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Precision (Tenon-Mortise) Attachment For Pier Abutment – A Case Report.

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Abstract: *By eliminating future problems like stress concentration and a fulcrum on the pier abutment, longevity of the fixed partial denture can be maintained. An appropriate means of causing a stress breaking action is by use of a precision attachment (tenon-mortise) for adequate dissipation of forces along the long axis of the tooth and not in any other direction. Transfer of shear stresses to the underlying bone is of utmost importance to avoid loosening of the pier abutment over a period of time.*

Keywords: *broken-stress principle, pier abutment, precision attachment, stress breaking, tenon-mortise attachment.*

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I. Introduction

Missing teeth due to caries, trauma, periodontal problems etc. has been an age old problem. Restoration of missing teeth with esthetic restorations keeping in mind the hygiene aspect of the prosthesis and the periodontium is one challenging aspect. Fixed partial denture is always the treatment desired by every patient who enters the dental office. However, in clinical situations like one in a pier abutment situation, a long span fixed partial denture cannot be fabricated due to the pier abutment acting as a fulcrum. In such a situation, the "Broken-stress" [1] principle of stress breaking is advocated by means of an attachment. Attachment can be either a precision or semi-precision attachment.

Pier abutment is also referred to as an 'intermediate abutment'.[2]

GPT 9[2] defines it as,"a natural tooth or implant abutment that is located between terminal abutments that serve to support a fixed or removable dental prosthesis".

The location, placement and positioning of the precision attachment is of utmost importance. Any precision attachment has a male (matrix) and female (patrix) component which together forms a single assembly. The attachment in most cases is placed on the middle abutment tooth with the male part towards the distal part of the abutment and the female part in the pontic of the distal most abutment tooth.Markley suggested that the stress should be broken at either terminal abutment so that loads centered on the pier are partly supported by terminal abutments.Schillinburg andFisher[3] demonstrated that a non-rigid attachment at the distal surface of the pier avoids fulcruming across the pier and prevents dislodgment of the less retentive retainer.

This case report in a simple manner shows the attachment of a "Tenon-mortise" precision attachment to a pier abutment situation, so that stress breaking effect can be efficiently obtained.

II. Case report

A 38 year old female patient reported with a chief complaint of missing teeth in lower right back region of mouth since 3 months. On intra oral examination, teeth missing were mandibular right 1st premolar and 1st molar. Radiographic examination showed well corticated bone present around all abutment teeth with sound periodontium all over. The treatment plan was discussed with the patient and three options were given:

1. Implant supported fixed prosthesis 2. Fixed partial denture with precision attachment 3. Removable partial denture.

Due to financial constraints, patient opted for the 2nd option i.e. Fixed partial denture with precision attachment. A porcelain fused to metal 3-unit fixed partial denture with 43, 44 and 45 was planned along with an all metal 2-unit fixed partial denture with 46 and 47. Tooth preparation with 43, 45 and 47 was done followed by gingival dilation with retraction cord impregnated with aluminium chloride. Impression was recorded using putty and light body impression material using two-stage double mix technique. Temporization was done using

tooth-colored auto-polymerizing acrylic resin using indirect technique. Wax pattern was fabricated and then the tenon-mortise attachment was placed on the distal aspect of the middle abutment. Casting was done in two parts. First, the anterior segment consisting of 43, 44 and 45 including the male component of the attachment and later wax pattern for the posterior segment consisting of 46 and 47 including the female component was fabricated so that no interference or distortion would be encountered. After metal try-in, ceramic layering was done to obtain a smooth and highly polished surface. Occlusal pre-maturities were corrected prior to final cementation. Anterior segment was cemented followed by posterior segment using type Iglass-ionomer cement. Excess cement was removed using floss following radiographic evaluation.

Fig 1: Maxillary occlusal view

Fig 2: Mandibular occlusal view

Fig 3: Pre-operative view

Fig 4: Tooth preparation and gingival dilation

Fig 5: Impression recorded

Fig 6: Temporization segment (tenon-mortise)

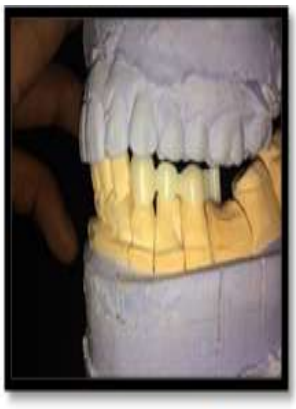

Fig 7: Wax pattern and attachment

Fig 8: Casting of anterior


Fig 9, 10: Metal try-in


Fig 11, 12: Ceramic layering and finishing of prosthesis

Fig 13: Cementation of anterior segment

Fig 14: Cementation of posterior segment

Fig 15: Post-operative view

III. Discussion

The type of connector used whether rigid or non-rigid plays an important role in the success of the fixed partial denture. Clinical situations govern the use of these type of connectors. Torquing, flexure, leverage and peri-cemental area are important factors which should be considered while designing a fixed partial denture for longevity and adequate distribution of stress along the long axis of the tooth.[4] Oruc S et al[5] stated that high stress concentrations were present at the connector and cervical areas of abutment teeth including at the pier abutment.In pier abutment cases, if a rigid connector design is planned, areas of high stress concentration will occur with the pier abutment acting as a fulcrum.[6] Use of non-rigid connector design can help in distribution of the stress equally and efficiently over the abutment teeth.[7]Mensor M[8] 1973 designed an attachment selector system for precise identification of the best attachment to be used in a particular situation depending on the height of the abutment tooth. Use of pre-fabricated non-rigid connectors has an additional advantage over its semi-precision counterpart, as to being machine-made which would be more precise in function, stability and reliability. Attachments can provide an effective answer to prosthesis stability and retention in a way that is cosmetically pleasing.[9] Grubb HD[10] was of the opinion that, for fixed bridgework to be successful, presence of

a satisfactory occlusion, roentgenographic diagnosis and adequate care in making retainers on the abutment teeth is essential.The stress of the movement of one tooth prying against the others was eliminated much as a broken-stress joint frees a fixed bridge from destructive strain.[1] The positioning of the mortise which is cyclindrical in shape is very critical and must be parallel to the path of removal of the distal retainer.[11]

IV. Conclusion

The use of precision attachments which act as non-rigid or stress breakers play an important role in increasing the longevity, stability and success of long span fixed partial dentures. They serve as safety valves against the extreme leverage forces created by the rigid connectors which was promptly put-forth by Miles Markley in the Broken-stress principle. Thus, the use of a non-rigid connector tremendously increases the success of pier abutment situations.

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