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Case Study

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REAKING A STRESS AROUND A PIER ABUTMENT – A CASE REPORT

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ABSTRACT

Rigid connectors between pontics and retainers are mostly preferred in fabrication of fixed dental prosthesis. However, a completely rigid restoration might not be a successful option for all situations during replacing of missing teeth. An edentulous space can occur on either side of a tooth, creating a single, freestanding pier abutment. In this situation, a non-rigid connector is preferred. Non rigid connector helps in distribution of shear stresses evenly to supporting bone & permits the abutments to move independently. It acts as stress breaker between retainer and pontic, preventing the pier abutment from becoming the fulcrum. This case report describes importance and method of incorporating non-rigid connector during management of pier abutment.

INTRODUCTION

The scope of fixed prosthodontic treatment can range from the restoration of a single tooth to the rehabilitation of the entire occlusion. Fixed prosthodontic treatment involves the replacement and restoration of teeth by artificial substitutes that are not readily removable from the mouth. The treatment aims to restore function, esthetics and comfort that ultimately leads to physiologic, social and psychologic well-being of the patient.[1,2] Hence, fixed restoration is also the most preferred treatment of choice opted by the patient.

The success of a FPD depends upon the appropriate evaluation and selection of abutment teeth, retainer, connector & pontic design. During the function, the forces applied over a FPD are mostly concentrated on the connector and is most prone to fracture. So, adequate design of the connector is necessary in order to maintain integrity of the prosthesis.

Depending on the situation these connectors can be rigid or non-rigid, based on the movement at the connector joint.[4] Rigid connectors are mostly seen in form of soldered, welded or loop connectors, whereas, non-rigid connectors are used in form of key-keyway, split pontic and cross pin and wing.[2]

In case of a pier abutment, a non-rigid connector is indicated due to three factors: 1) Difference in physiologic movement of individual tooth, 2) Difference in direction of individual tooth and 3) Varying retentive capacities of retainers.[5]

The present case report describes the use of a Tenon-Mortise connector to manage the stress around a pier abutment. This connector consists of a patrix, key or male component that is attached to the mesial surface of the distal pontic and the female component, matrix or keyway that is attached to the distal surface of the pier abutment.[6] Hence, the FPD is fabricated in two parts.

CASE REPORT

A 27-year-old male patient reported to Department of Prosthodontics and Crown & Bridge, Inderprastha Dental College and Hospital, having a chief complaint of missing teeth in lower left back tooth region. He had no relevant past medical history and past dental history revealed that patient had undergone extraction of the left mandibular first premolar and first molar 6 months back.

Intraoral examination revealed missing mandibular left first premolar and first molar making canine and second molar as primary abutments and second premolar as a pier abutment (fig. 1). The abutments were clinically evaluated and were vital having no evidence of pain on percussion and there was no loss of tooth structure. Silver amalgam filling was present in mandibular left and right 2nd and 3rd molars. On radiographic examination, adequate bone support was seen with no evidence of any pathological radiolucency.

Figure 1: Preoperative intraoral view-mandibular arch.

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

CLINICAL PROCEDURE

On the day of appointment, tooth preparation w.r.t 33, 35 and 37 was done following all the biomechanical principles, for metal-ceramic FPD with non-rigid connector (fig. 2). Following preparation, 2 stage putty-wash impression with addition silicone was made. It was then poured with high-strength die stone (Kalabhai Karson Pvt.Ltd.) (fig. 3).

Figure 2: PFM tooth preparation done w.r.t. 33, 35, 37.

Figure 3: Putty-wash impression of mandibular arch made.

An inter-occlusal record was made using bite registration material which was used to mount mandibular cast and provisional restorations were fabricated with a tooth color auto polymerizing acrylic resin and cemented with non-eugenol temporary cement. After fabrication of die, wax pattern was fabricated for 33, 34, and 35 first with a keyway at distal proximal area (fig. 4), then posterior section of wax pattern fabricated i.r.t 36 & 37 with key at mesial surface (fig. 5). On the distal surface of the wax pattern of 35, a plastic castable male semi-precision attachment was incorporated in waxed up.

Figure 4: Anterior section of wax pattern fabricated w.r.t. 33, 34, 35, keyway at distal proximal area.

Figure 5: Posterior section of wax pattern fabricated i.r.t 36, 37 with key at mesial surface.

To maintain parallelism of the key-keyway, surveying was done and the pattern was invested followed by casting of both the segments individually. After casting is completed, metal trial was done in the patient mouth to check the fit of the prosthesis (fig. 6).

Figure 6: Coping trial done in respect to 33, 34, 35, 36 & 37 with non-rigid connector design.

Following metal trial, ceramic layering was done for both the segments and was tried in patient's mouth. All the occlusal adjustments were done and the prosthesis was luted with glass ionomer cement (fig.7). First anterior segment was luted, followed by the posterior segment.

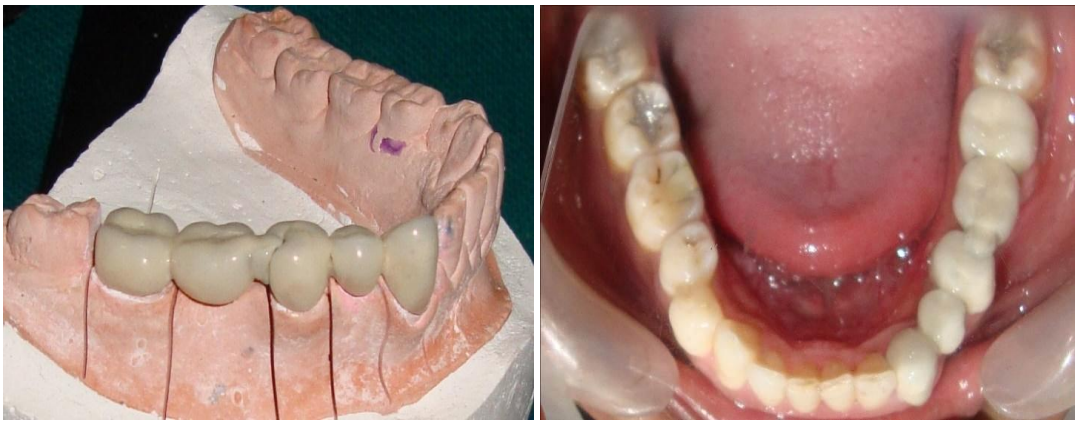

Figure 7: Fixed partial denture in respect to 33, 34, 35, 36, 37 fabricated having a NRC between 35 and 36.

Figure 8: Postoperative view.

All the instructions for maintenance of oral hygiene were given to the patient. Use of dental floss and an interdental brush was recommended and was recalled for a routine follow-up.

DISCUSSION

The success of any long span FDP depends upon its type of connector (shape, size and location). If a conventional cast connector is provided in a case of pier abutment, the occlusal load on either side of it will make the abutment as fulcrum and the prosthesis tends to rotate around it, causing early failure of the pier abutment and ultimately the FDP.[7] Bothelo and Dyson reported that rigid FPDs with pier abutment were linked with higher debonding rates than short span prosthesis.[8] In such a condition non-rigid connector is generally recommended.

The ideal treatment of choice in this case was a five unit fixed partial denture with non-rigid connector as it transfers the shear stress along the long axis of the abutment to the supporting rather than concentrating them in the connector. This produces a stress breaking effect which protects the abutment teeth and prevent its early failure.[9,10]

In this case report, the key-keyway (Tenon–Mortise Connector) non rigid connector was selected to preserve the vitality and conserve the tooth structure of the pier abutment. In follow-up of 11 months, it was observed that the FPD was intact in its place, the gingiva around the prepared teeth was healthy and firm with no apparent pockets or secondary caries of the abutment teeth.

CONCLUSION

Normal stress over a fixed dental prosthesis during function, if not encountered appropriately will lead to its early failure. The size, shape and type of connectors play important role in favorable prognosis of a FPD. When non-rigid connector is used, it allows movement in the fixed partial denture prosthesis, providing transfer of stresses away from the pier abutment and also acts as stress breaker by neutralizing all the forces acting on the connector thereby protecting the abutment teeth.

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