

Management of a Tooth Supported Stud Attachment Overdenture Failure

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ABSTRACT

Background: Overdenture provides better function than conventional complete denture. Precision attachments may be used in over denture construction; act as shock absorbers and stress redirectors as well as to provide superior retention, by either connecting the attachments to cast abutment copings or connecting into the prepared post space of the abutment teeth. The aim of the study is to report a case of Management of a Tooth Supported Stud Attachment Overdenture failure with a conservative treatment plan by providing a fixed removable option.

Keywords: Overdenture, Precision Attachments, Stud Attachment, Double Combination Design of Rhein830TCap Distal Extension Attachments, Cast Partial Framework, Freeway Space

INTRODUCTION

Overdenture forms a viable option for rehabilitating edentulous patients with a few remaining natural teeth. They provide better masticatory efficiency as well as proprioception compared to the conventional dentures due to the presence of periodontal ligaments of the remaining abutment teeth thus controlling the rate of residual ridge resorption to a great extent.^{1, 2} These advantages offered by an overdenture may often result in dental practitioner rendering overdenture treatment as an alternate option to achieve better retention and stability for their dentures without proper case selection.³ This may finally end up in a denture with compromised esthetics as well as function. There are various attachments systems available for the above mentioned treatment procedure. A precision attachment which is used for such overdentures can be a stud, bar, clip, magnet or a ring. The stud- O-ring attachment system is a good resilient attachment for overdentures^{4, 5, 6} A clinical case report is being presented in the

following session where an overdenture failure due to an improper case as well as attachment selection in managed in a conservative approach by giving a fixed removable combination of prostheses

CASE REPORT

A 52 year old female patient reported with history of repeated fracture of maxillary and mandibular dentures and difficulty in bringing the lips together. On examination, the patient had maxillary and mandibular acrylic overdentures retained using stud attachments. Maxillary arch had five anterior teeth present, Mandibular arch had canines and first premolars on both sides and the third molar teeth. All the teeth had been endodontically treated and stud attachments cemented on the teeth except the third molars in the mandibular arch (**Fig. 1**).

Diagnostic casts were made, bite blocks fabricated, tentative jaw relation made and diagnostic mounting was done. It was observed that

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the thickness of acrylic coupled with the height of the stud attachments had obliterated the freeway

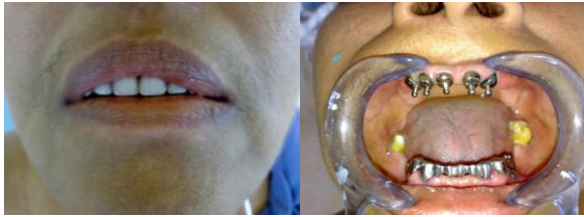


Fig 1: Pre- operative picture showing stud attachments cemented on the maxillary and mandibular teeth encroaching into the freeway space.



Fig 2: Stud attachments were cut, crown lengthening done for each tooth and the remaining metal core along with the tooth structure shaped into crown preparations. Mandibular arch was rehabilitated prior to maxillary arch.



Fig 3: 8 unit fixed prosthesis replacing the missing anterior teeth along with attachments.

space resulting in repeated fracture of the acrylic dentures. So the objective of the treatment was to reduce the increased vertical dimension within physiological limits and to refabricate the prosthesis in a more conservative approach.

Management was similar in both the arches; the mandibular third molars were not part of the rehabilitation plan. Mandibular rehabilitation was completed followed by the maxillary one for no

particular reason. Stud attachments were cut and removed using carbide burs. Crown lengthening was done for each tooth and the remaining metal core along with the tooth structure shaped into crown preparations. (Fig.2)



Fig 4: The stud attachments attached distal to the glazed joined ceramic crowns. Coloured retentive nylon caps were placed inside the metal housing in the cast partial denture.

Addition silicone putty wash impressions were made and casts poured. Bite blocks in the posterior part of the ridges were prepared, face-



Fig 5: The distal extension cast partial denture in approximation with the attachments distal to the joined ceramic crowns- occlusal view.

bow transfer done on to a semi-adjustable articulator (Hanau Wide Vue; Water Pik; Fort Collins; USA). Vertical dimension was reduced and brought within physiologic limits. Interocclusal record was made to mount the lower cast in centric relation.

In mandibular arch a 8- unit fixed partial denture replacing the missing incisors and with distal attachments were made. (**Fig.3**) In the



Fig 6: Maxillary and mandibular joined crowns with precision attachments on both sides.

maxillary arch, joined metal ceramic crowns splinting the five anterior teeth with two precision attachments distal to the crowns, on each side were fabricated. The precision attachment was a double combination design of the Rhein83 OT Cap Distal Extension attachments, each a 2.5mm ball, fabricated as a one piece casting, giving additional stability and functionality in the distal area.⁸

It was then tried in the mouth for accuracy of fit. The Ceramic crowns were in bisque stage during the trial. A pick up impression using addition silicone was made to accurately transfer the relationship of the crowns- precision attachments to the rest of the ridge. A thin layer of separating medium was applied on the inner surface of the crowns and cast was poured. The inner surface of the crowns which has to replicate the prepared crown stumps on the cast were poured using pattern resin after reinforcing by placing metal posts in the inner side of each crown. Metal posts projected outside of the resin to provide retention to the dental stone which was poured over the set pattern resin. The finished cast; the pickup cast, had the joined ceramic crowns and the both side-precision attachments held fixed on the cast in the same relation as it was in the patient's mouth. Dummy nylon caps/sleeves, black in colour, were placed on all the ball attachments. This cast was duplicated using duplicating silicone and a refractory cast was poured.

On this refractory cast, the cast partial denture framework with tissue stops was waxed up, towards replacement of the missing posterior teeth. The female parts -metal housings- to house the retentive nylon caps later were waxed over the areas corresponding to dummy nylon caps/sleeves on the refractory cast. The conventional metal clasps for retention were not employed. Casting was completed, the dummy nylon caps on the ball attachments in the pickup cast were removed and placed inside the metal housings and the framework was tried on the pickup cast. The joined ceramic crowns with the stud attachments were carefully separated from the pickup cast. The crowns were again inserted in the patient's mouth and cast partial denture framework trial was done. The dummy nylon caps provided minimal retention.

Bite blocks were made on the frame work, vertical and centric relationships were recorded again, care being taken to see that the anterior crowns were mildly out of contact when the rims were in centric relation. Teeth were set in group function occlusion on working side with no non-functional contacts. Wax trial was completed and acrylisation done subsequently. Acrylisation was done on another duplicated cast made using the silicone mould used for fabricating the refractory

cast. The dummy black nylon caps were replaced with coloured retentive nylon caps. The ceramic crowns were glazed. **(Fig. 4, Fig.5)**

Maxillary and mandibular joined crowns with precision attachments on both sides were cemented with glass ionomer cement followed by the insertion of the cast partial denture. **(Fig.6)** Instructions were given regarding the insertion and removal of the cast partial denture and its maintenance. Periodic reviews for one year reported satisfactory functional and esthetic results. Once the nylon caps become worn and non retentive, periodically, they will have to be replaced.

DISCUSSION

Stud attachments are simple compared to other precision attachments like bar, in overdentures. The ball and socket type joint permit limited movement in all directions, unlike a bar attachment where only hinge movement is possible.^{5,6} A bar attachment can be more technique sensitive too. Stud on a tooth requires more vertical dimension whereas placing the stud attachment distal to the crowns need lesser vertical dimension. Alternately, stud on a tooth/root demands more tooth reduction and invasive post space preparation. The shift in location of attachments distal to the crowns resulted in the change from an overdenture to a precision attachment retained; clasp less cast partial denture.

Overdentures are inherently weaker due to the space occupied by abutments and the superstructure in comparison with a conventional complete denture. Ironically the chewing forces are much higher in an overdenture than in a complete denture owing to the proprioception of the underlying teeth and the stability and retention of the prosthesis. In this case, precision attachment overdenture with adequate tooth height reduction, correct placement of stud attachments closer to the ridge, to avoid encroaching in to the freeway space could have prevented the failure.⁹ The most important thing to avoid this disaster is to do diagnostic mounting, a dummy placement of the attachments and evaluation of the vertical dimension. Metal reinforced acrylic dentures would withstand the higher chewing forces in an overdenture than plain acrylic ones and should be preferred over the latter.

Crown lengthening was done without compromising the crown/root ratio, to increase the surface area.¹⁰ Splinting of the teeth in the maxillary and mandibular arches supported the two precision attachments on each side. The splinted crowns resulted in the distribution of the undesirable forces due to the distal extension precision attachments.¹¹ A major connector connecting both the partial dentures was incorporated since that would add cross arch stabilization; reduce the tissue ward movement of the individual partial dentures in the distal extension situation thereby increasing the longevity of the precision attachment connection. Also, chances of swallowing on dislodgement of separate partial dentures are minimized.

Ceramic crowns were not glazed prior to the pickup impression, since a rough surface was thought to be better to be picked up using addition silicone. If any corrections were to be made in ceramic, glazing could be done for once eventually. Another observation is that the pickup impression is always best poured in the lab in order to do the pattern resin replication of the underlying stumps, proper blockage of undercuts if any, and separating medium application on the inside of crowns to facilitate separation eventually.

The crown preparation stumps were poured in harder pattern resin to prevent their fracture during separation of the ceramic crowns from the pickup cast and during multiple removals and insertions of the cast partial denture framework from the pick- up cast. Dummy black nylon cap with minimal retention was employed during lab phase and trial to avoid damage to the retentive coloured nylon caps. The dummy cap is also used to cover and protect the distal extension ball attachment from damage or abrasion during the trimming and polishing of the metal during the fabrication of the metal-ceramic crowns.

Coloured nylon caps are available providing varied retention.^{7,8} In this system pink caps provide soft retention while white retentive caps provide standard retention. A new patient may be comfortable with using pink caps. Once the patient develops adequate dexterity, they may start using white caps with standard retention. Group function occlusion was employed rather than a

canine guided occlusion on the functional side to distribute the occlusal forces among all the teeth on the side. Non-functional contacts were avoided to do away with harmful oblique forces on the teeth on the non-functional side. Anterior crowns were left out of contact when the posterior teeth were in centric occlusion to avoid excessive occlusal load on them.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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