

Direct versus indirect pick up of the locator retentive caps for four implant retained mandibular overdenture: (within patient study)

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Abstract:

Purpose: compare and evaluate direct versus indirect pick up of the Locator retentive caps used for four implants retained mandibular overdenture

Materials and Methods: six completely edentulous patients were selected for this study. Each patient received four implants in the canine and premolar area and . The clinical retention was measured with digital forcemeter after one week of denture insertion and after 6 months for both direct and indirect pickup of the locator attachment

Results:

In T0 Intraoral retention had a significant difference among extraoral retention for both direct pickup and indirect pickup of attachment (p value for direct pickup 0.023 , p value for indirect pickup 0.001), In T6 there was insignificant difference between intraoral and extraoral retention for both direct and indirect pickup of attachment (p value for direct pickup 0.604 , p value for indirect pickup 0.441), In T0 there was a significant difference of retention values either intraoral or extraoral between direct pickup and indirect pickup of attachment , In T6 there was insignificant difference of retention values either intraoral or extraoral between direct and indirect pickup of attachment, within time there was a decrease in retention values for both direct and indirect pickup of the attachment (p value for intraoral retention for direct pickup technique 0.001 , p value for extraoral retention for the direct pickup technique 0.003 , p value for intraoral retention for the indirect pickup technique 0.001 , p value for extraoral retention for the indirect pickup technique 0.001)

Conclusion:

- Direct pickup of locator attachment is favorable than indirect pickup , Retention plastic inserts must be replaced after six months of overdenture insertion regardless the implant number and locations

Key words: implant overdenture, locator, four implants.

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I. Introduction:

The introduction of dental implants has improved the quality of life for edentulous patients. Overdentures have been advocated as a means of preserving the structures associated with mandibular denture support that may augment retention and stability⁽¹⁾.

Implant overdentures can be retained by many types of attachments either by splinting or non-splinting concept. Among the own unique features of every attachment system, locator is well known for self-aligning and dual retentive system. The locator attachment is available in different colors with different retention values. They are retentive, resilient, and durable and, have some built-in angulation compensation. In addition, repair and replacement are easy and fast⁽²⁾.

There are various techniques for incorporating these attachments to the overdenture. Broadly, they can be classified as direct techniques (performed by the clinician intraorally) or indirect techniques (performed by the technician in the laboratory).⁽³⁾.

In addition to the nature of incorporation are the type of final impression and the stage of incorporation during the overdenture fabrication.⁽⁴⁾.

The direct technique has several advantages including simplicity, less expenses, requires less prosthetic elements and allows the patient to retain the prosthesis. However it has the following disadvantages; requires high skill and control of the prosthesis position during the curing of the autopolymerising resin, care must be taken to avoid flow of resin into undercuts, as well as several disadvantages related to the

autopolymerising resin such as high shrinkage, water resorption, voids, difficulty in polishing and rapid degradation.⁽⁵⁾

While the indirect technique's advantages include reduced chair time, avoidance of contact with the acrylic monomer, optimal polishing, and the use of an acrylic resin with better mechanical properties for the incorporation of the attachments, due to pressure polymerization. Patients suffering from motor control diseases can be better treated using this technique. On the other hand, the main disadvantage is that the impression taking for implants position record through the use of implant transfer copings and analogues may introduce discrepancies and may result in incorporation inaccuracy⁽⁶⁾.

The purpose of this investigation was to evaluate effect of direct and indirect pick up of the locator retentive caps on retention

II. Material and Methods:

Six completely edentulous healthy male patients were selected for this study from the outpatient clinic at department of removable prosthodontics, faculty of dentistry, Mansoura University according to the following criteria: all patients have maxillary and mandibular residual alveolar ridge covered with healthy firm mucosa, sufficient mandibular residual alveolar ridges verified by C.B.C.T, Angle's class I maxillomandibular relation, sufficient restorative space. Exclusive criteria were smoking, alcoholism, systemic disorders affecting bone as diabetes, history of radiation therapy in the head and neck region, TMJ or neuromuscular disorders.

For each patient, conventional complete denture was constructed and inserted. After one month of using denture, mucosa supported Sterolithographic surgical guide was constructed by the aid of CT cone-beam software for exact site and angulations of dental implants to be used as a surgical guide for implants placement. After local anesthesia, four implants (11 mm length and 3.5 mm diameter) were surgically inserted in the mandibular interforaminal region, two implants in the canine regions and the other two implants in the premolar regions using the flapless surgical approach. The mandibular denture was relieved over implant sites and the denture was relined with silicon soft liner for three months according to the standardized two-stage protocol.

After three months of Osseo-integration period, the dental implants were exposed and healing abutments were placed for two weeks. After that, the old soft liner was removed from the fitting surface, healing abutments were removed and the locator abutments were attached to the implants intra-orally and denture was relined permanently using direct-indirect technique and The clinical retention was measured after one week of denture insertion and after 6 months

Indirect pick up of locator attachments was done also by using Auto polymerized acrylic resin custom tray was constructed for the mandibular arch, open tray impression will be made so we need to prepare holes that will line up with the transfers when the impression is taken. Block out holes on top of the screws with wax or other suitable material, remove the healing abutment from the implant and immediately replaced with an impression coping, place light body impression material around copings and record a full arch impression with heavy body impression material the copings will protrude through the tray, once the impression sets remove the tray which will be capturing the copings in the impression material, connect the implant analogue to the copings which are still in place in the impression material, screw the coping with the analogue together and the impression now can be sent to the laboratory

Measurement of clinical retention:

Retention was measured after one week of denture insertion for both dentures the one with direct pickup technique and the other with indirect technique, measurement is done using Force meter device mounted to force meter holder device.

Statistical analysis of the data.

Data were analyzed using the Statistical Package of Social Science (SPSS) program for Windows (Standard version 24). The normality of data was first tested with Shapiro test. Continuous variables were presented as mean \pm SD (standard deviation) for normally distributed data. The following tests were used;

Independent t test: Compare two quantitative variables (parametric).

Paired t test: Compare two quantitative variables at baseline and after follow up

For all above mentioned statistical tests done, the threshold of significance is fixed at 5% level. The results was considered significant when $p \leq 0.05$. The smaller the p-value obtained, the more significant are the results.

III. Results

T0-T6	Direct pickup		Test of significance	P value
	Intraoral T0	Intraoral T6		
Mean ± SD	29.73± 0.63	7.27± 0.65	t=31.52	0.001*
Range	28.10- 30.10	6.60- 7.90		
t: Paired t test, * p value significant ≤0.05				
T0-T6	Direct pickup		Test of significance	P value
	Cast T0	Cast T6		
Mean ± SD	25.56± 1.91	7.03± 0.31	t=18.22	0.003*
Range	24.00- 27.70	6.70- 7.30		
t: Paired t test, * p value significant ≤0.05				
T0-T6	Indirect pickup		Test of significance	P value
	Intraoral T0	Intraoral T6		
Mean ± SD	24.90± 0.26	6.73± 0.25	t=205	≤0.001*
Range	24.70- 25.20	6.50- 7.00		
t: Paired t test, * p value significant ≤0.05				
T0-T6	Indirect pickup		Test of significance	P value
	Cast T0	Cast T6		
Mean ± SD	22.10± 0.30	6.50± 0.40	t=74.94	≤0.001*
Range	21.80- 22.40	6.1- 6.90		
t: Paired t test, * p value significant ≤0.05				

In T0 Intraoral retention had a significant difference among extraoral retention for both direct pickup and indirect pickup of attachment (p value for direct pickup 0.023 , p value for indirect pickup 0.001), In T6 there was insignificant difference between intraoral and extraoral retention for both direct and indirect pickup of attachment (p value for direct pickup 0.604 , p value for indirect pickup 0.441), In T0 there was a significant difference of retention values either intraoral or extraoral between direct pickup and indirect pickup of attachment , In T6 there was insignificant difference of retention values either intraoral or extraoral between direct and indirect pickup of attachment, within time there was a decrease in retention values for both direct and indirect pickup of the attachment (p value for intraoral retention for direct pickup technique 0.001 , p value for extraoral retention for the direct pickup technique 0.003 , p value for intraoral retention for the indirect pickup technique 0.001 , p value for extraoral retention for the indirect pickup technique 0.001)

IV. Discussion Of Results

The results of this study indicate that there is significant difference between intraoral retention and extraoral retention after one week of insertion either for both direct pick up and indirect pick up techniques , this may be due to there is both mechanical and physical means of retention intraorally while extraoral evaluation depends on mechanical retention only⁽⁷⁾

In this study an insignificant difference between intra oral and extraoral retention for both direct and indirect pick up techniques after six months from insertion of overdenture , decreasing in retention values intraorally may be due to surface changes and wear of the retentive plastic components as the most common prosthetic complication with the use of the Locator system is loosening of the retentive mechanism⁽⁸⁾. Plastic deformation, wear, and surface abrasion are all possible causes for the loss of retention. Several factors affecting the retention of Locator attachments have been identified, including repeated insertion-removal cycles of the prosthesis , implant location, diverging implant angulations , Locator abutment height , overdenture immersion in denture cleansers , exposure to high water temperatures and direction of tensile force in the retention tests ⁽⁹⁾

this study also revealed that both intra oral and extraoral retention for direct pick up technique had significant difference from indirect pick up technique after one week of insertion that is because direct pick-up has the advantage is that the attachment can be made in a passive loaded (i.e., bite force) environment to ensure complete seating of denture on the underlying tissues and to overcome the dimensional changes associated with transfer impression⁽¹⁰⁾ , impression-taking discrepancies and denture laboratory processing during attachment incorporation may result in attachment incorporation inaccuracy, which increases the need for aftercare. On the

other hand, the direct technique using intraorally attachment incorporation overcomes such inaccuracies and minimizes the need for aftercare. Therefore, the reported disadvantages of the direct technique⁽¹¹⁾ are negligible as far as aftercare is concerned⁽¹²⁾

There was an insignificant difference found between direct pick up technique and indirect technique after six months of insertion either intraoral or extraoral that is because of the both overdentures affected by wear and surface changes no matter the technique used for pick up⁽⁸⁾

Also, a significant reduction of retention was noted in all groups after six months of overdenture insertion. The decreased retention values may be due to surface changes and wear of the retentive plastic components. However, **Evtimovska et al**⁽¹³⁾ explained that the reduction of the retentive capacity of the attachments attributed to the strain energy that absorbed during insertion and removal that may be divided into elastic (recoverable) and plastic (permanent) components. If permanent deformation occurs, a rapid loss of retention will be observed.

Also, Gamborena et al,⁽¹⁴⁾ reported that viscoelastic creep may contribute to the loss of retention, particularly of plastic contacting surfaces.

V. Conclusion:

- Direct pickup of locator attachment is favorable than indirect pickup, Retention plastic inserts must be replaced after six months of overdenture insertion regardless the implant number and locations

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