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Case Report

Multiple loop connectors - an aesthetic alternative solution for missing anteriors

Anoopa Paulose[1*], Jimmy George[1], Jinsa P Devassy[1], Lithiya Susan John[1], Abraham Kunnilathu[2]

[1]Department of Prosthodontics, Mar Baselios Dental College, Kothamangalam, Kerala, India.
[2]Department of Public Health, Western University, Ontario, Canada.

[*]**Correspondence**
Anoopa Paulose
dranoopa@gmail.com

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Background: Spacing in the midline of the natural dentition has long been a focus for Prosthodontists. The challenge often proves difficult, with the common approach being to incorporate the gap into the treatment plan, rather than attempting to eliminate it entirely. This is due to the fact that closing a midline diastema with a fixed prosthesis frequently leads to aesthetic compromises.

Case Presentation: In this article, 2 cases with excessive space in the anterior region are discussed. The prosthetic rehabilitation was done by using a modified FPD with loop connectors instead of a conventional FPD design. Using this method to restore patients' natural smiles helped boost confidence and patient satisfaction.

Conclusion: Replacing a single anterior tooth is a complex and demanding procedure that can be successfully achieved using implant-supported restorations, conventional porcelain-fused-to-metal crowns, or resin-bonded fixed partial dentures. A range of aesthetic treatment options should be carefully considered when planning the best approach for such patients.

Keywords: *loop connectors, midline diastema, modified fixed partial denture, spacing*

Introduction

Midline diastema refers to a space between natural teeth at the midline, which can occur in the maxilla, mandible, or both. When the gap is small, it may enhance the aesthetic appearance of the face, but when the space is larger, patients often seek treatment to close it. This spacing typically results from a mismatch between the size of the bony arch and the mesiodistal dimensions of the teeth (Srinivasan et al., 2020). It can be generalized or localized and is generally considered a form of malocclusion. For Prosthodontists, the decision to eliminate the space versus preserving a natural look is challenging (Plengsombut et al., 2009; Pradhan & Goel, 2023). In most cases, the space is left intact, as closing it would require increasing the mesiodistal width of adjacent restorations. While various treatment options have been explored, the use of a loop connector in these cases remains essential, as it provides the most favorable outcomes.

Case presentation

CASE 1:

A 19-year-old male patient reported to the Department of Prosthodontics with the primary concern of a missing right maxillary central incisor and the need for crowns on the right lateral incisors following root canal treatment (Figure 1). His main focus was on achieving an aesthetic replacement while maintaining the midline diastema. Examination

revealed that the edentulous space was larger than the approximate size of the adjacent central incisor. No other relevant medical history reported.

Figure 1. Case 1. Pre-treatment

Procedure:

After obtaining diagnostic radiographs, maxillary and mandibular alginate impressions were taken to create a mock-up of the final restorations. In this mock-up, a fixed partial denture with a loop connector was designed to ensure an aesthetic result that aligned with the patient's natural teeth and overall appearance. Other treatment options were also discussed with the patient, who ultimately approved the wax-up incorporating the loop connector. The maxillary left central incisor and right lateral incisors were prepared in the conventional manner, and impressions were made to design the loop connector. To enhance support and retention, two retainers were placed to reduce stress on a single abutment. These retainers were connected by a minor connector extending onto the rugae area, with a 2mm dimension and relief provided by 0.2mm relief wax. After the wax pattern was completed, the casting process was carried out, and a coping trial was performed in the mouth (Figure 2). Once the fit of the casting was verified, ceramic build-up was completed, and the bridge was cemented in place (Figure 3).

Figure 2. Coping trial performed

Figure 3. Case 1. Post-treatment

CASE 2:

A 38-year-old male patient reported to the Department of Prosthodontics with the primary concern of missing right maxillary central and lateral incisors. Examination revealed that the edentulous span was larger than the size of the adjacent central incisor, with a noticeable amount of spacing between the remaining teeth, indicating generalized spacing. No other relevant systemic problems reported.

Procedure:

The following clinical and laboratory procedures were performed for the patient’s oral rehabilitation. Tooth preparation for porcelain-fused-to-metal (PFM) restorations was completed on teeth 13, 21, and 22, with subgingival shoulder finish lines to enhance aesthetics. A final impression was taken using a two-stage putty-wash technique with rubber base impression material and poured into type IV dental stone. After retrieving the master cast, die cutting was performed.

A provisional restoration was fabricated and tried in, serving as a mock-up for the final restoration. The patient's feedback on aesthetics was gathered and incorporated into the design. A second set of provisional restorations was then prepared and cemented using non-eugenol cement. Next, a wax pattern was created using blue inlay wax, with adjustments made for optimal occlusal contacts and contours. Care was taken to minimize the bulk of the loop connector to avoid discomfort for the patient. The wax patterns were invested in phosphate-bonded investment material and cast in a ceramometal base metal alloy. After verifying the metal try-in, porcelain was applied, and the pontics were contoured with a fine-grained bur, ensuring proper spacing and evaluating aesthetics and residual ridge adaptation. The occlusion was checked and adjusted as needed. After glazing and polishing, the restoration was tried in, any interferences were removed, and the final restoration was cemented with luting cement (Figure 4). The patient was instructed on maintaining proper oral hygiene, with recommendations to use dental floss and interdental brushes. A follow-up appointment was scheduled one week later to assess oral hygiene and overall progress.

Figure 4. Case 2. Post-treatment

Discussion

An extensive anterior diastema presents a significant aesthetic challenge, as achieving optimal aesthetic results while preserving the natural anatomical forms of the teeth and avoiding excessive over-contouring of adjacent teeth can be difficult. Treatment options for patients with a missing single anterior tooth include implants, removable partial dentures, and conventional fixed partial dentures (FPD) (Al-Quran et al., 2011); (Pradhan & Goel, 2023). In loop connector FPDs, the loop can be fabricated by casting it from sprue wax, which is circular in cross-section (Kamalakanth & Arbaz, 2008); (Sharma et al., 2012). An alternative approach, the spring cantilever FPD, uses a palatal connector that runs over the palatal soft tissue as a thin, resilient bar. This design is often considered when the posterior teeth are healthy and serves as abutments for replacing a maxillary anterior tooth with a diastema. (Boujoual et al., 2024). However, spring cantilever connectors have certain drawbacks, such as the potential for deformation or coronal displacement of the pontic, as well as possible interference with speech and patient discomfort (Mishra et al., 2016); (Taggart, 1990). For this reason, the loop connector FPD is often preferred over the spring cantilever design. Meticulous design of the prosthesis is crucial to ensure proper plaque control and avoid interference with tongue movement or phonetics (Kalra et al., 2013). Photoelastic studies have shown that the highest stress concentration in the connector occurs at the gingival region, with the lowest stress at the center of the connector (Kou et al., 2007), (Oh et al., 2002). The geometry of the connector also influences the strength of ceramic materials, and smoother, more rounded connectors help reduce stress levels (Fischer et al., 2003); (Kamposiora et al., 1996). The modified FPD with loop connectors enhances the natural appearance of the restoration, maintains the diastema, and supports the proper emergence profile. While loop connectors provide several aesthetic advantages, patients may initially experience discomfort from projection in the palatal rugae area. However, with time, patients typically adapt to the prosthesis. When excessive space is present in the aesthetic zone, loop connectors represent an excellent treatment option.

Conclusion

This clinical report outlines a method for fabricating a modified fixed partial denture (FPD) with loop connectors to restore the wide edentulous space created by the absence of central incisors. Full-coverage porcelain-fused-to-metal (PFM) crowns were designed for the abutments to ensure their preservation. The resulting prosthesis provided an aesthetically pleasing outcome and required minimal adjustments.

Author contribution

Anoopa Paulose: Contributed in Cases and Manuscript writing. Jimmy George: Contributed in Cases and Manuscript writing. Jinsa P Devassy: Contributed in Manuscript writing and Proof reading. Lithiya Susan John; Contributed in Manuscript writing and Proof reading. Abe Abraham: Contributed in Manuscript writing.

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Conflict of interest

The author declares no conflict of interest. The manuscript has not been submitted for publication in other journal.

Informed consent

Approval taken from the institution and Informed consent taken.

AI tool declaration

The authors declare that no AI and associated tools are used for writing scientific content in the article.

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