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Patient satisfaction of tooth supported overdentures utilizing ball attachments



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ABSTRACT

Statement of problem: Teeth retained overdenture therapy is an alternative treatment rarely used in cases with few remaining teeth.

Purpose: The aim of this study was to evaluate the patient satisfaction associated with teeth retained maxillary and mandibular overdentures utilizing ready made ball attachment.

Materials and methods: Thirty patients treated with teeth retained overdenture utilizing ready made ball attachment. Participants completed a series of questionnaires (OHIP-14 questionnaire) after tooth supported overdenture wearing by one month (base line), then after one month and 12 months of wearing the attachment retained overdenture.

Results: Statistically insignificant difference between gender, and for upper and lower arch overdentures, before attachment placement, one month and one year post attachments placement. Statistically significant difference in patient satisfaction was recorded with different intervals of the questioner.

Conclusion: Tooth retained overdentures using ball attachments achieve greater satisfaction scores than those conventional tooth supported overdentures.

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1. Introduction

Various types of treatment for rapidly increasing elderly population with partially or completely edentulous patients may be indicated. Conventional complete dentures and both tooth-supported and implant-supported overdentures are common treatment modalities [1].

The preservation of supporting teeth as an overdenture abutments provide efficient prosthetic treatment. Tooth-supported overdentures can be retained with attachments improving both retention and stability. This treatment modality is cost-effective, maintains dental proprioception and simultaneously reduces alveolar bone resorption [2].

Different overdenture attachments designs are available including bar and clip, ball and O-ring, ERA, and magnet attachments. The selection of the most appropriate system depends on the number, distribution, and location of the remaining natural

teeth [3].

Proper diagnosis and treatment planning ensures acceptable long-term performance of the remaining teeth to maintain sufficient bone height and periodontal support [4].

The ball attachment system is considered an appropriate, easily constructed and maintained resilient mechanical attachment. Several studies describe the use of either custom made [5–8] or ready made [9] ball attachment.

The aim of this study was to evaluate the patient satisfaction associated with teeth retained maxillary and mandibular overdentures utilizing ready made ball attachment.

2. Materials and methods

The study was carried out in the Department of Removable prosthodontics, Faculty of Oral and Dental Medicine, Future University. The participants of this study were thirty two patients (18 male, 14 female). Thirty patients had completed a follow-up period of one year and two dropped out. The dropped out cases were one patient unfortunately died during the follow up period and one patient didn't commit for schedule follow ups.

The age of the patients ranged between 48 and 70 years with a

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mean age of 59 years. The basic inclusion criteria were partially edentulous patients with one remaining tooth on each side (either canine or first premolars), good oral hygiene measures and patients with proper interarch distance. Fig. 1 Patients with remaining teeth showing grade II or III mobility, crown/root ratio exceeding 1:1, bruxism, uncontrolled systemic diseases, irradiated cancer patients and patients with bad oral hygiene were excluded. The patients agreed with a written informed consent. The study was conducted in accordance with the Helsinki Declaration of 1975 for medical studies, as revised in 2000 and the study has been independently reviewed and approved by an ethics committee review board at Future University. Patient's selection was based on clinical and radiographic examinations using preoperative panoramic view.

2.1. Abutment preparation

Treatment plan included extraction of teeth with poor prognosis, through periodontal therapy and root canal treatment for the selected abutments on both side of the arch. Abutment teeth were prepared 2–3 mm supra gingivally in a dome-shaped contour hemispherically rounded in all dimensions. Fig. 2 The exposed dentin of the abutment was polished and treated with fluoride varnish. One month later after overdenture construction, preparation for the ball attachment (Pivot and Pivot Flex) (Rhein 83, Italy) direct access post was done with Mooser bur (Rhein 83, Italy) to the predetermined length of half to two thirds' of root length. Ball attachment was cemented in it place using resin cement. Fig. 3.

2.2. Overdenture construction

After abutment preparation, primary impression was made with irreversible hydrocolloid impression material. The impressions were poured and special trays were fabricated with self-cure acrylic resin. Border molding was done for both the arches with low fusing compound. Final impression was made with regular body elastomeric impression material. Master casts were prepared and occlusal blocks were fabricated; maxillo-mandibular relations recorded and transferred to the semi-adjustable articulator with the help of face-bow record. Teeth setting were done and try in was made in patient's mouth for phonetics, vertical and centric relation and finally esthetics. Vertical dimension was verified and centric and eccentric contacts checked. Patient's approval was taken, and the curing of the final denture was done in heat-cure acrylic resin reinforced with metallic meshwork and metallic palatal plate. After one month space was created in front of abutment teeth in the



Fig. 1. Partially edentulous patients with few remaining teeth.



Fig. 2. Abutment teeth prepared 2–3 mm supra gingivally in a dome-shaped contour.

overdenture and O caps were picked-up by self cure acrylic resin. Fig. 4 Attachment retained overdentures was delivered and post insertion instruction was given.

2.3. Questionnaire

Participants completed a series of questionnaires after tooth supported overdenture wearing by one month (base line), then after one month and 12 months of wearing the attachment retained overdenture. The questionnaire was an OHIP-14 questionnaire [10] that used to evaluate functional limitation, pain, psychological discomfort, social disability, psychological disability, physical disability, and general satisfaction. The OHIP-14 uses a scale of five categories (1 = never, 2 = hardly ever, 3 = occasionally, 4 = fairly often, and 5 = very often). Table 1 A lower score in any of the five categories indicates higher satisfaction.

2.4. Statistical analysis

Data presented as mean and standard deviation (SD). Data explored for normality using Kolmogorov-Smirnov and Shapiro-Wilk tests. Independent *t*-test used to compare male and female as well as upper and lower arch within each follow-up period. Paired *t*-test used to compare between different follow up periods. The significance level was set at $P \leq 0.05$. Statistical analysis was performed with IBM® SPSS® (SPSS Inc., IBM Corporation, NY, USA) Statistics Version 24 for Windows.

3. Results

Statistically insignificant difference resulted in all tested parameters. Either with different gender nor for upper and lower arch overdentures, before attachment placement, one month and one year post attachments placement. Statistically significant difference in patient satisfaction was recorded, before attachment placement, one month and one year post attachments placement. Tables 2 and 3.

4. Discussion

Overdentures improve biting force, chewing efficiency and minimize alveolar bone resorption than do conventional complete dentures [11,12]. Moreover the negative psychological aspect of patients losing their teeth has been well documented [13–15]. Teeth retained overdenture therapy is an alternative treatment seldom preferred in today's insistent marketing for implant dentistry. In a few reported literature [16–18], tooth supported



Fig. 3. Ball attachment cemented in upper and lower canine.

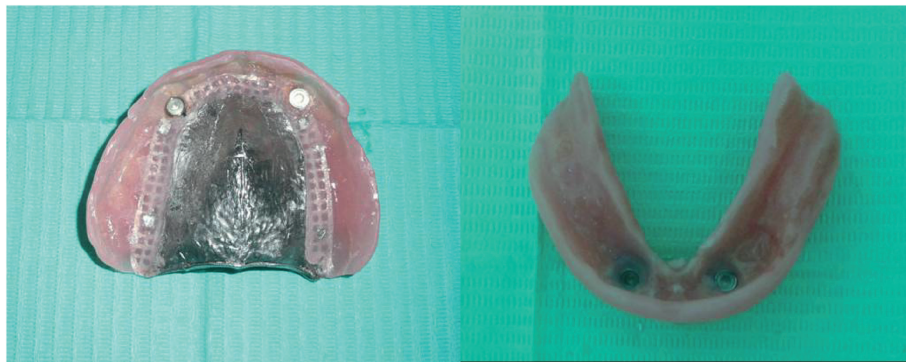


Fig. 4. O caps picked-up in upper and lower overdenture.

Table 1
The OHIP-14 questionnaire.

How often you had the problem with your denture?						
1	Have you had trouble pronouncing any words?	Very often	Fairly often	Occasionally	Hardly ever	Never
2	Have you felt that your sense of taste has worsened?	Very often	Fairly often	Occasionally	Hardly ever	Never
3	Have you had painful aching in your mouth?	Very often	Fairly often	Occasionally	Hardly ever	Never
4	Have you found it uncomfortable to eat any foods?	Very often	Fairly often	Occasionally	Hardly ever	Never
5	Have you been self conscious because of your dentures?	Very often	Fairly often	Occasionally	Hardly ever	Never
6	Have you felt tense?	Very often	Fairly often	Occasionally	Hardly ever	Never
7	Has your diet been unsatisfactory?	Very often	Fairly often	Occasionally	Hardly ever	Never
8	Have you had to interrupt meals?	Very often	Fairly often	Occasionally	Hardly ever	Never
9	Have you found it difficult to relax?	Very often	Fairly often	Occasionally	Hardly ever	Never
10	Have you been a bit embarrassed?	Very often	Fairly often	Occasionally	Hardly ever	Never
11	Have you been a bit irritable with other people?	Very often	Fairly often	Occasionally	Hardly ever	Never
12	Have you had difficulty doing your usual jobs?	Very often	Fairly often	Occasionally	Hardly ever	Never
13	Have you felt that life in general was less satisfying?	Very often	Fairly often	Occasionally	Hardly ever	Never
14	Have you been totally unable to function?	Very often	Fairly often	Occasionally	Hardly ever	Never

Table 2
Mean and Standard deviation OHIP-14 Score for male and female patients.

	Gender				p-value
	Male		Female		
	Mean	SD	Mean	SD	
Before	37.19 ^a	2.07	37.71 ^a	2.13	0.498 NS
After	24.25 ^b	1.61	25.00 ^b	1.62	0.215 NS
One year	19.19 ^c	1.17	19.00 ^c	0.96	0.633 NS

Means with the different letter within each column indicating a paired difference at p = 0.05.

*= Significant, NS=Non-significant.

Table 3
Mean and Standard deviation OHIP-14 Score for upper and lower overdenture.

	Arch				p-value
	Upper		Lower		
	Mean	SD	Mean	SD	
Before	37.54 ^a	1.81	37.35 ^a	2.32	0.813 NS
After	24.77 ^b	1.42	24.47 ^b	1.81	0.628 NS
One year	18.69 ^c	0.85	19.41 ^c	1.12	0.065 NS

Means with the different letter within each column indicating a paired difference at p = 0.05.

*= Significant, NS=Non-significant.

overdentures are retained by stud attachments. Most of the reported cases in the literature for using different stud attachments are implant supported/retained overdentures [19–22].

The keystone of success for an overdenture treatment is the selection of strategic abutments with endodontic and periodontal therapy to receive the attachment [6]. In the present study at least

one teeth either canine or premolars were present bilaterally to insure symmetry of the attachment. A proper interarch distance was kept in mind and the abutment teeth were prepared to create adequate space for the ball attachment and the overlying denture.

The prefabricated metal posts exhibit more advantages over the customized cast posts. The exact fit made by special drills and higher strength in the cross-sectional area beside it only requires minimal enlargement of the canal space, hence they strengthen the tooth rather than weaken it. The prefabricated metal posts transmit less stresses to the supporting structures and absorbs more of the transmitted forces [23].

The use of ball attachments provides a superior retention as well as it acts as shock absorbers and stress redirectors. It is effortless to insert/remove and it is convenient for most of the patient. The metal OT cap attachment system is considered to be a good resilient attachment for overdentures [24].

The patient attitude to the proposed treatment should be well assessed. Patients who understand the limitations and benefits of using an attachment as well as patients with good oral hygiene measures should be the proper candidate for treatment with attachment retained overdentures.

In the majority of people, oral health plays an important role in quality of life [22,25,26]. The type and quality of prosthodontic rehabilitation in edentulous patients can be considered major aspect of oral health. The present study used the oral health impact profile index (OHIP-14) as a shortened 14-item questionnaire to assess the impact of using teeth supported overdenture utilizing pivot attachment on the quality of life. The index measures people's opinion of the social impact of oral disorder and rehabilitation on their well-being and it is one of the most frequently used instrument nowadays [27].

It could be noticed that patients treated with teeth retained overdentures utilizing OT attachment were generally satisfied with the outcome of the treatment. Although all patients received tooth supported overdenture initially for a period of one month. This could have possibly introduced a little bias towards the ball retained overdenture because data were recorded one month after attachment insertion and the one year recall. The longer period of the follow-up after the attachment insertion could be in favor of the higher satisfaction score.

Nevertheless the results of this study support the established evidence base for an improvement in edentulous patients' satisfaction with their prostheses when attachments are used to retain and support their overdenture. The candidates in present study consistently showed statistically significant difference and greater satisfaction with teeth supported and retained prosthesis across all domains of the patient satisfaction questionnaire regardless of the gender of the patient or even the arch retaining the overdenture.

5. Conclusion

The concept of overdentures became trendy with the inception of implant dentistry, but unfortunately the treatment costs may not be affordable to most of the patients. A tooth retained overdenture may be advised whenever few teeth with good support remains as an alternative to dental implants or even total edentulism.

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