

## **PATIENT SATISFACTION AND PROSTHETIC MAINTENANCE WITHIN-SUBJECTS TREATED WITH CONVENTIONAL COMPLETE DENTURE AND TELESCOPIC IMPLANT OVERDENTURES**

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### **ABSTRACT**

**Purpose:** the aim of this study was to compare the patient satisfaction and prosthetic maintenance with conventional complete denture versus telescopic overdenture for the same patient.

**Materials and method:** Eight completely edentulous male patients were selected to receive complete dentures for six months. after 6 months period all the patients received four interforaminal implants followed by construction of telescopic overdenture. during the two designs periods both patient satisfaction (VAS) and prosthetic maintenance were analysed.

**Results:** The obtained data revealed that the parameters of VAS for group II (Telescopic overdentures) were significantly higher for items 1,3,4 and 6 (satisfaction, speech, stability and chewing ability) as p- value is less than 0.001. However, the ratings for the same group were significantly lower for items 2, 5, 7 and 8, that is, comfort with the denture, handling of dentures, metallic taste and ease of hygiene procedure ( $p < .001$ ) as compared with the group I (conventional complete dentures). The overall number of maintenance interventions and service provided was equal to 8 in group I and to 9 in group II, respectively. Table 2 gives an overview of the maintenance performed for both groups. more interventions were counted for group I, regarding items 10,11, and 12 (sore spots, relining and occlusal adjustments). While there were more maintenance interventions counted for group II, regarding items 6,9 and 14 (denture base resin fracture, changing the denture design and excessive tooth wear). But regarding the rest of items, there was no maintenance intervention at all for both groups.

**Conclusion:** Within the limitations of this study the following conclusions can be made:

1. Edentulous patients who selected and included in this study were satisfied with both designs, however mandibular telescopic overdentures showed significant improvement in visual analogue scale regarding overall satisfaction, speech, stability and chewing ability compared to mandibular conventional complete dentures worn for the same period (6 months).
- 2- Overall prosthetic maintenance required for telescopic overdenture is slightly more than that needed for conventional dentures.

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## INTRODUCTION

According to the World Health Organization's criteria; Completely edentulous patient is considered handicapped or physically disabled, because these patients can not be able to perform most of the essential functions of life as mastication, speech and esthetics.<sup>(1,2)</sup>

Edentulism is a major public health problem and demographics reveal an increase in the edentulous population as a result of an increase in life expectancy.<sup>(3)</sup>

The traditional treatment of edentulism is complete denture construction, despite the new trends and recent technology in their production, some of patients dissatisfied with their dentures regarding to nutrition, speech and appearance in public.<sup>(4-6)</sup> This dissatisfaction and reduced quality of life is especially emphasised in mandibular complete denture wearers.<sup>(7,8)</sup>

Introduction of osseointegrated dental implant has improved the outcomes and quality of life of many edentulous patients. Implant assisted mandibular overdentures can provide a highly successful restoration of both function and esthetics.<sup>(9-11)</sup>

Traditionally, implant supported overdenture are introduced by the use of two or more mandibular implants. Although, it seems that increasing the number of implants may improve the treatment outcome.<sup>(12-16)</sup>

Telescopic crowns were initially introduced as retainers for removable partial dentures (RPDs) at the beginning of the 20th century. They are also known as a double crown, crown and sleeve coping (CSC). These crowns consist of an inner or primary telescopic coping and a congruent detachable outer or secondary telescopic crown, rigidly connected to a detachable prosthesis. The secondary crown engages the primary coping to form a telescopic unit and serves as an anchor for the remainder of the dentition.<sup>(17,18)</sup>

The retention and the stability of the telescopic denture are directly related to the number and the distribution of the abutments along the dental arch and also to the taper of the primary coping marginal walls. The taper configuration of the contacting walls generates a compressive intersurface tension. The tension should be sufficiently strong enough to sustain the prosthesis in its place. An increase in the tapering of the coping walls reduces the retention between the copings. The smaller degree of the taper provides the greater frictional retention of the retainer. The walls of the abutments with short clinical height should be kept parallel to each other or the taper of the wall should be reduced (2–5°) to improve the retention.<sup>(19)</sup>

Nowadays, there is sufficient evidence that overdentures supported by a few, mostly two, inter-foraminal implants are superior to complete dentures.<sup>(20,21)</sup>

However, this view of two implants as the standard of care has been challenged by clinicians who contend that the evidence does not support the assertion of implants are necessary or advisable for all edentulous denture-wearers.<sup>(22,23)</sup>

There is no evidence supporting one particular treatment modality as superior to all others for the edentulous mandible. Unfortunately, even for cases where most clinicians might agree that mandibular implants would be appropriate, high costs may be an obstacle.<sup>(24-26)</sup>

Most studies suggest that edentulous patients who choose mandibular IODs have significantly greater satisfaction than those who choose new conventional dentures, despite the relatively high cost.<sup>(27-32)</sup>

**The aim of this study** was to compare within subjects; the patient satisfaction and prosthetic maintenance for conventional complete denture versus telescopic overdenture.

## MATERIAL AND METHODS

Eight completely edentulous male patients seeking treatment with implant supported prosthesis were selected from the prosthodontic clinic, faculty of dentistry, minia university.

### Criteria for selection

At least 3 years of edentulism, No smoking, No history of previous implant failure, Age between 50 and 65 years, ability to understand and answer the questionnaires and scales used in this study, Sufficient bone height and width to accommodate four implants of minimum length 10 or 12 mm and a standard diameter of 3.7 mm. without grafting procedures, membranes, or additional surgical measures, Angle,s class I maxillo-mandibular relationship, Absence of flabby tissue or any pathological lesions that may interfere with the surgical procedures or the proper seating of the prosthesis, Inter-arch space not less than 22 mm, Fair health conditions as follows:

- no insulin dependent diabetes
- no bisphosphonates
- No irradiation or chemotherapy
- no signs of osteoporosis and/or autoimmune diseases
- no psychological or psychiatric conditions that could affect a participant's reaction to the treatment
- no long term intake of steroids -anticoagulants, but thrombocyte aggregation inhibitors were accepted
- no history of heart attack/CVI during the last 12 months; cardiovascular problems, high or low blood pressure, if the patients were well-controlled by medications; they were not excluded.

All the patients received detailed explanations about the study through an information session. Potential participants were clinically and radiographically (using an orthopantomogram) examined to assess for eligibility. All recruited participants signed an informed consent form.

### Conventional complete denture construction

At the first test period, all the patients have received a conventional maxillary and mandibular

complete dentures for 6-months (groupI). All steps of conventional upper and lower complete denture construction were done. The final complete denture was delivered and all post insertion adjustments were done. Prostheses were revised several times until patients were completely satisfied with the functional and aesthetic aspects of the complete denture.

At this period, both patient satisfaction through the visual analogue scale(VAS)recorded at the end of each 3-months period as the patients answered a questionnaire and the prosthetic maintenance which was evaluated once a month during the 6-months period.

### Preparation for telescopic overdentures

After 6 month period from adaptation and using conventional dentures, Laboratory duplication of all complete lower dentures was performed to obtain a radiographic stent. Cone-beam radiographic images for all patients were obtained using the radiographic stent. The proposed implants size was 3.75mm diameter and 10-12 mm. length inserted at the canine and the second premolar area bilaterally.

The desired implant sites were identified through the radiolucent channels previously prepared in the prosthetic teeth center. These sites were evaluated for sufficient bone height and buccolingual width.

All patients were operated under local anesthesia to receive four root formed tapered threaded dental implants(s-clean.tapered dental implant fixture-Dentis-Korea) inserted at the mandibular canine and the second premolar area bilaterally. The Radiographic stent converted into a surgical guide for implant installation at the predetermined areas.

After reflection of the flap, the stent was applied over the mandibular ridge and used to slightly retract the soft tissue. A round surgical bur was used to mark the implant sites through the surgical stent. The pilot drill (2.3mm diameter) was used to perform the initial osteotomy site. Great care was

taken to maintain parallelism between the implants in bucco-lingual as well as mesio-distal directions using the paralleling tools. The initial osteotomy site was expanded manually using the successive drills then final preparation was carried out with the final drill at very low speed with copious cooling. The implants were manually inserted using the wrench until the neck was flushed with the crestal bone. External coolant was applied during tightening the implant to avoid overheating the bone.

After a healing period of 3 months, the implant stability was assessed clinically using the ostell device. While at the healing period, all the patients were instructed to use their old dentures relined with a soft liner. A second surgery to expose the implants was done and impression copings were used for secondary impression by the open tray technique. The verification jig was made intraorally using duralay material. After the impression was

poured, the master cast was obtained and verified for accuracy using the verification jig by single screw test.

The anti-rotational plastic cap(Dentis, anti-rotational plastic cap, dentis- Korea) attached to each implant analogue. The wax pattern of the primary coping was built up using milling wax(Fraswasles milling wax, BEGO-Germany). The primary copings had parallel side walls and the length and width were adjusted according to each case. A deep chamfer finish line was made at the lower margin of each waxed up coping. The wax pattern was sprued, invested, burnt-out and finally cast into cobalt chromium alloy.(cobalt chromium metal framework, vita, Switzerland). The wax pattern of the secondary copings with the metal framework was cast as one piece using the same cobalt-chromium alloy.

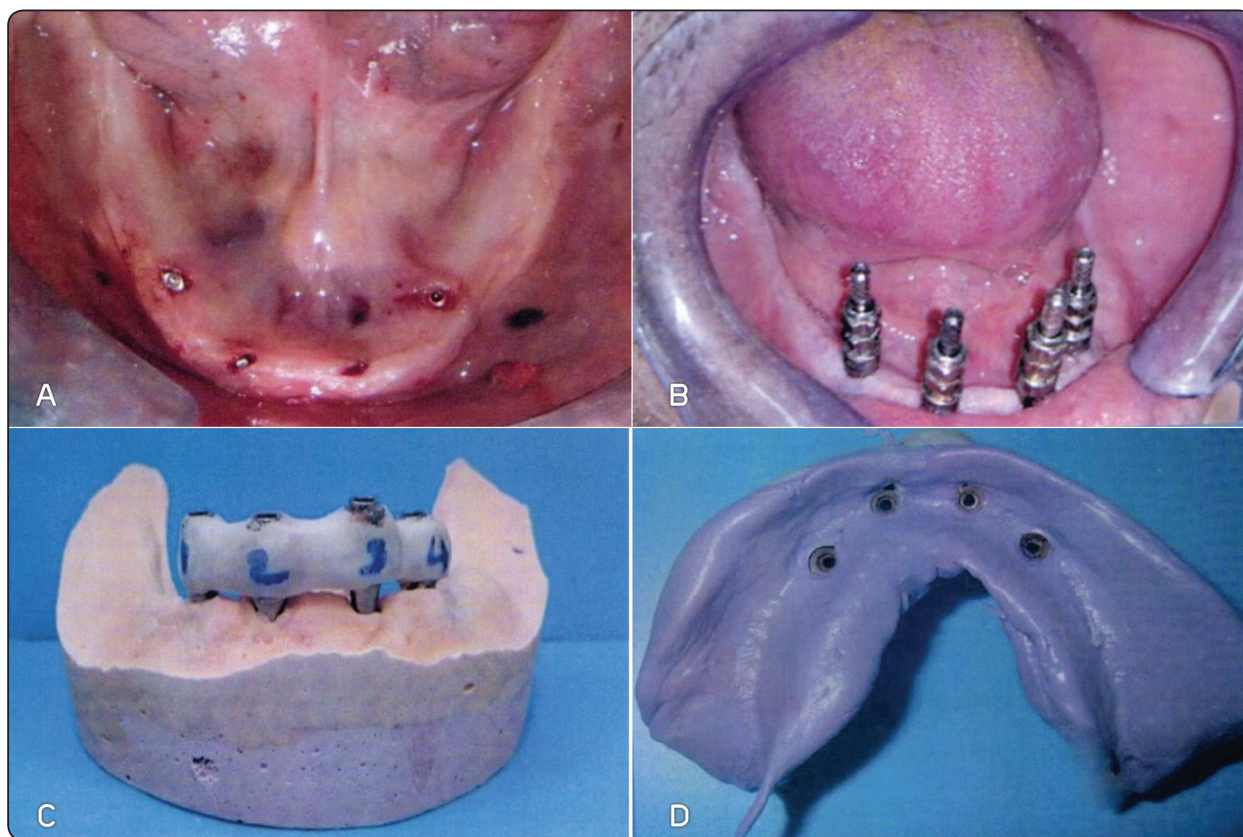


Fig. (1) (A) Intra oral view after exposure of four mandibular implants. Impression copings fastened to the implants. (C) Intraoral view of the verification jig. (D) Silicon based impression of the lower ridge having the impression copings in place.

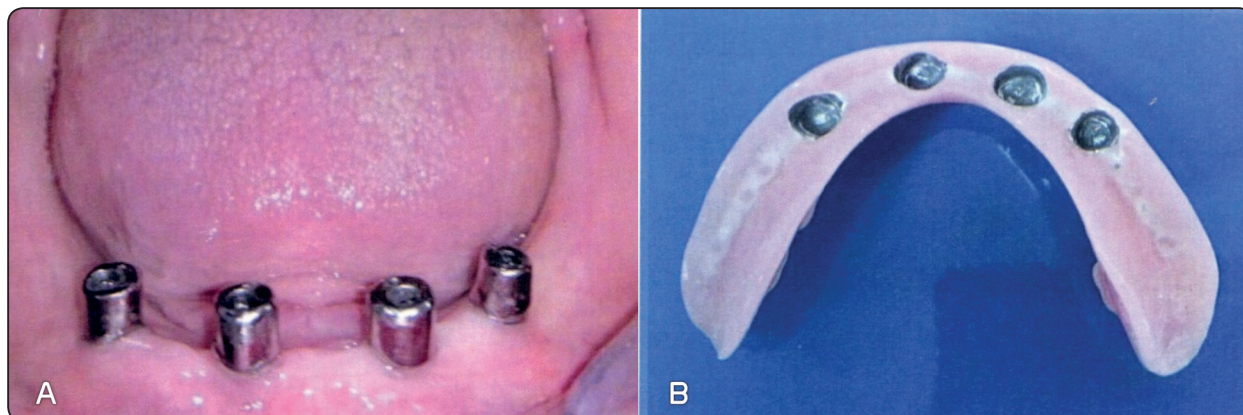


Fig. (2) (A) intra oral view of the primary copings of telescopic crowns. (B) the fitting surface of telescopic overdenture

Jaw relation, setting up of modified anatomic lower denture teeth and waxing up of the trial denture base was done with the principles of maximum extension. Then flasking, packing, curing, deflasking, finishing and polishing of the lower denture was made.

Passive fit between the lower denture with secondary copings and the metallic primary copings was checked. Also, the occlusion was checked by laboratory and clinical remounting.

At the second test period similar to that of the first test period, all the patients have received a telescopic overdentures for 6-months (groupII) and patient satisfaction through the visual analogue scale(VAS)recorded at the end of each 3-months period. and prosthetic maintenance which was evaluated once a month during the 6-month period.

## Methods of evaluation

### *I- Eight – Item Questionnaire (Visual Analogue Scale) [VAS]*

The patients had to assess their function and handling of the dentures. A questionnaire was used with the following items:

Overall satisfaction, Comfort of wearing dentures, Speech and phonation, Chewing ability, Metallic taste, Stability and retention of mandibular

dentures, Handling of the dentures(insertion and removal) and Ease of hygiene procedure

The answers of the patient were recorded by means of VAS of 100 mm. at the end of each 3-months period.

After this first 6-months period, the patients continued to wear the overdentures with the telescopic copings for another 6- months; then all patients were recalled to answer the questionnaire again. Some further questions were directly addressed to the patients in an open interview.

### *II-Prosthetic Maintenance:*

During the 6- month study period, all patients had scheduled appointments once a month. All prosthetic service, complications, and repairs were registered. The classification into three categories was used as described previously. The first category is related to the implant/abutment /prosthesis assembly(which was recorded in this study as descriptive not comparative between two designs), the second category contains repairs of the dentures, and the third adjustments of the dentures as follows:

#### *Anchorage device:*

Abutment loosening, Loosening or loss of occlusal screw, Broken loose lost female retainers, Retightening of female retainers and Attachment fracture

*Repair of denture:*

Denture base resin fracture, Fracture of teeth, Fracture of cast framework and Change of denture design

*Adjustments of denture:*

Sore spot under denture, Relining of overdenture, Occlusal adjustment of overdenture, Aesthetic problems, Excessive wear of teeth and Hyperplasia under denture around attachment

**Statistical analysis**

The SPSS statistical package (SPSS Inc., Chicago, IL,USA) was used. For statistical analysis of the questionnaire (VAS,100 mm), the Wilcoxon test was used: Wilcoxon matched-pairs signed-rank for pairwise testing within groups and Wilcoxon-Mann-Whitney U test for comparisons between groups.

**RESULTS**

No implant failure was found during the entire study period. There was no patient who discontinued to wear the dentures or dropped out from the study for any reason.

**I- Visual Analogue Scale (VAS)**

The obtained data revealed that the parameters of VAS for group II (Telescopic overdentures) were significantly higher for items 1,3,4 and 6 (satisfaction, speech, stability and chewing ability) as p- value is less than 0.001. However, the ratings for the same group were significantly lower for items 2, 5, 7 and 8, that is, comfort with the denture, handling of dentures, metallic taste and ease of hygiene procedure (p <.001) as compared with the groupI (conventional complete dentures). (fig 3)

TABLE (1) Mean values of parameters, among the study groups

Parameters	Group I (n=8) Mean ±SD	Group II (n=8) Mean ±SD	t-test	P value
Satisfaction	90.14±1.57	97.57±0.97	10.614	P<0.001*
Comfort	89.28±1.49	82.00±1.73	8.422	P<0.001*
Speech	91.28±1.11	94.71±1.49	4.865	P<0.001*
Stability	82.28±1.11	93.71±1.49	16.218	P<0.001*
Handling	89.28±1.11	83.71±1.11	9.367	P<0.001*
Chewing	86.85±4.56	97.71±0.75	6.212	P<0.001*
Metallic taste	90.28±1.11	81.85±1.34	12.774	P<0.001*
Hygiene	90.00±1.29	77.57±1.27	18.141	P<0.001*

\* Significant difference between the two groups follow-up period (P<0.05).

Group I = Patients treated with conventional dentures.

Group II = Patients treated with telescopic over dentures.

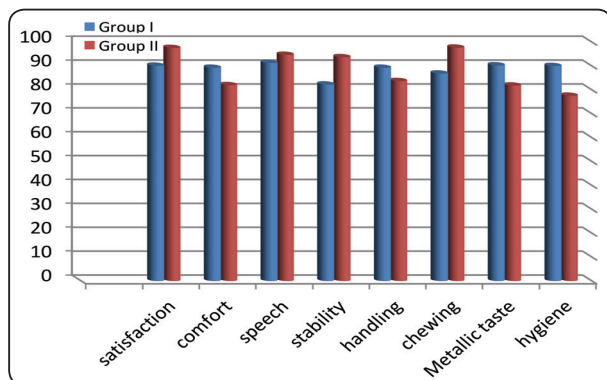


Fig. (1) Graph showing the mean values of VAS parameters

**II-Prosthetic Maintenance**

The overall number of maintenance interventions and service provided was equal to 8 in group I and to 9 in group II, respectively. Table 2 gives an overview of the maintenance performed for both groups. more interventions were counted for group I, regarding items 10,11, and 12 (sore spots, relining and occlusal adjustments).

While there were more maintenance interventions counted for group II, regarding items 6,9.and 14 (denture base resin fracture, changing the denture design and excessive tooth wear ). But regarding the rest of items, there was no maintenance intervention at all for both groups.

TABLE ( 2 ) Prosthetic Maintenance Service

Prosthetic service	Group A	Group B
1. Corrosion	0	0
2. Abutment loosening	0	0
3. Occlusal screw retightening	0	0
4. Retainer problems	0	0
5. attachment fracture	0	0
6. Denture base resin fracture	0	2
7. Fracture of teeth	0	0
8. Fracture of cast framework	0	0
9. Change of denture design	0	1
10. Sore spots	4	2
11. Relining	2	0
12. Occlusal adjustment	2	0
13. Aesthetic problems	0	0
14. Excessive tooth wear	0	1
15. Hyperplasia under denture around attachments	0	3
<b>Total</b>	8	9

**DISCUSSION**

The majority of denture complaints concern the mandibular denture. The denture bearing area for a mandibular denture is three times lesser than for a maxillary denture. This leads to an unfavorable distribution of occlusal forces to the bone, decreased the area of coverage, approximation of muscle attachment, flooding action of saliva and increased activity of the tongue. <sup>(33,34)</sup>

All the patients selected in this study subjected to the inclusion criteria.

Male patients were selected to avoid hormonal imbalance. All the patients were nonsmokers, nondiabetic, systemically free and having enough bone height, width, and quality. This to avoid any possibility of implant failure.

The selected patients were normal Angle,s class one maxillo-mandibular relationship. Regarding the interarch distance should not be less than 22 mm. to accommodate for the telescopes and overdenture.

From this clinical study, it was observed that edentulous patients were satisfied with both designs. in spite of the fact that telescopic overdentures have many advantages but some drawbacks can be clarified from the patients.<sup>(35)</sup>

By analyzing the feedback from the patients, we realized that all the patients were satisfied with the results obtained from the telescopic overdenture regarding speech and phonation, stability and retention and chewing ability. This can be attributed to the much more support, Stability and retention obtained by implants inserted in the mandible and the frictional interlocking between the primary and secondary copings.

The patients in the present study noticed the greatest improvement in the stability of the prosthesis after it was retained by dental implants. This improvement in stability is the consequence of additional retention provided by implants and bearing tissues, contrary to complete dentures that only have tissue support.

These implants dramatically changed the case from resilient tissue support into a hard totally implant supported denture, which gives good basal foundation to resist the masticatory forces and help in the chewing ability. Also, the more stable and retentive telescopic mechanism provides the patients a steady denture during phonation and speech.

Patient expectations of the treatment outcome may have an important role in their satisfaction. According to Awad<sup>(36)</sup>; an expectation is related to the patient's level of knowledge and understanding of his or her condition, which affects his or her perceptions after receiving treatment.

However, these patients claimed that in spite of these advantages over the conventional denture but they suffered from the handling of telescopic dentures during insertion and removal this is due to the single path of insertion as a result of parallelism acquired by the inserted four implants. Also regarding the hygiene measurements ; they reported that telescopic overdentures require more time and effort for brushing around the abutments and denture cleaning due to design complexity.

Obviously, most of the patients felt more comfort without metallic taste with the conventional denture, this feeling is due to the less complicated design without metal framework.

There were no prosthetic maintenance services through-out this study regarding: corrosion, abutment loosening, occlusal screw retightening, retainer problems or attachment fracture during the tested period.

But on the other hand, during the follow-up ; two of the telescopic dentures cases were subjected to fracture of the resin base and repair was made. Also one of the cases complained from loose telescopic denture and consequently we did manage this problem by changing the design into ball and socket.

Regarding the metal framework fracture and denture teeth fracture; no evidence of fractures occurred during the whole study period for both the conventional denture and telescopic overdenture. Also, four cases reported sore spots under the conventional complete denture while two cases only for the telescopic overdenture, and this can be

attributed to the settling of complete denture and further occlusal adjustments were needed.

Relining was needed for 2 cases of conventional dentures and this was made to increase the fitting surface adaptation and flange sealing and consequently improving the retention.

Moreover two of the conventional dentures cases were reported for occlusal disharmony and required occlusal adjustments, while no occlusal adjustments were needed for the telescopic overdenture design.

According to aesthetics, all the patients did not complain from appearance problems during the whole study regarding both designs.

Excessive teeth wear occurred in only one case of telescopic overdentures which required occlusal pivoting to regain the lost vertical dimension and centric relation.

During the follow-up period, gingival hyperplasia was observed under three cases of telescopic overdentures, and this was attributed to the pumping action exerted by the secondary coping and insufficient oral hygiene measurements.

## CONCLUSIONS

Within the limitations of this study the following conclusions can be made:

1. Edentulous patients who selected and included in this study were satisfied with both designs, however mandibular telescopic overdentures showed significant improvement in visual analogue scale regarding overall satisfaction, speech, stability and chewing ability compared to mandibular conventional complete dentures worn for the same period (6 months).
- 2- Overall prosthetic maintenance required for telescopic overdenture is slightly more than that needed for conventional dentures.



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