



## CASE REPORT

### STRESS BREAKER IS THE BEST FOR INTERMEDIATE ABUTMENT-A CASE REPORT

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#### ABSTRACT

It is Physiologic movement of healthy teeth occurs and it varies for each tooth. The movement of the teeth in different segment occur in different direction (Non-rigid connectors for fixed partial dentures, 1973). Tooth movement of divergent direction create stresses that are transferred to the abutment and cause loosening of the prosthesis at the weaker retainer side. In such situation a non-rigid connector, a stress breaking mechanical union of pontic and retainer is recommended. The non-rigid connectors in pier abutment cases allows shear stresses to transfer to the supporting bone and permit the abutment to move independently. Thus this clinical report describes the restoration of intermediate abutment with semi precision attachment.

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## INTRODUCTION

Pier abutment is also named as intermediate abutment (The pier abutment, 2006). According to GPT pier abutment is defined as a natural tooth located between terminal abutments that serve to support a fixed or removable dental prosthesis. Pontic, retainer and connectors transmits the forces to the supporting structure when occlusal forces are applied in a fixed partial denture. Shear stresses are transferred to the supporting bone in a non-rigid fixed partial denture rather than concentrating the stress on connectors. The stress breaker permits the abutment to move independently by minimizing the mesiodistal torqueing of abutment (*Indigenously* Fabricated Non-rigid Connector for a Pier Abutment, 2011). Abnormal stress concentration in a fixed partial denture is created because of biomechanical factors such as overload, leverage, torque and flexing (Non-rigid connectors in fixed prosthodontics, 2005). The important reason for failure in a long span fixed partial denture is found when stress is concentrated in the connector of the prosthesis and in cervical dentin area near the edentulous ridge. The long standing bridges with pier abutment depend upon the selection and use of non-rigid connector. Designs of non-rigid connector (Sherring-Lucas, 1994; Jerkins, 1999):

Key and keyway  
Loop connector  
Cross pin and wing  
Split connector

#### Indications

- Malaligned abutment
- Long span FPD'S
- The existence of pier abutment which promote fulcrum like situation.
- When questionable distal abutment exists and non-rigid connector prevents the problem of repetition of the entire prosthesis (Non-rigid connectors in fixed prosthodontics, 2005).

#### Contraindications

- The missing teeth in the edentulous space adjacent to the abutment is longer than 1
- If significant mobility of abutment teeth is present.
- The distal terminal abutment may supraerupt if it is opposed by removable partial denture or edentulous ridge while the two anterior retainers are opposed by natural dentition.

When an intermediate abutment is present, rigid connector is considered to be not an ideal treatment. The pier abutment acts as a fulcrum when an occlusal load is applied to the retainer on the abutment at one end of the prosthesis. A tensile force is created on the abutment and retainer connection on the other end of the prosthesis. Extensive forces are created during fulcrum action and it is experienced by the anterior or posterior abutment. The loss of retention of these restorations occurs because of tensile force created at the retainer to abutment interface. The teetering movement occurs because of intrusion of terminal abutment and gradually result in debonding of the less retentive terminal.

## CASE REPORT

A female patient of aged 60 years reported with the chief complaint of missing teeth and food lodgement in the left upper back region. On examination it was diagnosed as partial edentulous condition (Figure-1). The treatment options were implants and fixed partial denture (non-rigid connectors). The treatment plan was non rigid connector supported prosthesis. The teeth missing were 23, 25&27. After endodontic treatment the first premolar crown superstructure is modeled with treatment plan of post and core. The easy fibre post (DENTSPLY) of no-2 was used. Tooth preparation is done on lateral incisor, first premolar, first molar and third molar (Figure-2). As the prosthesis planned for anterior, first premolar is porcelain fused to metal and posteriors were metal and the tooth was prepared accordingly. Cord retraction was done and impression was made with elastomer material (Figure-3) and poured with die stone. Removable dies are made and wax pattern was fabricated.



Figure 1. Diagnostic cast



Figure 2. Tooth preparation



Figure 3. Impression



Figure 4. Key and Keyway attachments

A semi precision attachment named conical attachment is selected. (Bredent Company). It had frictional retention, integrated parallel holder on matrix parts and matrix save time and expand the application range (Figure-4). Female and male parts are assembled and parallel holder is taken off the non-required part. The keyway is attached on the distal side of premolar abutment and the key is suspended to the pontic on

the mesial side (Figure-5&6). The height of attachment is adjusted with a metal bur. Primary and secondary parts are modelled. The wax pattern casting was done separately for tenon mortise framework. Once the casting is completed and seating is made on removable dies a trial procedure is done of separate attachments (Figure-7-9). Once the fit of the prosthesis is exact the porcelain built up is done. Final cementation is done only after finishing and polishing of the prosthesis is done (Figure-10).



Figure 5. Wax pattern

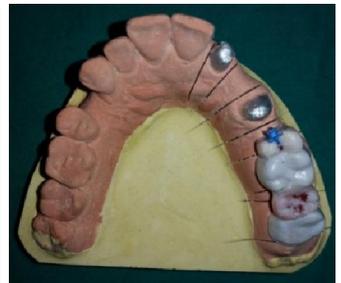


Figure 6. Wax pattern



Figure 7. Seating of prosthesis



Figure 8. Trial of keyway



Figure 9. Trial of Key



Figure 10. Cementation of prosthesis

## DISCUSSION

The physiologic tooth movement is not visible with naked eye. The buccolingual movement varies for different teeth and it ranges from 56micron to 108microns and the movement also occurs in apical direction. The location of non-rigid connectors are responsible for the difference in the stress field. Distal to the intermediate abutment a keyway must be placed and key is placed on mesial side of pontic. 98% of posterior teeth when subjected to occlusal forces tilt mesially and produce further movement in this direction. The mesial movement seats the key into keyway more solidly if the keyway of the connector is placed on the distal side of pier abutment (Shilling burg *et al.*, 1999). There are different opinions by the authors for the placement of non-rigid connectors. Markley stated that the non-rigid connector should not be placed on the pier abutment

but it should be placed on one of the terminal retainers because the premolar abutment is subjected to extreme load (Non rigid semi precision connectors for FPD, 2014). Carl E Misch stated that implant does not undergo mesial drifting and stress breaker is not indicated for natural intermediate abutment located between implants. Adam recommended the placement of non-rigid on distal of anterior retainer and one more on distal to intermediate abutment. Gill suggested the placement of non-rigid connector on one side or both the sides of pier abutment. Shillingburg et al stated for the placement of non-rigid connector on the distal aspect of the intermediate abutment. When the mortise are placed in the distal position it would nullify the fulcrum effect and seat the connectors firmly in place when pressure is applied distally to the intermediate abutment. In this case we have placed on the distal aspect of pier because the maximum stress concentration is reduced when placed in this position and it has been supported by a study done by Oruc et al.

#### **Some non –adjustable intra-coronal attachments are:**

Rod and tube attachments, stern tube lock, cylindrical slide attachment, preat contour, conicast, Dovetail slide attachment by Prof Beyler.

#### **Adjustable intra-coronal attachments are:**

Ancra, Mccollum.

#### **Conical attachment was preferred in this case:**

This attachment is of conical shape, precisely fitting designed for intraoral use. No individual milling work is necessary. Primary and secondary parts are fabricated simultaneously to save time and money. The other intra-coronal attachments which can be used as a non-rigid connectors for pier abutment cases are rod and tube attachment, stern tube lock (stern gold), dovetail slide attachment. These attachments can be used to overcome alignment problems.

#### **Conclusion**

The long term success of an FPD depends on the size, shape, location, design occlusion, periodontal status and selection of a precise connector. The non-rigid connector play an important role by compensating the difference between retention and resistance form between the abutments. Broken stress

mechanism creates safety valves when the rigid attachment is created on two or more teeth against the tremendous leverage forces (Broken stress principle and design in fixed bridge prosthesis, 1951).

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