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Prosthodontic Rehabilitation of a Partially Edentulous Mandibular Arch Using the Andrews Bridge System: A Case Report

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KEYWORDS

Andrews Bridge, Fixed-removable partial denture, Ridge defect, Prosthodontic rehabilitation, Geriatric prosthodontics.

ABSTRACT:

Rehabilitation of partially edentulous arches with extensive ridge defects presents both functional and esthetic challenges, especially in elderly patients where surgical interventions or implant therapy may be contraindicated. The Andrews Bridge system offers a unique fixed–removable design that combines the stability of fixed prostheses with the hygiene access of removable ones. This case report describes the prosthodontic rehabilitation of a 70-year-old male patient who presented with a completely edentulous maxillary arch and a partially edentulous mandibular arch retaining only the molars (37, 38, 47, and 48), all of which were periodontally sound. Intentional root canal therapy was performed on the remaining teeth, followed by full metal crown preparation to serve as abutments. A metallic complete denture was fabricated for the maxillary arch, while the mandibular arch was rehabilitated using an Andrews Bridge system. The bar-and-sleeve attachment provided excellent retention and stability to the removable pontic segment, achieving favorable esthetics, function, and hygiene maintenance. The Andrews Bridge continues to be a conservative, biomechanically sound, and cost-effective alternative for managing long edentulous spans and ridge defects, offering fixed-like retention with removable convenience, particularly beneficial in geriatric prosthodontic care.

1. Introduction

Prosthodontic rehabilitation aims to restore function, esthetics, and patient comfort through restorations that harmonize with the remaining dentition and surrounding oral structures. In many partially edentulous situations, achieving this balance can be challenging, especially when conventional fixed or removable partial dentures fail to meet both biomechanical and esthetic requirements. The introduction of **fixed-removable prosthodontic designs**, such as the **Andrews Bridge System,** represented a significant advancement in addressing these limitations through a more flexible and maintenance-friendly approach.

Conventional fixed partial dentures provide excellent stability and masticatory efficiency but often compromise on hygiene accessibility, especially when pontic contours must be extended to achieve gingival or labial support. Conversely, removable partial dentures facilitate hygiene maintenance and soft tissue replacement but are less retentive, bulkier, and may produce unfavorable distribution of occlusal loads on the abutments. The **Andrews Bridge System** effectively bridges this gap by combining the advantages of both prosthetic philosophies into a single restorative design.

The system comprises a **fixed retainer-bar assembly** permanently cemented to the abutment teeth and a **removable pontic segment** retained by precision clips or sleeves on the bar. This dual-component design allows the prosthesis to function with the rigidity of a fixed bridge while permitting the patient to remove the pontic assembly for hygiene access. The acrylic or composite flange component of the removable segment can be

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contoured to restore soft-tissue form, improve lip support, and enhance phonetics without overloading the abutment teeth. Additionally, as residual ridge resorption progresses, the removable component can be relined or modified without disturbing the fixed retainers, enhancing long-term adaptability. The **clinical rationale** behind choosing an Andrews Bridge lies not solely in the presence of a ridge defect but in achieving a **balanced restoration** that integrates esthetics, hygiene, and biomechanical stability in patients where a fully fixed or removable approach may be less ideal. **Indications** for the Andrews Bridge extend beyond the replacement of ridge defects. It is particularly useful when a fixed prosthesis cannot be designed due to unfavorable alignment of opposing arches, tilted or pier abutments, or when esthetic tooth positioning requires freedom beyond the limits of conventional fixed frameworks. It is also indicated for stress-breaking situations in free-end saddles, for stabilizing unilateral edentulous segments, in hybrid or overdenture designs, and even as an adjunct in implant-supported restorations. The system is advantageous in patients seeking a non-surgical, cost-effective solution that combines fixed stability with removable hygiene access. However, **contraindications** must be carefully evaluated. The system is not recommended in patients with poor periodontal health, high caries susceptibility, short clinical crowns, or compromised abutment tooth structure, as the preparation and load distribution demand sound supporting teeth. Additionally, patients with limited dexterity, systemic illness, or poor compliance may struggle with the maintenance requirements of a removable component

This case report presents the use of an **Andrews Bridge System** as a conservative and patient-centered solution for prosthodontic rehabilitation of a long edentulous span, demonstrating how this fixed–removable concept can restore function, esthetics, and hygiene control in a clinically demanding situation.

2. Case History

A 70-year-old male patient reported to the Department of Prosthodontics with the chief complaint of missing teeth and difficulty in mastication. The patient desired a fixed and esthetic solution for his lower arch and a stable prosthesis for the upper arch.

Intraoral examination revealed that the maxillary arch was completely edentulous, while the mandibular arch retained only four molars- 37, 38, 47, and 48 with an

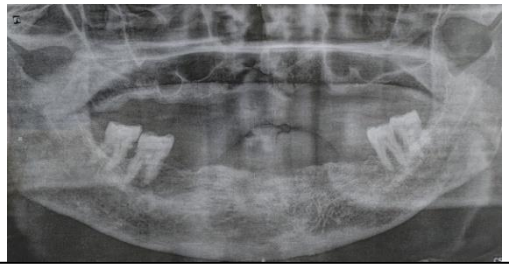

Figure 1: Preoperative panoramic radiograph showing a completely edentulous maxillary arch and a partially edentulous mandibular arch

edentulous span extending between the premolar regions bilaterally as evident in the preoperative orthopantomogram shown in figure 1. The retained molars were periodontally sound, exhibited adequate bone support, and demonstrated favorable crown-root ratios, making them suitable as potential abutments. The interarch space was found to be adequate for a bar-retained fixed-removable prosthesis.

After thorough clinical and radiographic evaluation, several treatment options were discussed with the patient, including an implant-supported prosthesis, a conventional removable partial denture, and a fixed-removable prosthesis. Considering the patient's age, anatomical limitations, financial considerations, and desire for a prosthesis that provided both comfort and hygiene access, the Andrews Bridge System was selected for the mandibular arch. For the maxillary arch, a metal-based complete denture was planned to enhance strength, fit, and comfort.

Following oral prophylaxis, intentional root canal treatment was carried out on all four mandibular molars (37, 38, 47, and 48) to ensure long-term abutment integrity and eliminate the risk of pulpal complications during tooth preparation. The teeth were then prepared to receive full metal crowns.

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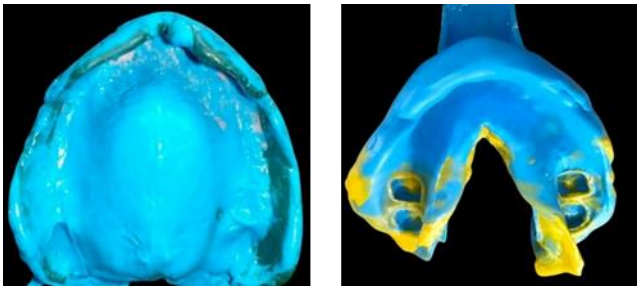

Figure 2: Final impressions of the maxillary and mandibular arches made using addition silicone material. The maxillary impression (left) records the completely edentulous arch, while the mandibular impression (right) captures the abutment preparations on 37, 38, 47, and 48 for fabrication of metal copings and the bar assembly of the Andrews Bridge system.

Definitive impressions were made using a rubber base impression material as shown in figure 2.

Working casts were poured in type IV dental stone. A facebow transfer was then performed to record the patient's maxillomandibular relationship and to accurately orient the maxillary cast on a semi-adjustable articulator (Figure 3).

This step ensured that occlusal harmony was achieved and that the final prosthesis would function efficiently within the patient's existing mandibular dynamics. The metal copings were fabricated and tried in for marginal fit and path of insertion. A custom-cast bar framework was designed to connect the two pairs of molar retainers, one on each side, ensuring adequate rigidity and clearance for the removable component.

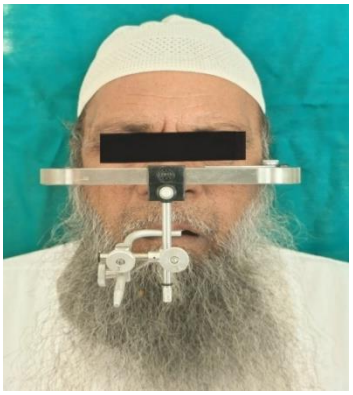

Figure 3: Facebow transfer procedure performed to record the maxillomandibular relationship for accurate articulation and orientation of the prosthesis.

Figure 4: Cast model showing the metal framework of the fixed component of Andrew's bridge with retainers and connecting bar.

The bar and retainers were cast as a single unit. After verification of fit and passive seating intraorally, the framework was cemented using glass ionomer luting cement (figure 5).

Figure 5: Intraoral view showing the mandibular Andrews' bridge framework trial with the custom-fabricated metal bar and retainers on molars 37, 38, 47, and 48 for evaluation of fit, alignment, and passive adaptation.

The removable pontic segment was fabricated using an acrylic resin flange and denture teeth arranged to restore the missing lower dentition. Initially, three precision clips were incorporated on the intaglio surface of the pontic assembly to ensure secure engagement with the bar while allowing removal for hygiene maintenance; however, due to difficulty encountered by the patient during intraoral insertion and removal, the anterior clip was subsequently removed. (figure 6). Occlusal equilibration was performed to achieve harmonious

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bilateral contacts in centric and balanced occlusion with the maxillary metallic denture (figure 7).

Figure 6: Removable acrylic pontic segment with denture teeth and a precision intaglio clip for secure bar engagement and easy hygienic removal.

Figure 7: Right lateral view showing the definitive prosthesis in occlusion; Frontal view of the definitive maxillary denture in occlusion; Left lateral view showing the definitive prosthesis in occlusion.

The patient was instructed regarding insertion and removal of the prosthesis, hygiene maintenance around the bar and retainers, and the need for periodic recall visits. Follow-up evaluations at one week, one month, and three months demonstrated satisfactory function, comfort, and esthetics.

Figure 8: Pre- and post-treatment extraoral photographs.

The patient reported improved mastication and phonetics, and no discomfort or tissue irritation was observed.

3. Discussion

The rehabilitation of partially edentulous arches in elderly patients poses both functional and biological challenges, requiring a treatment approach that restores masticatory efficiency, phonetics, and esthetics while maintaining hygiene and comfort. In the present case, the **Andrews Bridge System** was selected as a fixed–removable prosthetic design that combines the stability of fixed prostheses with the cleansability of removable prostheses, offering a conservative and patient-centered solution.

Introduced by **Dr. James Andrews in 1966**, the Andrews Bridge represents an innovative hybrid system that employs a **bar-and-sleeve mechanism** to achieve retention and stress distribution.[1,2] The fixed portion consists of retainers joined by a rigid bar, while the removable segment, which carries the pontics, engages the bar through a precision sleeve attachment. This design ensures even distribution of occlusal forces along the long axes of abutment teeth and allows the patient to remove the pontic assembly for cleaning, promoting periodontal health and prosthesis longevity.[3,4]

It has been documented that the majority of cases involving anterior tooth loss also exhibit **alveolar ridge resorption**, with approximately **91% of patients** showing ridge defects.[5,6] **Seibert (1983)** classified these defects into three categories based on the type and extent of tissue loss: *Class I*-buccolingual loss; *Class II*-

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apicocoronal loss; and *Class III*-combined buccolingual and apicocoronal loss.[7] Combined Class III defects are the most frequently observed (56% of cases), followed by horizontal Class I (33%) and vertical Class II defects (3%).[6]

Depending on the severity of the defect, a range of **surgical augmentation techniques** such as cortico-cancellous onlay grafts, guided bone regeneration, distraction osteogenesis, and ridge expansion can be considered to re-establish ridge contour.[8,9] However, in cases where surgical reconstruction is contraindicated or insufficient to restore form and function, the **Andrews fixed-removable system** presents a commendable prosthetic alternative.[10,11] **Mueninghoff and Johnson** and **Everhart and Cavazos** reported favorable outcomes with this approach, emphasizing its ability to restore both hard and soft tissue contours while maintaining comfort and hygiene.[12,13]

The Andrews Bridge offers several notable advantages: it reduces prosthesis bulk, provides excellent retention, restores missing alveolar structures, and eliminates the need for extensive palatal or lingual flange coverage seen in conventional removable prostheses.[10,14,15] Its stress-breaking bar design prevents undue leverage on abutments and minimizes soft-tissue impingement.[13,16] Furthermore, the removable segment facilitates hygiene access and allows future modifications if ridge resorption progresses.

Nevertheless, certain **limitations** exist. The procedure is technique-sensitive, requiring precise bar fabrication and alignment. Food accumulation beneath the bar can cause mucosal irritation or tissue proliferation, while inadequate soldering may result in mechanical failure.[16] The system demands a **minimum occluso-gingival height of 3–4 mm** for the bar-sleeve assembly and is contraindicated in patients with periodontally compromised abutments, poor oral hygiene, or limited manual dexterity.[18]

In the present case, the mandibular arch exhibited bilateral edentulous spans with only the four molars (37, 38, 47, 48) remaining, which were periodontally sound and provided ideal abutments for a bar-retained prosthesis. Intentional root canal therapy was performed to allow parallel preparation and full-coverage crowns, forming the fixed segment of the system. The removable pontic assembly effectively replaced the missing anterior and premolar teeth, restoring esthetics and function while maintaining hygiene access.

The **clinical indications** for the Andrews Bridge extend beyond ridge deformities to include long edentulous spans, pier abutments, and situations requiring stress relief and removable hygiene access.[11,15] It is particularly valuable for **geriatric or medically compromised patients** where implant therapy or extensive bone augmentation is impractical.[17,19] In contrast to conventional removable partial dentures, which depend on mucosal support, the Andrews Bridge is entirely tooth-borne, ensuring occlusal stability and eliminating clasp-induced stresses. Compared with fixed partial dentures, its removable segment allows direct access for plaque control, improving peri-abutment health.[14,15,20]

In this case, the combination of a **metallic maxillary complete denture** and a **mandibular Andrews Bridge** resulted in a balanced occlusal scheme, satisfactory esthetics, and functional improvement. The patient reported enhanced comfort, chewing efficiency, and ease of maintenance. This outcome underscores the continued clinical relevance of the Andrews Bridge as a **biomechanically sound, esthetically satisfactory, and cost-effective alternative** in complex partially edentulous scenarios, particularly when ridge deficiencies or surgical limitations exist.

4. Conclusion

The **Andrews Bridge System** remains a valuable prosthodontic solution for patients presenting with partial edentulism accompanied by ridge resorption or limited abutment support. Its hybrid design successfully combines the mechanical advantages of a fixed prosthesis with the hygienic and esthetic benefits of a removable one. In the present case, it allowed successful rehabilitation of a mandibular edentulous span with excellent retention, comfort, and patient satisfaction. With proper case selection, meticulous fabrication, and maintenance, the Andrews Bridge continues to stand as a **versatile and predictable treatment option** in modern prosthodontic practice, particularly for geriatric patients where implant or surgical interventions are contraindicated.

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