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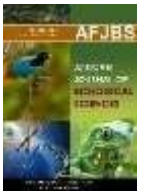

THE STRESS BREAKER IN FIXED PARTIAL DENTURES TO MANAGE PIER ABUTMENTS - A CASE REPORT

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ABSTRACT

Regular clinical dental scenario deals with management of different types of partial edentulism using fixed partial dentures. A most common finding is presence of abutments with edentulous space both anterior and posterior to it making it a pier abutment. This is mainly seen in cases of missing maxillary first premolar and maxillary first molar resulting in second maxillary premolar a pier abutment . Maxillary canine & maxillary second molar acts as mesial and distal abutments respectively. Due to teetering movements during function, a rigid FPD is going to cause the terminal abutments to intrude as pier abutments becomes fulcrum. These movements will eventually result in debonding of the less retentive terminal retainer . To overcome such risk utilisation of non rigid connectors is advised. This article is a case report of one such pier abutment that was rehabilitated using non rigid connector.

Keywords- Non rigid connectors, precision attachments, pier abutments, stress breakers

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INTRODUCTION

Success of a fixed partial denture depend on a number of criteria one of which that needs to be emphasized enough is selection of the type of connector. We are more accustomed to the use of rigid connector in clinical practice since its placement requires minimum technical and laboratory expertise. The real problem arises when we encounter 5-unit fixed dental prosthesis (FDP) with a pier abutment.[1] Fixed bridgework, by its rigid construction, creates stresses which tend to limit the useful life of the appliance, unless the engineering design compensates for the stress. Broken stress can help to prevent these FPD failures. [2] Because of the curvature of the arch, the faciolingual movement of anterior tooth occurs at a considerable angle to the faciolingual movement of molar tooth. These movements can create stresses on the abutments in long-span prosthesis. A non-rigid connector, a stress breaking mechanical union of retainer and pontic, is usually recommended in such situation.[3,4]

CASE REPORT

A 20 years old male patient reported to the Department of Prosthodontics and Crown & Bridge , Hazaribagh college of dental sciences and hospital Hazaribagh , India with the chief complaint of missing tooth in upper left back tooth region due to which he was facing functional as well as aesthetic issues. Past medical history was in significant and past dental history revealed that patient had undergone extraction of the badly carious left maxillary first premolar and first molar six months back. Intra oral examination noted missing maxillary left first premolar and first molar . Maxillary left second premolar was present with a slight distal tilt. Other findings showed a two unit porcelain fused to metal crowns in respect to 16,17 [Fig 1]. On radiographic evaluation the abutment teeth had adequate bone support and occlusogingival height to be used as abutment.

After discussing all the treatment options and their pros and cons, it was decided to rehabilitate the case with five unit FPD using nonrigid connectors on the distal aspect of a pier abutment. Its advantages and disadvantages were explained to patient and a written, informed consent was obtained.

CLINICAL STEPS UNDERTAKEN TO COMPLETE THE PROCEDURE- The following clinical steps were performed for the rehabilitation of this case.

1. Tooth preparation was done using tapered fissure bur on left maxillary canine and maxillary second premolar and maxillary second molar with equigingival margins and shoulder finish line and adequate clearance from opposing teeth for porcelain fused to metal prosthesis in order to enhance the aesthetics. [Fig:2].
2. The final impression was made using polyvinyl siloxane elastomeric impression material following placement of retraction cords[Fig:3].
3. Shade matching was done taking reference from the adjacent tooth using VITA Shade selection guide.
4. For temporisation, provisional restorations were fabricated using a tooth colour auto polymerising acrylic resin and cemented with non eugenol based temporary cement.
5. Type IV dental stone was used to pour the impression. Master cast was retrieved and die cutting was done.
6. Master cast were mounted on an articulator using the interocclusal record.
7. Wax pattern was fabricated using casting inlay wax for maxillary left canine, first premolar and second premolar and then recess for the female was cut accordingly to

fit the prefabricated plastic dovetail and it was placed on distal aspect of pier abutment. [fig:4]

8. Surveying was done to determine the position and parallelism of plastic dovetail; Any extension of the female pattern above the occlusal level of the abutment was left remaining.
9. After casting, excess height of the male and female parts was cut down; metal try-in of the anterior segment was done to verify proper seating.[Fig:5]
10. Casting of the posterior part was carried out after the casting of anterior segment.
11. Metal try-in of the individual units was done to verify proper seating [Fig:6].
12. Ceramic layering was added onto all the retainers and pontics depending upon correct shade[Fig:7].
13. Anterior and posterior segments were assembled together.[Fig: 8]
14. During cementation, anterior three unit segment with key was cemented first followed by cementation of posterior two unit segment with keyway using glass ionomer cement [Fig:9].
15. Proper occlusion was maintained by rechecking in centric after seating the prosthesis.[Fig:10]
16. The patient was instructed to maintain proper oral hygiene. Use of dental floss and interdental brush was recommended. The patient was evaluated after three months to assess the oral hygiene status.

Fig 1: pre-operative intra oral view

Fig 2: Tooth preparation done on left maxillarycanine,second premolar and second molar

Fig 3: Final Impression

Fig 4: Wax pattern with male and female parts

Fig 5: metal tryin mesial part with patrixon the distal of pier abutment

Fig 6: metal trial with both the segments seated

Fig 7: completed prosthesis (anterior segment with patrix)

Fig 8: completed prosthesis (anterior segment with matrix)

Fig 9: Post operative intra oral view (occlusal)

Fig 10: Post operative intra oral view (frontal)

Fig 11: post operative intraoral view (lateral)

Fig 12: Post-operative extraoral view

DISCUSSION

A fixed partial denture is made up of three parts that are the retainers, pontics and the connectors. Connectors are that part of a FPD that units the retainers to the pontics. Connectors may be rigid (solder joints or cast connector) or non-rigid (precision attachment or stress breaker)[7]. In most of the clinical scenarios rigid connectors are more frequently used due to their ease of fabrication as well as fulfills the functional and aesthetic demands efficiently. But there are a few conditions in which conventional rigid connectors are not indicated because they prove to be detrimental to the overall prognosis of the case, one of which is presence of a pier abutment. Stress breakers or precision attachments or non rigid connectors are the ones that are fabricated and becomes the right choice of connectors, hence improving the overall prognosis and treatment plan.Teeth in different segments of the arch move in different directions. The facio-lingual movement of an anterior tooth occurs at a considerable angle to the facio-lingual movement of a molar, because of the curvature of the arch. These movements of measurable magnitude in divergent directions can create stresses in a long span prosthesis that will transferred to retainers and their respective abutments teeth[5]. The forces that are transmitted to the terminal retainers as a result of the middle abutment acting as a fulcrum, cause failure of weaker retainers. Because of these dislodging forces rigid type of FPD with pier abutment have higher debonding rate than short span prosthesis, resulting in marginal leakage and caries[6].

In order to overcome such hazards the non rigid connectors are used. There are various types of non rigid connectors which are broadly classified as precision and semi precision attachments. The most commonly used precision attachment is the T-shaped key that is attached to the pontic and a dovetail key way placed within the retainer[5].

There is a conflicting opinion between authors on where to place the non-rigid connector. Markley[2] suggested placement on one of the terminal abutments and not at the pier abutment. Adams[3] 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[4] suggested placing it at one side or both sides of the pier. The most preferred placement of precision attactments in pier abutment case is on the distal aspect of the pier abutment only, as suggested by Schillinburg[5].

Indication for non- rigid connector[10]:

1. The existence of pier abutment which promotes a fulcrum-like situation that can cause the weakest of the terminal abutments to fail and may cause the intrusion of a pier abutment.
2. The existence of the malaligned abutment, where parallel preparation might result in devitalisation. Such situation can be solved by the use of intracoronal attachment as connectors.
3. Long span, FPD which can be distort due to shrinkage and pull of porcelain on thin sections of framework and thus, affect the fitting of the prosthesis on the teeth.
4. In the mandibular arch, FPD consisting of anterior and posterior segments, a non rigid connector is indicated as the mandible flexes mediolaterally during opening and closing strokes.
5. Disparity in retentive capacity of the abutments.

The contraindications of using a non-rigid connector in a posterior 5-unit FPD with a pier are as follows:

1. Significant mobility of abutments.

2. If the span between the abutments is longer than one tooth.

3. If the distal retainer and pontic are opposed by a removable partial denture or an edentulous ridge, while the two anterior retainers are opposed by natural dentition, allowing the distal terminal abutment to supraerupt[8,9].

CONCLUSION

Each patient and every mouth is different and so should be our treatment plan. The correct choice of connectors not only increase the longevity of the remaining teeth but also of the overall treatment. Non rigid connectors transfers less stress onto the abutment teeth and is beneficial in managing the pier abutment situations. As prosthodontists it is our duty to have thorough knowledge and also keep ourselves updated about the different treatment options available and provide what is best for each patient.

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