CASE REPORT

Loop Connectors: Aesthetic Solution to Spaced Mandibular Anteriors—Case Report

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Abstract

Spacing present in the anterior region before the loss of the teeth results in an excessive pontic space mesio-distally. This is a challenging clinical situation for the prosthodontist and leaves one in a dilemma of whether the space should be closed or maintained in the restoration to simulate natural tooth appearance. If an implant-supported prosthesis is not possible or not selected as a treatment option, loop connector fixed partial denture is however the only option for maintaining space(s) via tooth supported fixed dental prosthesis (FDP) and provide optimum restoration of esthetics. Loop connectors are usually avoided in mandibular anterior edentulous area due to anatomic limitations like tongue interference, lingual frenum etc.

This article describes the procedure for the fabrication of a loop connector fixed partial denture to restore an excessively wide anterior edentulous space in a patient with existing spacing between mandibular anterior teeth.


Key words: Spacing, mandibular anteriors, edentulous space, loop connector.

Introduction

Life is not merely being alive, but being well and healthy also. In aged, dental health forms an integral 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.¹

Replacement of missing anterior teeth is a complex, challenging procedure for prosthodontists in order to achieve ideal esthetic results meeting the exacting demands of the patients. The clinical situation is further worsened with a previous existing diastema or drifting of teeth into the edentulous space.² Spacing between teeth or diastema is a common esthetic...
problem and it negatively interferes with harmony of the smile. It is frequent to encounter a clinical situation with excessive pontic space or presence of localized/generalized spacing between the teeth in need of prosthetic restorations. When pre-prosthetic orthodontic space correction (closure/reduction) is not selected, then depending upon the span of spacing and patient wishes, diastema can be maintained or closed in the restoration.  

Patients with missing teeth along with diastema have limited treatment options to restore the edentulous space. The diastema can be managed with implant-supported prostheses, conventional FPD or FPD with loop connectors. The use of a conventional fixed dental prosthesis (FDP) to replace the missing tooth may result in too wide anterior teeth, an over-contoured emergence profile, which in turn results in poor esthetics. Closing 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. 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 the teeth are protected and the diastema are maintained with minimal over-contouring of the adjacent teeth. 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 option. 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:**
- Presence of excessive mesio-distal pontic space due to pre-existing spacing or diastema.
- Patient willing to incorporate the diastema present prior to loss of teeth.
- Splinting of periodontally compromised and pathologically migrated teeth to distribute the occlusal load.
- Clinical situation where the prognosis of primary abutment is uncertain and patient desires to retain it. The immediate adjacent tooth is skipped.

**Limitations:**
- Leads to food accumulation.
- Difficulty in maintaining hygiene especially in patients with limited manual dexterity.
- Interference in tongue movements and phonetics.
- Relative flexibility as compared to conventional connectors.

Loop connectors are preferred less in mandible because of few other limitations:
- Continuous irritation to tongue as it lies against the incisors at rest.
- Lingual frenum attachment further limits connector placement and extension.

This clinical report describes a technique to fabricate a 04 unit FPD with a modified lingual loop connector to provide maximum esthetic correction for a patient with diastema/spacing between missing mandibular central and lateral incisors.
Case Report

A 38 year-old male patient reported to the Department of Prosthodontics, with a missing left mandibular lateral incisor and canine. 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.

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. Conversation with the patient affirmed that he was highly conscious about his esthetics and speech.

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) 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.

Procedure

After obtaining diagnostic radiographs, maxillary and mandibular alginate impression were made for a mock-up of the final restorations. Intra-orally with a periodontal probe sulcus depth was measured just lateral to the lingual frenum for evaluating the extent of the loop connector. To avoid any interference in tongue movement and irritation to lingual frenum sulcus depth was measured while the frenum being in activated state (Figure 3). Two diagnostic wax-ups were then made. In the first mock-up no diastema was kept between the adjacent teeth. In the second mock-up a fixed partial denture was designed with a loop connector to make the replacement esthetic and in accordance with the overall appearance and alignment of his other teeth. Both the mock wax-up were shown to the patient. The patient approved the second wax up that was designed with a loop connector.

Tooth preparation was done in relation to the left central incisor and first premolar, in conventional manner with slight sub-gingival finish line. One retainer was used on either side considering the reduced occlusal stresses due to 0.5 mm overjet, overbite and group function occlusion.

Retraction procedures were carried out and impression was made using a custom tray. Final impression was made with two stage double
mix putty light body rubber base impression material (Aquasil, Dentsply) (Figure 4) and poured in Type IV dental stone (Kalrock, Kalabhai). All borders were functionally molded. Master casts were retrieved and were mounted on semi-adjustable articulator using a face-bow transfer and interocclusal record. The provisional FPD was fabricated and cemented using non-eugenol cement. Wax patterns of the FPD with loop connector were fabricated indirectly on the cast by using blue inlay wax. Only one loop connector was given between the central and lateral incisors in order to exactly replicate the contra-lateral side i.e space between the central and lateral incisors. To ensure optimum rigidity of the connector length was decreased and half round form of cross section was given. The dimension of the connector was 2 mm with a relief provided by 0.5mm relief wax to ease in maintaining oral hygiene and avoid any marginal gingiva inflammation (Figure 5-6).

The patterns were invested with a phosphate bonded investment (Bellwest, BEGO) and cast in a base metal alloy (Wiron 99, BEGO). After confirming the metal trial (Figure 7-8), the porcelain (Vita, Germany) was fired. Try in was done and prosthesis was evaluated for adaptation and esthetics.

The occlusion was adjusted where necessary after evaluation. After glazing and polishing, the intaglio surfaces of the retainers was sandblasted and the restoration was cemented with Glass ionomer cement (GIC) Type I luting cement (Figure 9-11). The patient was instructed to maintain proper oral hygiene. Use of dental floss and interdental brush were recommended. The patient was advised for regular follow-ups.

Discussion

The presence of the missing anteriors with wide span is a difficult esthetic problem to resolve and a challenge for a prosthodontist. If an implant supported prosthesis is not selected or possible as a treatment modality, then the only
viable option available to maintain spaces in FPDs is with the aid of loop connectors, which is both esthetically and mechanically challenging.\(^3,4\) The modified FPD with loop connectors enhance the natural appearance of the restoration, maintain the spacing and the proper emergence profile, and preserve the remaining tooth structure of abutment teeth.\(^4\) Loop connectors are used not only to manage excessive (single/multiple) pontic space(s), but also to splint pathologically migrated teeth effectively.\(^3\) Loop connector is a non-rigid connector and consists of a loop on the lingual aspect of the prosthesis that connects adjacent retainers and/or pontic.\(^9\) The loop may be cast from sprue wax that is circular/half round in cross section or shaped from platinum gold-palladium (Pt-Au-Pd) alloy wire. The choice is entirely up to the dentist or the dental laboratory.\(^6\) Individually designed connectors by varying the circumferential form, diameter, and length of the loops provide variability to the treatment plan to meet the requirements of each clinical situation.\(^3\)

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.\(^4\) Tongue and its attachments are of major concern when such prosthesis is planned for mandibular partially edentulous arch, otherwise will lead to constant irritation. Bhandari S et al in a study found that 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 they found that 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.\(^3\)

Conventional FDP connectors are understandably 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.\(^3\)

Conclusion

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.

References

Modi et al.