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# Managing a Case of Sensitive Abutment Situations through Use of a Fixed Movable Prosthesis – A Clinical Report

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**ABSTRACT**

*Preserving a natural tooth that has strategic importance in the future planning of oral rehabilitation is clinical challenge which every dentist should manage successfully. This article deals with such a clinical partial edentulous situation that has a natural tooth in between two edentulous areas. Both the edentulous areas on either side of the abutment were restored with fixed prosthesis and the natural abutment was relieved of stresses by incorporating a unique design that allows stress breaking effect on the abutment. The patient was successfully rehabilitated with an esthetic fixed movable prosthesis, the designing of which has been described in this report.*

***Key words:*** *- Kennedy class 3, Fixed partial denture, Pier abutment, free and bound saddle*

## INTRODUCTION

Successful selection of abutments for fixed partial dentures requires diagnostic ability, knowledge of anatomy, ceramics, metallurgy, periodontics, phonetics, physiology, radiology, and the mechanics of oral function. Many partial edentulous situations require a balanced clinical approach in terms of prosthesis design, abutment

longevity, conservation of tooth and associated structure, stress distribution and meeting patient's expectations. A pier abutment which is situated in between two edentulous areas demands such approach. If such situations are managed by a conventional fixedprosthesis, there is a tendency of terminal abutments to intrude during function resulting in teetering movement within the prosthesis, which ultimately results in retainer failure.[1] The failure manifests in abnormal stress distribution between the cemented abutments especially in relation to the difference in vertical resilience of three different natural teeth within their respective sockets, decementation of the retainer (weaker), eruption of one natural abutment if the cement is strong enough not to allow debonding of the weaker retainer, pain and discomfort upon application of force in occlusion and stress concentration on a particular abutment especially the cementum tooth interface.

Over the years use of a non-rigid connector at one end has been advocated to prevent some of the problems associated with the use of rigid connectors in such situations. [2]Different authors have given different views regarding the designing of a fixed movable prosthesis.[3-6]

Use of a semi precision attachment that is fabricated by the direct casting of plastic, wax, metal or refractory patterns provides benefits of being less costly, ease of fabrication and castability in alloys. Extra coronal attachments also have added advantage of being conservative, maintaining the contour of the crown form and ability to redirect stresses. Patients are demanding of a restoration where metal is not visible on occlusal surfaces of the posterior fixed partial denture requires consideration of principles of occlusion combined with overcoming the drawbacks of porcelain firing, by incorporating various clinical aspects of occlusal rehabilitation. This article in the form of clinical case report, describes the management of pier abutment with fixed movable prosthesis that is completely covered in porcelain. Design considerations for such treatment design are discussed.

## CLINICAL CASE REPORT

An aesthetic conscious north Indian adult male, aged 45 years, came to the department of Prosthodontics, with a chief complaint of difficulty in mastication since last two years due to missing upper right side rear teeth. The patient had got his two maxillary right sided teeth removed as a result of complications of tooth decay. A detailed medical, dental, social and diet history was recorded. Medical history was noncontributory. Significant findings included pan chewing habit since last 10 years with no history of smoking or alcohol consumption.

Inspection of the oral cavity revealed good oral hygiene with generalized extrinsic staining, especially in the cervical and the palatal aspect of maxillary anterior teeth (Fig 1), class I molar relationship with midline diastema of maxillary central incisors andgeneralized spacing. The edentulous areas were examined for severity of bone loss in relation to missing right first premolar, first molar and opposing mandibular dentition. Maxillary right second premolar acted as a pier abutment. Occlusal examination revealed

a mutually protected occlusion with canine's discluding the posteriors and anterior in lateral excursions. Individual examination of the potential abutments on both sides revealed an adequate crown length. Radiographic examination revealed an adequate crown root ratio, favorable root morphology, healthy periodontal ligament space, positive long axis relationship, favorable gingival margin location, ideal occlusal morphology, occlusal plane and no evidence of any periapical or periodontal pathology. The diagnostic casts were mounted on a Hanau Widevue semi adjustable articulator (Waterpik, Ft Collins, CO, USA) using a Hanau spring bow. The articulator was programmed and the abutments were evaluated. The entire rehabilitation process included pre prosthetic mouth preparation that consisted of oral hygiene maintenance program followed by prosthetic rehabilitation with fixed movable prosthesis. The definitive treatment plan was discussed with the patient and his consent was taken. Treatment was completed in two stages.

**Stage 1–** This stage included important steps of occlusal correction in the form of occlusal equilibration of effected natural teeth, occlusal plane determination and correction through the fabrication of a removable partial denture in relation to mandibular right missing posteriors. After this stage was completed, another set of casts was mounted and a mock preparation was done for the maxillary cast and a diagnostic wax pattern of entire fixed partial denture was fabricated. The wax patterns were adjusted to their palatal contours till the occlusion developed was a mutually protected one including a canine guided occlusion during lateral excursions. The necessary readings were then noted in the laboratory record and a putty reline impression was made on this completed wax pattern. The cast was poured and a clear self-cure acrylic index was made over the completed wax pattern cast. Another putty index was also made which would help to make a temporary fixed partial denture. After all the procedures were done a special tray was fabricated from tray acrylic.

**Stage 2–** Maxillary right canine, right second premolar and second molar were prepared in one appointment. The occlusal reduction was done to maintain occlusal clearance of about 2 mm from the occlusal surfaces of the artificial teeth of the mandibular partial denture. After the abutment teeth were prepared, the irreversible hydrocolloid impression was made from which a check cast was prepared. After the necessary corrections in the preparations, gingival retraction was done and a final impression was made using addition polyvinyl siloxane material (Reprosil, Dentsply/Caulk; Milford, DE, USA). A temporary restoration was cemented with eugenol-free zinc oxide (PreVisionCem; HeraeusKulzer). Shade selection was done using 3D vita shade guide.

In the laboratory, the wax pattern for the final prosthesis was made in two sections, one section

extending from canine to second premolar and the other section included first and second molars only. From the second premolar on the distal side a semi precision attachment (male portion) was custom made. On it the receptive portion was fabricated. This was done by simply applying a lubricant on the male portion of the attachment later followed by wax adaptation over it. A spacer application of 1mm was applied over the male portion of the wax pattern to allow vertical movement within the framework. With careful manipulation the two were separated and the wax pattern was cast into the base metal alloy. The entire assembly of the metal framework was tried in the patient for evaluation of margins, movement and occlusal clearance. Selected porcelain was then added and fired on the metal framework except at the receptacle area (Fig 2 and 3)

The entire fixed movable prosthesis was thus fabricated in two sections.The entire assembly of the fixed movable bridge was then cemented using zinc phosphate cement (Fig. 4).

After the cementation of the fixed, movable prosthesis, the patient was instructed regarding the use and maintenance of the prosthesis. The patient highly appreciated the functional capability of his entire rehabilitation.

## DISCUSSION

Non Rigid Connector transfers shear stresses to supporting bone rather than concentrating them in connectors. It minimizes mesiodistal torquing of abutments and permits them to move independently.[7] It also allows mandibular flexure to work without affecting long span restoration during opening and closing movements.[8] According to a study the stress distribution and values of a FPD and pier abutment are affected by the presence and location of a non-rigid connector.[9] The area of minimum stress concentration occurs in pier abutments when a non-rigid connector is located at the distal region of the pier abutment for a 5 unit fixed partial denture with a pier abutment.[9]Russell studied the stress transfer patterns with variable implant support and simulated natural teeth through rigid and non-rigid connection under simulated functional loads. They concluded that rigid connector in particular situations caused only slightly higher stresses in the supporting structure and demonstrated more widespread stress transfer. [10]

The location of the non-rigid connector in this case was within the pontic at the distal aspect of the second premolar. The contour changes as a result of the bulk of semi precision attachment were therefore avoided. Moreover the semi precision attachment was designed to allow the vertical movement of the fixed movable prosthesis, thereby making the fixed partial denture design in two segments and providing a mechanism of stress direction away from the pier abutment.

## CONCLUSION

The fixed movable prosthesis provides clinician an excellent option of converting a removable prosthetic option to a fixed option thereby meeting the expectations of the patient. The technique described to fabricate a clear acrylic self-cure index after the mock up preparation and the diagnostic wax pattern fabrication is innovative and has many benefits both clinically as well as in the laboratory.

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