

# An Imminent Approach in Esthetic Enhancement Through Loop Connectors

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**Abstract:** Missing tooth with diastema presents a great esthetic challenge for the prosthodontists to restore the edentulous space. The use of a conventional fixed partial denture (FPD) to replace the missing tooth may result in too wide anterior teeth leading to poor esthetics. This is because of the excess space available for pontic, which makes the incorporation of the diastema in the planned prosthesis, a compulsion. In such cases the diastema resulting from the missing central incisors can be managed with implant-supported prosthesis or FPD with loop connectors. This clinical report discussed a method for fabrication of a modified FPD with loop connectors to restore the wide span created by missing central incisors.

**Keywords:** Loop, Diastema, Connector, Edentulous Space, Fixed Partial Denture, Spacing

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## 1. Introduction

Life is not simply being alive, but being well and healthy also. In elderly, dental health forms an essential part of overall health and oral rehabilitation entails the performance of all the procedures necessary to produce healthy, esthetic, well functioning and self-maintaining masticatory mechanism.

In treating a case of missing tooth along with diastema in the esthetic region, we have limited treatment options to restore the edentulous space. [1] Loss of an anterior tooth with existing diastema may result in the excess space available for pontic. In such a case the treatment options available for replacement are removable partial denture, or conventional fixed dental prosthesis or implant supported prosthesis. [2] If movable prosthesis is used it may or not be pleasing to the patient since it is removable and also the long procedure required in its fabrication may not be favored by the patient. Closing anterior diastema with conventional fixed dental prosthesis (FDP) without considering golden

proportion would fail to create an esthetically pleasing appearance and has detrimental effects on the periodontium/attachment apparatus. A conventional fixed partial denture (FPD) is used to replace the missing teeth. This may result into wide anterior teeth, an over-contoured emergence profile, which in turn causes poor esthetics. Implant-supported prostheses may be used in the oral rehabilitation of partially edentulous patients but may be expensive and time consuming for patients with requirements of many favorable local and medical factors for successful treatment options. [3, 4] So, the final outcome should be considered thoroughly before it is decided to close the diastema with the prosthesis. Maximum esthetic results may be obtained if the natural anatomic forms of teeth are protected and the diastema are maintained with minimal over-contouring of the adjacent teeth. This clinical report describes a technique to fabricate a three unit FPD with a modified palatal loop connector to provide maximum esthetic and functional correction for a patient with diastema between

lateral and central incisor and missing central incisors.

Although rarely used, loop connectors are the simplest and best solution to address this problem of excessive mesio-distal width pontic space and provide optimum restoration of esthetics. Connectors are the components of the fixed partial denture that joins the individual components (retainers or pontics or both together). Connectors are of two types, rigid connectors and non-rigid connectors. Loop connectors are non-rigid connectors that permit limited movements between otherwise independent members of the fixed partial denture prosthesis. It consists of a loop on the palatal/lingual aspect of the prostheses that connects adjacent retainer or pontics.

*Indications for loop connector [5]*

- a. When the patient wishes to maintain the diastema,
- b. Presence of excessive pontic space
- c. Multiple joined prosthetic restorations in clinical situations with presence of localised or generalised spacing between abutments.
- d. Prosthetic restorations for pathologically migrated and periodontally weak teeth.

*Contraindication*

- a. Patients having manual dexterity to maintain proper oral hygiene.
- b. Leads to food accumulation.
- c. Difficulty in maintaining hygiene especially in patients with limited manual dexterity.
- d. Interference in tongue movements and phonetics.
- e. Relative flexibility as compared to conventional connectors.

*Loop connectors are preferred less in mandible because of few other limitations:*

1. Continuous irritation to tongue as it lies against the incisors at rest.
2. Lingual frenum attachment further limits connector placement and extension.

*Advantages of Loop Connector*

1. Loop connectors enhance the natural appearance of the restoration,
2. Maintain the diastema,
3. Maintain the proper emergence profile and
4. Preserve the remaining tooth structure of abutment teeth.

*Disadvantages of Loop Connector*

1. Additional laboratory procedures,
2. Difficult to maintain oral hygiene,
3. Interference in tongue movement and discomfort in speech.

## 2. Case Report

A 38 year old male patient reported to the Department of Prosthodontics, with a missing left mandibular lateral incisor and canine. Clinical examination revealed that the anterior edentulous space was large, with spacing between the existing mandibular central incisor and lateral incisor (Figure 1-2). There was a generalized spacing between the maxillary anteriors. Both, maxillary and mandibular anteriors were

proclined with an almost 0.5 mm overjet and overbite. From his past dental history it was confirmed that he was having spacing between his missing lower anteriors. There were only two treatment options left: 1) a conventional fixed dental prosthesis with over-contoured teeth to compensate for the diastema and 2) a loop connector fixed dental prosthesis maintaining the space similar to the existing contralateral side. A 29-year-old male patient reported to the Clinic with a chief complaint of missing right maxillary central incisor. Patient had a chief complaint of loosened existing removable prosthesis and wanted a fixed replacement. Patient was wearing removable prosthesis since 5 years after loss of teeth. On examination, the left maxillary central incisor and right maxillary lateral incisor were vital with good periodontal support. The edentulous area was wide mesiodistally and there was spacing between existing anterior teeth (Figures 1-2).



*Figure 1. Preoperative picture showing missing teeth.*



*Figure 2. Preoperative frontal view.*

Conversation with the patient affirmed that he was highly conscious about his esthetics and speech. The treatment options include a removable partial denture for which the patient was not compliant. An ideal conventional fixed dental prosthesis could not have been planned without orthodontic correction of the large edentulous space. Replacement of missing teeth with two single tooth implants was a viable option as it would allow a restoration maintaining the diastema. But due to long term edentulousness, residual ridge was knife edged and implant placement was not possible without any advanced surgery. The patient was neither willing for orthodontic treatment and nor advanced surgery for implant placement. There were only two treatment options left:

- 1) Conventional fixed dental prosthesis with over-contoured teeth to compensate for the diastema and

2) Loop connector fixed dental prosthesis maintaining the space similar to the existing contralateral side

Considering the patient's economic status and esthetic requirement of maintaining space between the maxillary anterior teeth, the treatment option of three unit porcelain fused to metal fixed partial denture with intermittent loop connector was planned.

#### *Clinical Procedure*

The proposed treatment plan was discussed with the patient and after taking his consent, the clinical procedures were initiated. The abutment tooth preparation to receive porcelain fused to metal prosthesis was carried out on right maxillary lateral incisor and left maxillary central incisor with equi-gingival margins (Figure 3). The gingival retraction was carried out with gingival retraction cord, and final impressions were made using elastomeric impression material with two stage double mix technique. An inter-occlusal record was made using bite registration material (Ramitec). The impression was poured in Type IV dental stone Master cast was retrieved and die cutting was done. Master cast was mounted on a semi-adjustable articulator using inter-occlusal record. Wax patterns were fabricated using blue inlay wax. Provisional restorations were fabricated with a tooth colored auto polymerizing acrylic resin and cemented with non-eugenol temporary cement. Wax spacer was adapted on the palatal region so that adequate space will be given in the area of loop connectors for the maintenance of oral hygiene (Figure 4). The wax patterns were invested with phosphate-bonded investment material (Bellasan, Bego) and cast in base metal alloy (Figure 5). After confirming the metal try in, the ceramic build-up was done.



**Figure 3.** Tooth preparation in respect to 12 and 21.



**Figure 4.** Wax pattern fabricated with palatal loop connectors.



**Figure 5.** Metal coping trial.



**Figure 6.** The final prosthesis.



**Figure 7.** Post-operative view.

Trial was done and Loop connectors were finally fabricated and polished to meet the esthetic demand. (Figure 6). Final fixed dental prosthesis with loop connectors were luted using glass ionomer cement (Figures 7). The patient was instructed to maintain proper oral hygiene. Use of dental floss and interdental brush were recommended. The patient was evaluated after 1 week to assess the oral hygiene status.

### **3. Discussion**

Connectors are the part of fixed partial denture that connect the retainers with the pontic henceforth constitute an important part of FPD. [6-8] They may be either rigid or non-rigid. Conventional fixed partial denture connectors are more rigid as compared to loop connectors

This flexibility of loop connectors can relatively be overcome by using shorter lengths and increasing the diameter of the loop, and if possible, still keeping their form as round as possible.

The modified FPD with loop connectors enhance the natural appearance of the restoration, maintain the diastemas and the proper emergence profile, and preserve the remaining tooth structure of abutment teeth. [9] However, this type of prosthesis requires additional laboratory procedures. The prosthesis design may cause difficulty in maintenance and may affect in phonetics especially linguopalatal sounds. However, keeping the connectors round and small in size will not affect the phonetics. [10]

Meticulous designing of the prosthesis is important to ensure that plaque control is not impeded. In addition, it should not interfere with the tongue movements and phonetics. Tongue and its attachments are of major concern when such prosthesis is planned for mandibular partially edentulous arch, otherwise will lead to constant irritation. If proper oral hygiene measures are taken by patient then the evidence of food accumulation and gingival inflammation around the loop connectors is very less. In addition if loop connectors are not made overtly thick and have an intimate contact with underlying mucosa, interference in tongue movements and discomfort in speech was a minor problem and is overcome within no time. Hence, the advantages of the ability to maintain the diastema, maintaining the ideal mesio-distal dimensions of the abutments as well as the pontic results in the esthetic rehabilitation of the patient and as far as the discomfort is concerned regarding the palatal loops, the size of the loops can be adjusted suiting the patient needs. [11] In perspective of performing various surgical procedures like osteotomy and osteoplasty, surgeons face a variety of issues while working with conventional tools including rotating/oscillating saws, drills, hammers and chisels such as maintaining a clear surgical site, multidirectional movement and generating minimal heat. While some instruments and treatment modalities are time efficient and are speculated to be better. Consequently, these procedures often rely heavily on a surgeon's competence and aptitude to apply conventional tool. [12]

#### 4. Conclusion

Treatment planning is very essential to success when going for any form of tooth replacement. The treatment procedure selected finally should suit the desires of the patient. Although they are rarely used, loop connectors are

sometimes required when an existing diastema is to be maintained in a planned fixed prosthesis, as in the above case. If the patient can get adapted to a projecting connector, loop connector FPD offers a simple and excellent solution to a prosthodontic dilemma involving an anterior edentulous space, albeit with the maintenance of the diastemas. Palatal loop connectors enables a simple and easy way to fabricate a life-like prosthesis for the patient. The esthetic advantage of such prosthesis certainly outweighs the presence of the palatal metallic loops in the patient's mouth.

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