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Original Article

Evaluation of Retention of Different Attachment System used in Implant Retained Overdenture

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***ABSTRACT*:**
Background: Dental implants are widely used nowadays. The most common problem associated with the management of edentulous patients is the severely resorbed mandibular ridge, especially in older age when adaptive capacities are reduced. The present study was conducted to evaluate retention of different attachment system used in implant retained overdenture. **Materials & Methods:** The present study was conducted in the department of Prosthodontics. It comprised of edentulous mandibular models which were made with heat cured polymethyl methacrylate resin. Acrylic resin mandibular overdentures were fabricated and provision was made to receive three different overdenture attachment systems, prefabricated ball/o ring attachment, Hader bar and clip attachment and locator implant overdenture attachment stud type. Each of the models were subjected to 100 pulls each to dislodge the overdenture from the acrylic model. **Results:** Group I comprised of prefabricated ball/o ring attachment, group II Hader bar and clip attachment and group III locator stud type implant overdenture attachment. In group I, mean force (N/cm) BT was 55.11 and AT was 50.24, in group II, BT was 72.26 and AT was 66.04, in group III, BT was 42.10 and AT was 36.01. The difference among BT and AT in all groups was significant (P< 0.01). **Conclusion:** Attachment may determine the success of implant supported overdenture. Ball O ring and Hader bar clip attachment proved to be better in terms of retention in compariosn to locator type of attachment.
Key words: Mandibular ridge, Implant, Overdenture.

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INTRODUCTION

Dental implants are widely used nowadays. They have been considered best option for missing one or two teeth. The most common problem associated with the management of edentulous patients is the severely resorbed mandibular ridge, especially in older age when adaptive capacities are reduced. This compromised situation consequently results in the fabrication of unsatisfactory dentures with poor retention and stability which can further precipitate psychosocial problems. Implant supported overdenture also proves to be effective in patients with resorbed ridges.[1]

Commercially offered systems of attaching overdenture were very efficient initially, but when they were used for a long period of time it was not possible to avoid some problems posed by the atrophy of alveolar ridge. Attachments with shock-absorbing buffer are not sufficient if the process of atrophy is quite advanced.[2]

The prognosis of the prosthesis depends on two important factors, retention and stress distribution. Retention is the function of and is directly related to the attachment system employed. The success of implant‐retained overdentures primarily depends on the retentive capacity of its attachment element to sustain its long‐term functionality.[3]

It assumes that the retention element (matrix) is an integral part of a soft liner of an ordinary acryl denture. Retention is guaranteed by a hole in a soft liner which is undersized to

the diameter of IA. This allows us to form insertion which generates an implant–silicone rubber frictional connection. Adequately chosen geometry and specific material properties of silicone enable the process of elastic strain of the element in accordance with the resilience of mucosa in the bearing area.[4] The present study was conducted to evaluate retention of different attachment system used in implant retained overdenture.

MATERIALS & METHODS

The present study was conducted in the department of Prosthodontics. It comprised of edentulous mandibular models which were made with heat cured polymethyl methacrylate resin. Two implant replicas of 3.75 mm diameter and 10 mm length, were placed in the intraforaminal region. Acrylic resin mandibular overdentures were fabricated and provision was made to receive three different overdenture attachment systems, prefabricated ball/o ring attachment, Hader bar and clip attachment and locator implant overdenture attachment stud type. Using a universal testing machine, each of the models were subjected to 100 pulls each to dislodge the overdenture from the acrylic model, and the force values as indicated on the digital indicator were tabulated both before and after thermocycling (AT). Results thus obtained were subjected to statistical analysis using chi- square test. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of attachment

Group I	Group II	Group III
ball/o ring attachment	Hader bar and clip attachment	Locator stud attachment

Table I shows that group I comprised of prefabricated ball/o ring attachment, group II Hader bar and clip attachment and group III locator stud type implant overdenture attachment.

Table II Comparison of force value in all groups

Groups	Mean (N/cm)	P value
Group I		0.01
Before thermocycling (BT)	55.11	
After thermocycling (AT)	50.24	
Group II		0.001
Before thermocycling (BT)	72.26	
After thermocycling (AT)	66.04	
Group III		0.05
Before thermocycling (BT)	42.10	
After thermocycling (AT)	36.01	

Table II shows that in group I, mean force (N/cm) BT was 55.11 and AT was 50.24, in group II, BT was 72.26 and AT was 66.04, in group III, BT was 42.10 and AT was 36.01. The difference among BT and AT in all groups was significant (P< 0.01).

DISCUSSION

The choice of different attachment system in implant supported overdenture determines the outcome of the treatment. A hole milled in acrylic denture facilitates the use of elastic properties of silicone rubber very effectively and therefore it reduces the load of both implant and tissues around the implant. Such an attachment mainly stabilizes the denture, whereas the occlusion forces are transferred mostly by the denture base to the tissues of the bearing area. Uniformly loaded bearing area ought to slow down the atrophy of the alveolar ridge and to prevent some possible damage to dentures and overloaded implants.[5]

The underlying principle in employing retentive implant overdenture systems for the treatment of edentulous patients is to increase denture retention and stability, thereby promoting chewing function as well as patient comfort and compliance. A design with bar attachments can be a good example to illustrate that any turn related to the axis of a bar pulls out the clips put on a bar which causes immediate removal of a denture. Such a turn, for example, can be made by a denture in the area of molar teeth by a slight movement of tongue.[6]

In present study, different attachment systems were used. group I comprised of prefabricated ball/o- ring attachment, group II Hader bar and clip attachment and group III locator stud type implant overdenture attachment. This is in agreement with Chung et al.[7]

In a study by Tejomaya[8], a significantly different behavior of the attachment systems both before and AT was analyzed. The ball/o ring and bar attachments developed higher retentive force as compared to the locator attachment. The bar and clip attachment exhibited the highest peak as well as the highest mean retention force at the end of the study. The Locator attachment showed a decrease in retentive potential after an early peak.

In 2001, Zest Anchors[9] introduced the Locator attachment, which provides an improved design that combines the best features of the ball, ERA and cap attachment types. Bar and clip attachments significantly improve the level of satisfaction of denture-wearing patients by enhancing the retention and stability of the prosthesis. These attachments have been most commonly used for connecting the prosthesis to implants, but they can be effectively used to retain tooth-supported prosthesis as well. The primary functions of bar attachments are splinting the abutments together, even distribution of forces to the abutments and supporting areas, guiding the prosthesis into place, improving the retention, stability, support and comfort of the patient.

Gulizio et al.[10] and others noted a reduction in the retentive force for attachments when the implant angulation was increased from 0 to 30 degrees. It has been suggested that an attachment system must be able to maintain its retentive force during a proposed lifespan of 10 years. It has been found that the diameters of ball abutments were reduced

significantly after 1, 3, and 8 years of clinical wear, with a maximal amount of wear after 3 years of use.

CONCLUSION

Ball O ring and Hader bar clip attachment proved to be better in terms of retention in compariosn to locator type of attachment. Attachment may determines the success of implant supported overdenture.

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