SD.	0.0 ± 0.0	0.17 ± 0.41		
	Median (IQR)	0.0	0.0		
	12 months				
	Min. – Max.	0.0–0.0	0.0–0.0	18.0	1.000
	Mean ± SD.	0.0 ± 0.0	0.0 ± 0.0		
	Median (IQR)	0.0	0.0		
Q8: interrupted meals	Baseline				
	Min. – Max.	0.0–2.0	0.0–1.0	13.0	0.485
	Mean ± SD.	1.0 ± 0.63	0.67 ± 0.52		
	Median (IQR)	1.0	1.0		
	6 months				
	Min. – Max.	0.0–1.0	0.0–1.0	18.0	1.000
	Mean ± SD.	0.33 ± 0.52	0.33 ± 0.52		
	Median (IQR)	0.0	0.0		
	12 months				
	Min. – Max.	0.0–0.0	0.0–0.0	18.0	1.000
	Mean ± SD.	0.0 ± 0.0	0.0 ± 0.0		
	Median (IQR)	0.0	0.0		
Q10: feeling embarrassed	Baseline				
	Min. – Max.	0.0–4.0	0.0–3.0	16.0	0.818
	Mean ± SD.	0.67 ± 1.63	0.67 ± 1.21		
	Median (IQR)	0.0	0.0		
	6 months				
	Min. – Max.	0.0–2.0	0.0–2.0	18.0	1.000
	Mean ± SD.	0.33 ± 0.82	0.33 ± 0.82		
	Median (IQR)	0.0	0.0		
	12 months				
	Min. – Max.	0.0–2.0	0.0–1.0	17.50	0.937
	Mean ± SD.	0.33 ± 0.82	0.17 ± 0.41		
	Median (IQR)	0.0	0.0		
Q11: feeling irritable with people	Baseline				
	Min. – Max.	0.0–1.0	0.0–1.0	18.0	1.000
	Mean ± SD.	0.33 ± 0.52	0.33 ± 0.52		
	Median (IQR)	0.0	0.0		
	6 months				
	Min. – Max.	0.0–0.0	0.0–0.0	18.0	1.000
	Mean ± SD.	0.0 ± 0.0	0.0 ± 0.0		
	Median (IQR)	0.0	0.0		
	12 months				
	Min. – Max.	0.0–0.0	0.0–0.0	18.0	1.000
	Mean ± SD.	0.0 ± 0.0	0.0 ± 0.0		
	Median (IQR)	0.0	0.0		

SD: Standard deviation, U: Mann Whitney test. p: *P* value for comparing between the studied groups.

Discussion

The questions were translated in Arabic and verbally asked to the patients to collect the answers, this was done because many patients were not capable of reading. There was no significant difference between the two groups in all questions. This was in accordance to a study evaluated oral health quality of life using OHIP14 between rigid telescopic and milled-bar four-implant supported mandibular overdenture found that telescopic overdenture was better in terms of pronunciation of sounds, cleaning and hygiene measures, and comfort on eating [13].

Another systematic review comparing quality of life between mandibular implant-retained overdenture and conventional complete denture found significant difference in favor of implant-retained overdenture [12].

In another study evaluating quality of life of bar versus ball-retained mandibular overdenture using OHIP14, found that older patients were satisfied more to their implant supported overdentures than younger patients. Neither type of attachments nor number of implants had any significant influence [14].

A crossover trial on 18 patients done to assess patient satisfaction and quality of life of conventional complete denture, bar, telescopic, and stud two-implant retained mandibular overdenture, the evaluation was reported after 3 months of using each prostheses, they found that implant retained overdenture was significantly better than conventional denture in all domains regardless of the type of attachments, they also reported that telescopic attachments perceived better in masticating soft or hard food and in hygiene measures [15].

Conclusion

Within the limitations of this study, telescopic two-implant supported mandibular overdenture showed high oral health related quality of life regardless to the rigidity of the attachments.

Contribution

All authors had read the manuscript, revised, and approved it.

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