"Spring cantilever fixed partial denture design to replace missing lateral incisor"

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ABSTRACT
Maxillary lateral incisor is naturally placed in an occlusal position that allows it to avoid protrusive contacts when anterior guidance functions to direct mandibular movements in protrusion and lateral excursion. This makes a missing lateral incisor an ideal candidate to receive a cantilever bridge. The choice of retainer in such case depends on the functional contacts between other anterior teeth during horizontal mandibular movements.We present a case of a young male patient whose impaired facial aesthetics due to missing lateral incisor motivated him to seek its replacement. The partial edentulous space being larger in mesiodistal dimensions demanded use of an implant supported single crown or a modified fixed partial denture that could incorporate diastema. A unique design of spring cantilever was devised to fulfill the treatment objectives. The patient was satisfied with the outcome of the treatment.

Keywords — *dental bridge, metal, ceramic, connector, pontic, diastema*

INTRODUCTION

A single missing tooth in the maxillary anterior region can be an embarrassment to an individual, especially if his routine involves social contacting with frequently new persons. Facial expressions during human communication can also be affected due to such tooth loss. At times, one's own actions during speech may look insulting to others while this may not be the case. The natural teeth are usually lost due to dental decay or periodontal problems. Accidental loss of a natural anterior tooth has a definite psychological impact on one's self image. Immediate replacement of teeth is advised when an individual faces such situation. Trauma to an anterior tooth can result in tooth loss either directly or indirectly. Trauma that results in fracture of the tooth is an ideal indication for an implant supported prosthesis.[1] In such cases, either immediate implant can be placed within the extraction socket or an implant can be placed after healing of extraction wound.[2] In either case, a patient has to wear a partial denture temporarily for restoring function.[3] Many practitioners, however, do not practice implant dentistry and at the same time they also do not like to refer the patients for such treatment to other practitioners. Such situations which patients are unaware of can unnecessary lead them to undergo the state of partial edentulousness and in turn suffering psychosocially. [4] At times the dental practitioner may prefer a treatment option that is immediately needed by the patient at that time which at most of the times is true. The replacement of a missing maxillary lateral incisor in a natural dentition may sound to be the least difficult case in terms of rehabilitation.[5] However, it is actually one of the most difficult tooth in terms of designing treatment options, since it allows a wide range of treatment options provided those options are carefully evaluated.[6] One such unconventional treatment option that a missing lateral incisor can be successfully rehabilitated with is the use of a cantilever fixed partial denture (FPD).
This article in the form of case report presents a case of a maxillary anterior tooth loss (vertical fracture) which was successfully restored with a spring cantilever FPD using a loop connector.

CASE REPORT

A young male patient in his early thirties reported to the post graduate section of the department of prosthodontics with a chief complaint of impaired facial looks due to missing front tooth. Patients medical and social history did not reveal any negative clinical findings that would impact dental treatment. Dental history revealed patient had lost his maxillary left lateral incisor after receiving trauma to the tooth. The doctor had advised to extract the tooth since the fractured segment was within the bone. Extra oral features were within the normal range. Intra oral picture was that of a kennedy class 3 partial edentulous situation with maxillary left central incisor and left canine serving as the primary abutment **(Fig 1 a)**. Diagnostic cast analysis revealed a wider inter abutment space (8mm), mutually protected occlusion with canines protecting both anterior and posterior during lateral movements. After thorough radiographic and mounted cast investigations, various treatment options presented to the patient were an implant supported single crown as first choice, a conservative conventional cantilever FPD, a three unit FPD or an interim partial denture. The patient consented to a conservative option of a cantilever retained FPD. The prosthesis fabrication

was done using routine clinical and laboratory procedures like tooth preparation of maxillary left canine, followed by gingival retraction (GingiTrac,USA) **(Fig 1 b)**, temporization (Unifast III, GC Europe) **(Fig 1 c)**. During the provisional fabrication, the lateral incisor width was verified to not fulfilling the esthetic norms in terms of golden proportion **(Fig 1 d)** thus resulting in early modification of the FPD design. Diastema was incorporated in the wax up design using a loop connector rather than a conventional connector **(Fig 1 d)** following which it was cast into the base metal alloy (Wiron 99; Bego, Bremen, Germany).

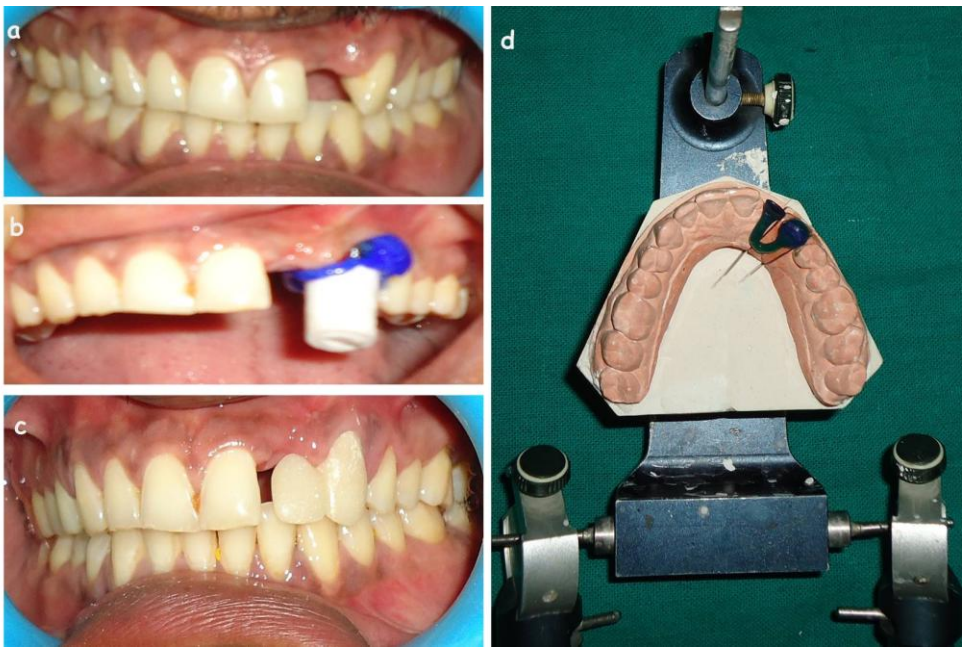

Figure 1: (a) Missing maxillary left lateral incisor (b) Gingival retraction using Gingifoam (c) Verifying the need of a loop connector to incorporate diastema during provisional trials (d) Wax pattern of the final prosthesis

Figure 1: (a) and (b) Metal trial occlusal and labial view (c) Porcelain trial (d) cemented definitive prosthesis (e) Extra oral view

A metal trial was done on a clinical appointment during which some metal on either side was removed **(Fig 2 a, b)**. Porcelain shade was selected using 3D Master (Vita Zahnfabrik, Badsackingen, Germany) shade guide and fused to the metal framework followed by a porcelain trial **(Fig 2 c)**. At this stage, occlusal analysis was done in order to provide a clearance of at least 0.5 to 1 mm between the lateral incisor and opposing teeth in centric and eccentric movements. After required glazing of the porcelain the two units cantilever utilizing a loop connector was cemented on canine **(Fig 2 d)** with glass ionomer cement (Ketac-Cem; 3M ESPE, St. Paul, Minn). Lateral incisor was freed from any centric and protrusive contacts. The patient was put on a follow up and during his subsequent visits he exclaimed to be satisfied with the esthetic outcome of the treatment **(Fig 2 e).**

DISCUSSION

A clinical case of a young adult male patient who had lost his maxillary lateral incisor due to trauma was successfully restored with a spring cantilever two units FPD. The unique feature of this case is that despite the indication, the adjacent central incisor was not involved in the design of the FPD. The main reason being that lateral incisors has minimum participation in bearing occlusal forces either in centric or in eccentric movements. Involvement of maxillary central incisor would have been a non conservative approach and involving one central incisor and leaving other without involving could have resulted in problems of shade matching. As the patient in this case is young, the porcelain restorations do not discolor with time, however, the same is not the case with natural teeth. They undergo surface discoloration and change color with time. Therefore maxillary central incisor was spared from such anticipated aesthetic failure in the future. Three different principles of bridge designing happen to be involved in the presented case which is another unique feature of the report. The three principles are that of a cantilever, spring bridge and a loop connector. The final prosthesis is essentially an outcome of all these three which makes it different to other designs mentioned in the literature.[7,8]

In a similar partial edentulous clinical situation there are other valid treatment options also like a resin bonded FPD or Maryland bridge. [9] Being a conservative procedure, the resin bonded FPD are also an ideal choice when single missing teeth are to be replaced especially those whose participation in occlusion is minimized. However, the age of the patient and the effect of the resin bonded retainer on the esthetics of natural central incisor need to be looked with certainty before opting for such procedures. The spring cantilever FPD using a loop connector can be fabricated by casting it from a sprue wax that is circular in cross section. [10,11]

CONCLUSION

Designing a fixed partial denture involves innumerable designs and planning of such cases should be done after exhausting all treatment options. Occlusion is the single most important factor that determines the choice of such treatment options.

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