Non Rigid Connector: A Stress Reliever– A Case Report

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Abstract

Rigid connectors are preferred in the fabrication of most of the fixed partial dentures. But there are certain clinical situations where a completely rigid restoration is not desirable. Non rigid connectors offer many advantages in such situations. This article describes a case report where a non rigid connector is used to rehabilitate two missing teeth 24 and 26 with a 5 unit segmented ceramo-metallic fixed partial denture.

Key Words: Connector, Non-rigid connector, Pier Abutment, Stress Distribution.

Introduction

Connectors, the portion of a fixed dental prosthesis that unites the retainers and pontic are considered as heartthrob of abutments, since under occlusal load maximum stresses are concentrated on them. Selection of the right type of connector is important for success of restoration.

Rigid connectors are generally used in clinical practice since its placement requires minimum technical and laboratory expertise.[1] But when we encounter a pier abutment, rigid connectors do not serve our purpose. Natural tooth located between terminal abutments that serve to support a fixed or removable dental prosthesis is known as pier abutment.[2] Restoration of two missing teeth and an intermediate pier abutment with a rigid fixed partial denture is not an ideal treatment. When an occlusal load is applied to the retainer on the abutment tooth at one end of afixed partial denture with a pier abutment, the pier abutment may act as a fulcrum. Thus, tensile forces may be generated between the retainer and abutment at the other end of the restoration. Anterior or posterior abutments may experience extrusive forces during fulcrum action, and resultant tensile force at the retainer to abutment interface may result in potential loss of retention for these restorations.[3]

Non–rigid connector is a broken stress mechanical union of retainer and pontic, instead of usual rigid connector. Inspite of apparently close fit, the movement in a non rigid connector is enough to prevent the transfer of stress from the segment being loaded to the rest of the FPD. The design and passive fit of non rigid connector is critical to the success of the long span FPD.

The four types of nonrigid connectors are the:

1. Dovetail (key-keyway) or Tenon-Mortise type connectors.
2. Cross-pin and wing type connector.

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3. Split type connector.
4. Loop type connector.

Case report

A 45 year old male patient was referred to the Department of Prosthodontics & Crown & Bridge, I.T.S Dental College & Hospital, Greater Noida with the complaint of inability to masticate on the left side. No relevant medical history was found to be significant. Examination showed missing first & second premolars and second molar of the upper right side (Fig.1). Patient was using a removable partial denture for the same but was not satisfied. Radiographs showed good bone support on the canine, second premolar and second molar. Treatment plan decided was to do the restoration with FPD of non rigid type design. The non rigid connector design to be used consists of T-shaped key (also called tenon) attached to the mesial surface of distal pontic and a dove tail key way (also called mortise) placed on the distal aspect of the pier abutment retainer during the wax pattern fabrication (Fig. 2) .

The tooth preparation for the abutments was done (Fig. 3) followed by the standard impression procedures and master cast fabrication. The non-rigid connector design to be used was prepared in the wax pattern. Accurate alignment is very much critical. It must be parallel to path of withdrawal of the distal retainer. Paralleling was accomplished using a surveyor. After the prepared wax pattern was cast, a trial of the fit of individual units was done to verify proper seating (Fig.4). Then a ceramic facing was added to the anterior retainer. At the time of cementation, the mesial 3 unit segment was placed and the distal 2 unit was cemented afterwards (Fig.5 & 6). No cement should be placed in the key way.

Fig. 1: Pre-operative view

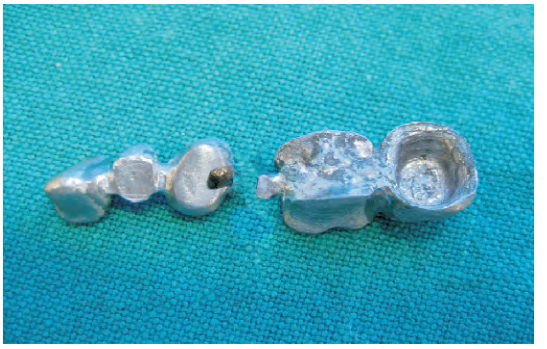

Fig. 2: FPD design with non rigid connector

Fig. 3: Tooth preparation

Fig. 4: Metal trial of the prosthesis

Fig. 5: Occlusal view of the final prosthesis

Fig. 6: Post-operative view

Discussion

The size, shape and type of connector plays an important role in the success of a FPD. Biomechanical factors such as overload, leverage, torque and flexing induce abnormal stress concentration in an FPD.[4] Stress concentration is found in the connectors of the prosthesis and near the cervical dentin near the edentulous ridge. Non-rigid connector provides the opportunity to provide the break type of connection in fixed partial denture.

There is a conflicting opinion on where to place the non-rigid connector. Markley[5] suggested placement on one of the terminal abutments and not at the pier abutment. Adams[6] suggested placing the connector at the distal side of pier, and if desired, adding one more at the distal side of the anterior retainer, while Gill[7] suggested placing it at one side or both sides of the pier.

Carl E.Misch[8] recommended that in conventional fixed prostheses, the "male" portion of a nonrigid attachment usually is located on the mesial aspect of the posterior pontic, whereas the "female" portion is in the distal aspect of the natural pier abutment tooth. This prevents mesial drift from unseating the attachment. However, an implant does not undergo mesial drifting, and the non-rigid connector location is more flexible. For a natural pier abutment between two implants, a stress breaker is not indicated.

In this case report, the nonrigid connector was placed on the distal side of the pier abutment which was beneficial. Since the long axis of the posterior teeth usually leans slightly in a mesial direction, vertically applied occlusal forces produce further movement in this direction. This would nullify the fulcrum effect and the patrix/male of the attachment would be seated firmly in place when pressure is applied distally to the pier. Shillingberg[9] suggested placing the connector at the distal aspect of pier abutment. This position was also supported by finite element analysis study done by Orucet al.[10]

Conclusion

The paper describes a technique to neutralize the effect of forces that are transmitted to terminal abutments when a rigidly designed fixed partial denture with an intermediate pier abutment acts as a fulcrum resulting in damage to abutment teeth. The selection of right type of connector is an important step when sorting treatment plan.

References

1. Saurav Banerjee, Arlingstone Khongshei, Tapas Gupta, and Ardhendu Banerjee. Non-rigid connector: The wand to allay the stresses on

abutment. Contemp Clin Dent. 2011 Oct-Dec; 2(4): 351-4.

2. Glossary of prosthodontic terms. 8
3. Selcuk Oruc, Oguz Eraslan, H. Alper Tukay and Arzu Atay. Stress analysis of effects of nonrigid connectors on fixed partial dentures with pier abutments. J Prosthet Dent 2008; 99:185-92.
4. Sutherland, Holland, Sluder. A photo elastic analysis of stress distribution in bone supporting rigid and non rigid designs. J.Pros. Dent. 1980; 44: 616-23.
5. Markley MR. Broken-stress principle and design in fixed bridge prosthesis. J Prosthet Dent.1951; 1:416-23.
6. Adams JD .Planning posterior bridges. J Am Dent Assoc. 1956; 53:647-54.
7. Gill JR .Treatment planning for mouth rehabilitation. J Prosthet Dent. 1952; 2:230-45.
8. Carl E.Misch. Dental implant prosthetics. Elsevier Mosby. 2005:189-90.
9. Shillingburg HT, Jr, Hobo S, Whitsett LD, Jacobi R, Brackett SE. Fundamentals of fixed prosthodontics. 3rd ed. Chicago Quintessence.1997:85-118.
10. Selcuk Oruc, Oguz Eraslan, H. Alper Tukay and Arzu Atay. Stress analysis of effects of nonrigid connectors on fixed partial dentures with pier abutments. J Prosthet Dent 2008; 99:185-92.