

Optimising aesthetic appeal and functional harmony – loop connectors in anterior rehabilitation.

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Abstract

In the realm of Fixed Prosthodontics, the quest for innovative solutions to address complex clinical scenarios has led to the exploration of novel techniques and materials. Among these advancements, the integration of loop connectors has emerged as a promising strategy for enhancing the stability, durability, and biomechanical integrity of multi-unit restorations, particularly in cases requiring anterior aesthetic rehabilitation. The incorporation of loop connectors in this case report facilitated the fabrication of a multi-unit prosthesis with enhanced stability and durability. The loop connectors served to reinforce the individual crown components, providing additional resistance to fracture and wear, particularly in areas of spacing or compromised tooth structure. This biomechanical support contributed to the long-term success and longevity of the restorations.

Keywords: Aesthetic rehabilitation aesthetics, fixed prosthodontics, loop connectors, porcelain fused to metal, restorations.

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Introduction

Traditional approaches to fixed prosthodontics have relied heavily on conventional frameworks and materials, often facing challenges when confronted with cases of extensive decay, compromised tooth structure, or spacing concerns.^[1] In such scenarios, the fabrication of multi-unit restorations necessitates careful consideration of biomechanical principles, occlusal dynamics, and aesthetic requirements to achieve optimal outcomes. The incorporation of loop connectors represents a paradigm shift in fixed prosthodontics, offering a versatile solution for reinforcing the individual components of the prosthesis and optimizing the distribution of occlusal forces. By strategically incorporating loop connectors into the design of the restoration, clinicians can effectively

mitigate the risk of mechanical failure, enhance long-term stability, and minimize the need for extensive tooth preparation.^[2]

Moreover, loop connectors enable a more conservative approach to treatment, preserving healthy tooth structure while providing additional support and reinforcement where needed. This conservative philosophy aligns with the principles of minimally invasive dentistry, prioritizing the preservation of natural tooth structure and the promotion of long-term oral health. Furthermore, the integration of loop connectors facilitates a seamless transition between the metal substructure and the porcelain veneering material, ensuring a harmonious blend of strength and aesthetics. This symbiotic relationship between metal and porcelain allows for the creation of restorations that not only exhibit superior

biomechanical properties but also possess lifelike aesthetics, seamlessly integrating with the surrounding dentition and soft tissues.^[3]

In the context of anterior aesthetic rehabilitation, where patient expectations are high and aesthetic demands are stringent, the incorporation of loop connectors offers a compelling solution for achieving predictable, long-lasting results. By harnessing the advantages of loop connectors in conjunction with porcelain fused to metal (PFM) crowns, clinicians can deliver comprehensive rehabilitative care that restores function, enhances aesthetics, and improves patient satisfaction.^[4]

Case Report

The 55-year-old female patient reported to the Department of prosthodontics and crown and bridge with chief complaint of broken and missing upper and lower teeth since past 6 months. Additionally, the patient expressed concern about generalised spacing between these teeth, impacting both aesthetics and function, and wanted treatment for the same. Patient had undergone root canal treatment (RCT) with respect to 13 12 11 21 22 24 33 42 43 and PFM fixed partial denture 6 months back. Patient was not satisfied with the aesthetics and the size of the prosthesis. The prosthesis was removed within a week of cementation. On clinical examination, spacing between the upper and lower anterior teeth was also noted, compromising both aesthetics and occlusion (Fig. 1). A radiographic examination was done and a treatment option was formulated to rehabilitate these anterior teeth using loop connectors in conjunction with PFM crowns (Fig. 2). This approach aimed to restore function, improve aesthetics, and address the spacing concerns. Teeth preparation for PFM restoration was conducted on specific teeth, including 13, 12, 11, 21, 22, and 24. Additionally, teeth preparation for PFM restoration was performed on 43, 42 and 33. The preparation

involved maintaining equigingival shoulder finish lines to enhance aesthetics. Impression was made using a two-step putty and light body polyvinyl siloxane impression material (Aquasil, Denstply), then it was poured with Type IV dental stone (Bego stone; Germany). Later, master casts were retrieved from the impression.

A provisional FPD was fabricated by ProTemp 4 (3M ESPE) and it was cemented using a non-eugenol temporary cement. Master casts were mounted on a semi-adjustable articulator (Hanau H2) after a face-bow transfer. Blue inlay wax was used to fabricate pattern of the FPD with loop connectors on the master cast, optimal occlusal contacts were established and contoured to final shape and form (Fig. 3 and 4). The wax pattern was invested in phosphate-bonded investment material (Bellawest, BEGO) and then casted in a base metal alloy (Wiron 99; BEGO). Following confirmation of metal try-in, porcelain firing (Vita, Germany) was carried out according to manufacturer recommendations.

The intaglio surfaces of the retainers were sandblasted using 50- μ m aluminum oxide airborne-particle. Try-in was conducted and interferences were removed (Fig. 5). Abutment teeth surfaces were cleaned, after which the restoration was cemented with glass ionomer cement (GIC) type I luting cement (Fig. 6 and 7). Prosthesis design of palatal loop connector limited the accessibility for good oral hygiene, so the patient was educated on maintaining proper oral hygiene, including the use of interdental aid. A follow-up evaluation was scheduled after one week to evaluate oral hygiene maintenance (Fig. 8). The rehabilitation of the decayed anterior teeth using PFM crowns with loop connectors resulted in significant improvements in both function and aesthetics. The restorations exhibited excellent marginal adaptation,

precise contours, and lifelike aesthetics, restoring the patient's confidence in their smile.

Discussion

The incorporation of loop connectors within fixed partial dentures (FPDs) presents a notable advancement in prosthodontic restoration. These connectors on the palatal aspect of the prosthesis efficiently link adjacent retainers and pontic, thereby addressing various clinical challenges. The selection between casting loop connectors from sprue wax or shaping them offers flexibility to dentists and dental laboratories. They are particularly advantageous in scenarios where patients seek to maintain diastema or present with excessive pontic spaces. Moreover, they prove beneficial in cases involving pathologically migrated or periodontally weak teeth.^[1]

A key aesthetic challenge addressed by loop connectors is the restoration of missing central incisors alongside diastema. Conventional FPDs may fail to achieve the desired aesthetic outcome, potentially affecting periodontal health. Loop connectors are indicated in patients who wish to maintain their diastema, presence of the excessive pontic space or clinical situations with presence of localized or generalized spacing between abutments. Despite their advantages, loop connectors necessitate additional laboratory procedures and may pose challenges in maintaining oral hygiene. Furthermore, they can potentially interfere with tongue movement and speech articulation, although minimizing connector size and ensuring rounded contours can mitigate these issues.^[4]

Understanding the stress distribution within loop connectors is essential for optimizing their design and material selection. Photoelastic analysis has demonstrated varying stress levels along connector, with the highest amount of stress typically observed at the gingival region and the lowest at the

middle section. Accordingly, smoother, less angular, and rounder connectors are recommended to minimize stress concentrations and enhance the durability of ceramic materials used in FPDs.^[5]

The incorporation of loop connectors in this case facilitated the fabrication of a multi-unit prosthesis with enhanced stability and durability. The loop connectors served to reinforce the individual crown components, providing additional resistance to fracture and wear, particularly in areas of spacing or compromised tooth structure. This biomechanical support contributed to the success and longevity of the restorations. Moreover, the use of loop connectors allowed for a more conservative approach to treatment, minimizing the need for extensive tooth preparation and preserving healthy tooth structure. This conservative philosophy is essential in anterior aesthetic rehabilitation, where preserving aesthetics and function are paramount considerations. The advantages of loop connectors in fixed prosthodontic extend beyond biomechanical support to include ease of fabrication, predictable outcomes, and patient satisfaction. The ability to customize the design and placement of loop connectors ensures tailored solutions for each clinical case, resulting in restorations that meet both functional and aesthetic requirements.

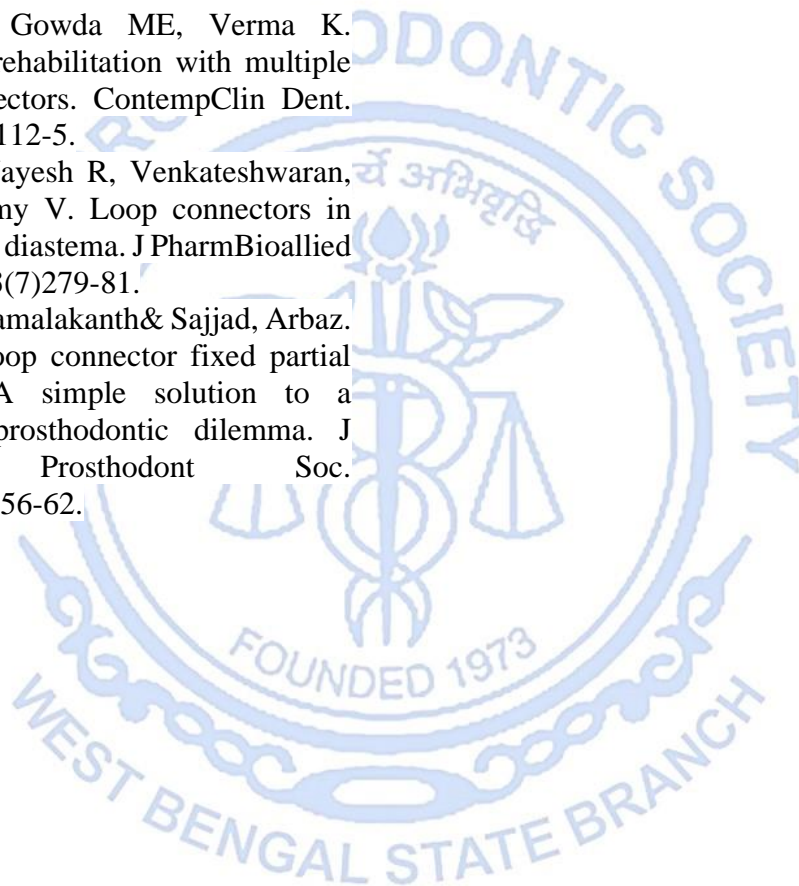
Conclusion

The incorporation of loop connectors in conjunction with PFM crowns represents an innovative approach to anterior aesthetic rehabilitation in fixed prosthodontics. The use of loop connectors offers advantages in terms of stability, durability, and conservative treatment, making them a valuable addition to the restorative dentist's armamentarium. Moving forward, continued research and clinical experience will further elucidate the optimal applications of loop connectors in achieving optimal outcomes for patients

undergoing comprehensive dental rehabilitation.

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FIGURES



Figure 1.

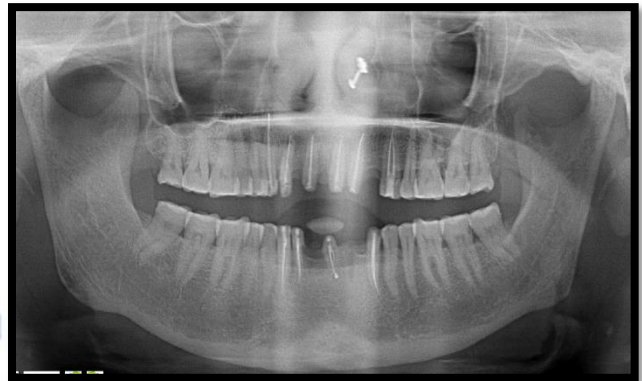


Figure 2.



Figure 3.

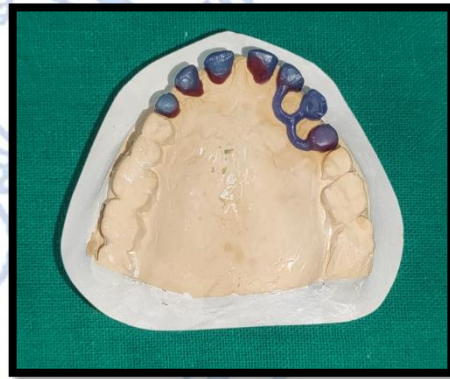


Figure 4.



Figure 5.



Figure 6.

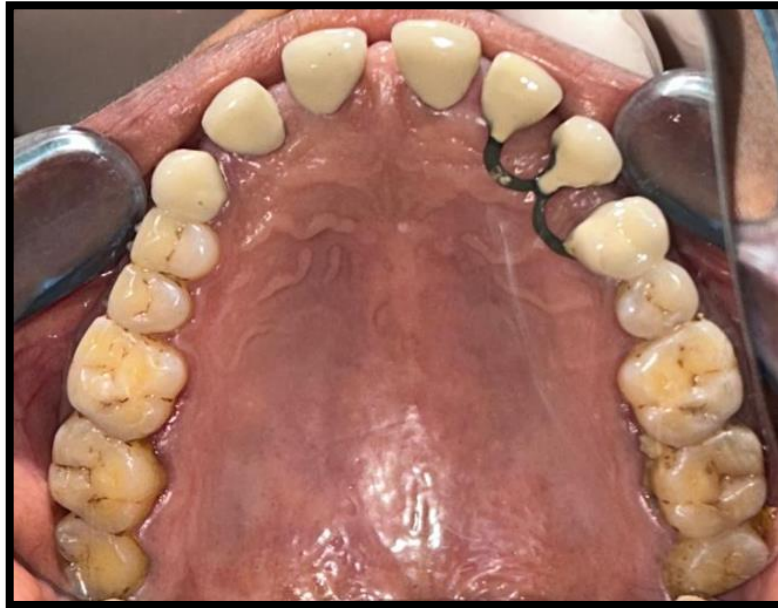


Figure 7.



Figure 8.