

Case Report

Spring cantilever fixed partial denture

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ABSTRACT:

Replacing a missing maxillary lateral incisor with a fixed partial denture that requires preparing of a healthy central incisor and a canine is a tough decision that many prosthodontists fear. Spring cantilever designs offer a viable solution to rehabilitate such situations provided occlusal conditions are favorable. A male patient working as a police officer reported for replacing a missing lateral incisor and demanded to incorporate a previously present diastema within the prosthesis. Extra and intra oral examination were non-contributory. Occlusal scheme was favorable. A spring cantilever design using maxillary canine as an abutment was designed to retain a missing maxillary lateral incisor using a blend between a loop connector and a spring cantilever design for the connector. The partial denture was cemented and provided highly pleasing results to the patient.

Keywords: cantilever, fixed partial denture, metal, ceramic, canine protected occlusion.

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INTRODUCTION

The term ceramo - metal (metal ceramic) has been synonymous to the field of fixed partial denture prosthodontics since its inception in the respective field in the year 1970.¹ One of the difficult decisions to make in fixed partial denture rehabilitation is to replace a missing lateral incisor at the expense of preparing a central incisor and a canine. Definitely, no one will agree that the preservation of oral structure is achieved by such treatment options. Another frequently encountered clinical situation is the occurrence of a diastema and its replication within a fixed partial denture. Diastema is a space or a gap between two natural teeth.² In lower animals, the presence of space is compulsory for normal masticatory function. However, for humans, a diastema is considered by many to affect the appearance of the individual while there are rare individuals who demand diastema to be incorporated in their artificial prosthesis. For a single missing tooth an implant supported crown is the most conservative option but for those who cannot afford or undergo implant treatment, conventional removable partial denture or fixed partial denture (FPD) is always a treatment option.

When FPD is planned, the spring FPD, which is essentially a type of a cantilever FPD is used especially to replace maxillary lateral incisors using the canine as a single abutment.^{3,4} The term cantilever implements a pontic that is supported at one end by one or many teeth.⁵ Such designs are usually avoided by most clinicians for its unilateral support unless support is not required at the other end.⁶ The cantilever design is also known by different names like direct extension bridge, free end, swing on or throw off the bridge.⁷ The spring cantilever FPD is a tissue supported FPD that is retained by the abutment tooth. The principle advantage of spring FPD is that the forces of mastication that act on the pontic are absorbed by underlying palatal mucoperiosteum and hence are dissipated before they reach the abutment tooth. This article describes a case of a restoration of a Kennedy class 3 partial edentulous situation involving missing maxillary left lateral incisor with a spring cantilever FPD. An insight of why patients demand to have such natural features to be incorporated with their prosthesis has also been discussed.

CASE REPORT

A male patient aged 48 years, and a police personnel by profession reported to the post graduate clinic of the department of prosthodontics for replacement of maxillary front tooth which he had removed about 5 months back. Medical, social, drug and dental history were non-contributory to the diagnosis and treatment plan. While the edentulous space seemed relatively large, a question pertaining to the occurrence of a diastema previously was enquired at this stage. The patient reported that between the lateral and central he had a unilateral diastema about 2 mm present and that he wished his prosthesis to look like the same. Extra oral examination did not disclose any negative findings. Intraoral examination of the patient disclosed missing left maxillary lateral incisor while occlusal examination disclosed a canine protected occlusion (**Fig 1A**). Generalized attrition of posterior cusps was another feature that was enquired about and was related to the patients' stress, which was in turn related to his profession. Radiographic examination did not disclose any negative findings. Occlusal examination revealed that during protrusion there was minimal contact with anteriors and the contact was in the region of maxillary central incisors. Diagnosis and treatment planning was completed after diagnostic impression making, using irreversible hydrocolloid (CA 37; Cavex, Haarlem, Holland) and articulating the diagnostic casts on a semi adjustable articulator (Articulator #3140; Whip Mix Corp) that was programmed according to the patients interocclusal records. Treatment options presented to the patient included single implant supported prosthesis, conventional metal, ceramic three unit fixed partial denture using maxillary central incisor and canine as abutment, two unit spring FPD or a cast partial denture.



Figure 1: (A) Intra oral view showing partial edentulous space (B) Temporary bridge after tooth preparation (C) Metal trial (D) Porcelain metal trial (E) Definitive cementation (F) Follow up

Since patient insisted on incorporating diastema within the FPD, the spring FPD was the treatment of choice. Planning for spring FPD was done after both static and dynamic occlusal examinations. Once the canine was prepared for a porcelain fused to metal retainer, a temporary resin bridge (Fortex; Lucite Intl, Durham) was placed (**Fig 1B**) following which metal trial (**Fig 1C**), porcelain trial (**Fig 1D**) was done. The spring FPD was finally cemented with zinc phosphate cement (**Fig 1E**) and the patient was given instructions regarding use and maintenance. The patient was followed up regularly and was happy with the outcome of the results (**Fig 1F**).

DISCUSSION

A case of prosthetic rehabilitation of missing maxillary left lateral incisor in an elderly male patient with a fixed partial denture design has been described in this report. The feature of the case being the incorporation of the diastema within the FPD and using a modified design for the connector. Age and occupation are defining factors to explain the patient's insistence on having the space present within his new FPD. A younger patient might not have opted for preserving diastema but an older person who is used to be seen by people for a long period of time depending on his age had a reason to maintain the diastema in FPD. The patient's occupation and profession of a police officer is bound to expose an individual to a wide array of population who remember him to have some unique feature in his dentition as an identification mark. Diastema is unique in any dentition especially if it is unilateral and is present anteriorly especially in the maxillary arch. Sudden and abrupt differences in individuals dentition are easily identifiable and attract the attention of the viewer. Although the existence of diastema may have not been noted by many, but the absence of diastema can be noted by viewers and then they tend to memorize his previous picture. Another important relevance of the patients' profession is the stress that is associated with it. The patient's natural posterior teeth had evidence of generalized wear facets indicating existence of parafunctional habits. Existing habits were verified by a patient as he reported that his wife has often noticed his night grinding of teeth. There are reports of stressors associated with police personnel and relates to many reasons.⁸

The design considerations of the spring FPD were based on recommendations given in the literature.^{9,10} The design of the connector is important in such FPD. The connector we used was a long, thin resilient bar that was closely adapted to the palate. This allowed the connector to be tissue supported.⁷ The connector should be thick enough so that it does not deform.⁵ The design at the end of the loop increases the rigidity of the connector. A critical problem that arose in this case was the uneven incisal plane of the

maxillary incisors. This prevented the ideal location of the incisal edge of the pontic in our case. Occlusal plane is an essential component in term of occlusal rehabilitation.¹¹ another alternative treatment for such cases is the use of a resin bonded cantilever fixed partial denture.¹² While the success of these restorations have been claimed by few,^{13,14} it is imperative that such cases are done in selected cases where occlusion permits. In our case, the eccentric contacts of the anterior teeth did not allow such design.

Another important observation in this case was the marginal discrepancy of the crown on the palatal aspect of the retainer. Because of the extra thickness of the palatal connector, the contraction of alloy during cooling tends to shorten the margins of the retainer. Therefore, such designs should be preferably done with noble alloys rather than base metal alloys. Noble alloys allow burnishing of the margins and thus improve the marginal adaptation of the prosthesis.¹⁵

CONCLUSION

The patients' desires are at times meaningful and add new dimensions to the choice of treatment. Use of a spring cantilever is an excellent treatment option that should be used more in dental practice.

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