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Reconceptualizing dual arch prosthodontic rehabilitation: A case report

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Abstract
This case report outlines the prosthodontic rehabilitation of a patient with a fully edentulous maxillary arch opposing a partially edentulous mandibular arch. A dual-arch rehabilitation strategy was implemented, involving the fabrication of a maxillary complete denture in opposition to a mandibular cast partial denture. The maxillary arch was rehabilitated using an unbreakable (super-flex) denture, while the mandibular arch was restored with porcelain-fused-to-metal crowns incorporating occlusal rest seats and a cobalt–chromium cast partial denture framework. This design aimed to improve retention, achieve favorable biomechanical distribution of occlusal forces, and enhance overall prosthesis stability. The clinical report highlights the step-by-step procedures involved in fabricating both prostheses to achieve optimal support, stability, esthetics, and masticatory efficiency. The primary objective of the treatment was to restore oral function and esthetics while improving the patient's overall quality of life.

Keywords: Dual-arch rehabilitation, complete denture, cast partial denture, prosthodontics, biomechanical stability

Introduction

Loss of natural teeth occurs as a result of cumulative biological changes and disease processes, often progressing to partial or complete edentulism [1]. The absence of teeth has a profound impact on chewing efficiency, speech, facial appearance, and overall quality of life, thereby necessitating appropriate prosthodontic intervention. Replacement of missing teeth not only restores oral function but also improves facial support and esthetics, contributing positively to a patient's psychological well-being [2].

Removable prostheses, including complete and partial dentures, have long been an integral part of prosthodontic practice. Despite advances in fixed and implant-supported restorations, removable dentures continue to be widely employed due to factors such as cost considerations, systemic health limitations, anatomical constraints, and patient reluctance toward surgical procedures [3].

Although removable prostheses do not fully replicate the function of natural dentition, they remain effective in restoring oral function and facial form. In complete denture therapy, treatment objectives extend beyond tooth replacement to include re-establishment of facial muscle support and maintenance of harmonious facial contours.The presence of a fully edentulous maxillary arch opposing a partially edentulous mandibular arch poses specific challenges related to biomechanics and occlusal harmony.Such clinical situations demand careful planning to achieve stable occlusion, balanced articulation, and preservation of the remaining dentition, while also addressing esthetic and phonetic requirements [4].

In situations where implant placement is not a viable option, rehabilitation using a maxillary complete denture opposed by a mandibular cast partial denture provides a reliable and practical treatment alternative.This approach restores function and esthetics while conserving the remaining natural teeth and minimizing biological and financial burdens [2]. The prosthodontist's responsibility, therefore, extends beyond mere tooth replacement to comprehensive rehabilitation of oral function, esthetics, and facial support [5-6].

Prosthodontic rehabilitation of a patient exhibiting a fully edentulous maxillary arch and a partially edentulous mandibular arch was accomplished using a combined dual-arch treatment strategy. An unbreakable (super-flex) maxillary complete denture was fabricated to restore the edentulous arch, while the mandibular arch was rehabilitated with porcelain-fused-to-metal crowns incorporating occlusal rest seats and a cobalt–chromium cast partial denture framework to enhance retention, stability, and favorable force distribution. This report details the clinical procedures involved in fabricating both prostheses to achieve optimal support, stability, esthetics, and masticatory efficiency, ultimately improving the patient's overall quality of life.

Case Report

A 55-year-old male patient reported to the Department of Prosthodontics and Crown & Bridge, with the chief complaint of missing teeth and ill-fitting removable partial denture since last three years, which led to impaired mastication, deglutition, and speech. Detailed intraoral and radiographic evaluations resulted in the following observations: Missing teeth with 11,15,17,21,22,24,27,31,41,42. Existing Removable partial denture present in maxilla. Root stump with 32 region.The maxillary arch exhibited moderate-to-severe alveolar bone loss in both horizontal and vertical dimensions, while the mandible showed predominantly horizontal bone resorption. (Figure 1) Radiographic evaluation revealed apical radiolucent areas associated with the posterior teeth of the mandibular arch.

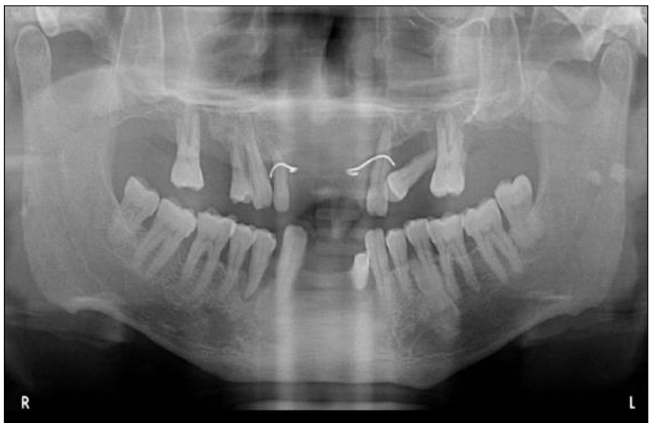

Fig 1: Preoperative Opg

The patient was explained all treatment options, including both fixed and removable prostheses as per the financial constraints, he opted for a removable prosthesis. Rehabilitation of maxillary complete denture and mandibular cast partial denture (CPD) were selected as treatment plan.

Clinical Procedure

The maxillary teeth and mandibular teeth 32, 43, 44, and 45 were extracted because of extensive bone loss and apical pathology. Oral Prophylaxis was carried out and oral hygiene instructions were given. (Figure 2)

Fig 2: Intraoral photographs

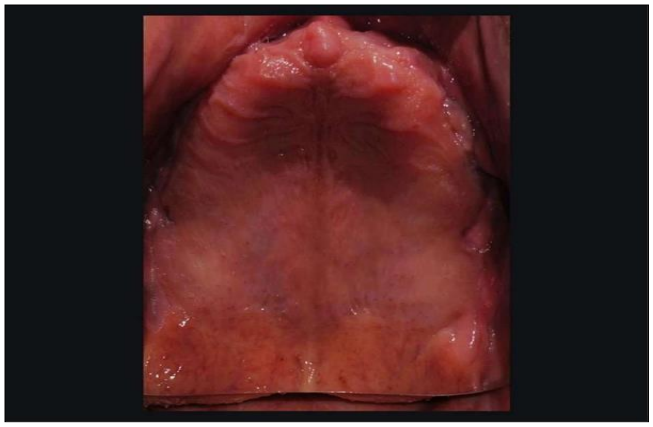

Fig 2: Intraoral photographs

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Diagnostic impression made with irreversible hydrocolloid impression material in mandibular arch and for maxillary impression made with a rigid, thermoplastic material. Diagnostic mounting was done. Post to which surveying was done and designing of cpd was done.

The right mandibular first molar and canine was endodontically treated. Tooth preparation and gingival retraction was performed, followed by impression making using an elastomeric impression material. (Figure 3, 4).

Fig 3: Tooth preparation irt 43, 36

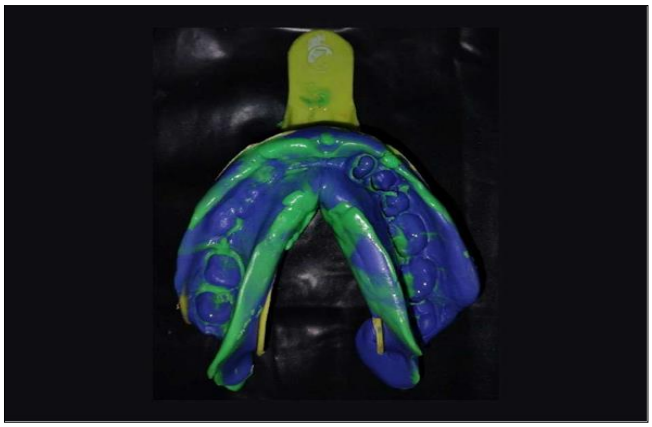

Fig 4: Impression with Mandibular Arch

Wax up was done and casted. Metal ceramic crowns fabricated with 43 and 36 region, and accordingly occlusal rest seat preparation done with 37 also in the 46-47 region. (Figure 5)

Fig 5: Rest prepared on 46, 47 and 37 region

The PFM crown was fabricated. After final evaluation, the PFM crowns were cemented, and occlusal and marginal adjustments were performed intraorally and impression was taken. (Figure 6)

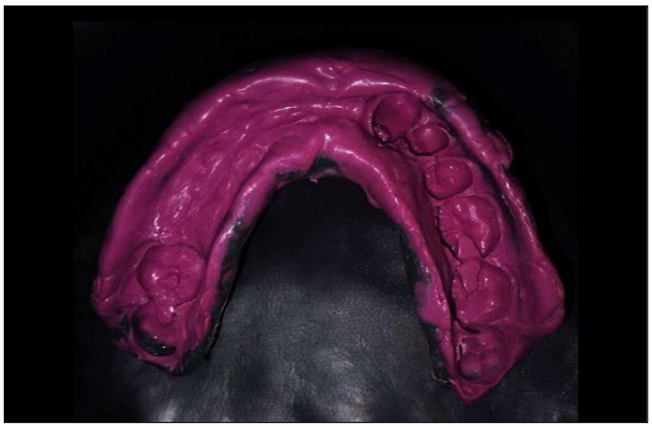

Fig 6: Final Impression

The cobalt-chromium framework was fabricated for denture framework try-in. Clinical evaluation revealed a satisfactory framework fit. (Figure 7). Occlusal rim was fabricated over metal framework.

Fig 7: Metal Framework Trial Done

Completely edentulous maxillary arch the primary casts were obtained from diagnostic impression (figure 8).A uniform spacer was adapted over the primary cast and on the primary cast custom tray is fabricated by a self-cure acrylic resin. The borders of the tray were kept 2 mm short of the vestibular depth. Functional border molding was accomplished with green stick compound (DPI, Pinnacle). After removal of the spacer wax and preparation of relief holes, a definitive impression was obtained using zinc oxide eugenol impression paste. (Figure 9) Dental stone was used to fabricate the master cast. (Type III gypsum). Denture base was fabricated on master cast with self cure acrylic resin and wax rim was fabricated on denture base.

Fig 8: Primary Impression

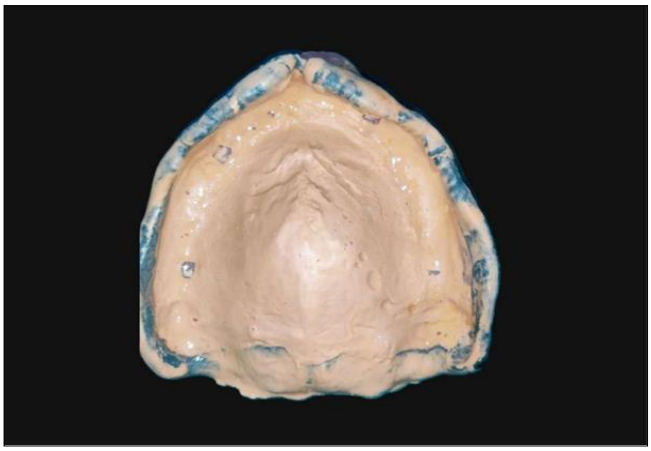

Fig 9: Final Impression

The jaw relations were recorded and try-in was carried out. (Figure 10). Phonetic function, esthetic appearance, and occlusal relationships were assessed, and the denture teeth were chosen with regard to size, mould, and shade. The patient was satisfied with the appearance. The denture was then processed and finished. (Figure 11) In the current clinical case, the patient presented with a completely edentulous maxillary arch and a mandibular Kennedy Class IV partially edentulous arch. In partially edentulous patients, there are various treatment options. Treatment planning was carried out by integrating diagnostic factors with the patient's economic constraints. (Figure 12)

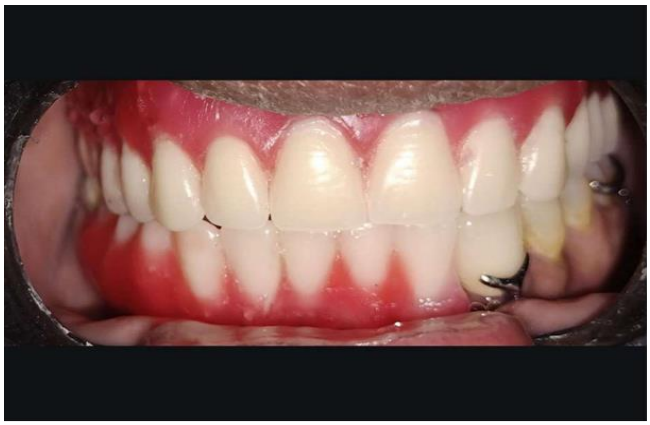

Fig 10: Try In

Fig 11: Final Insertion

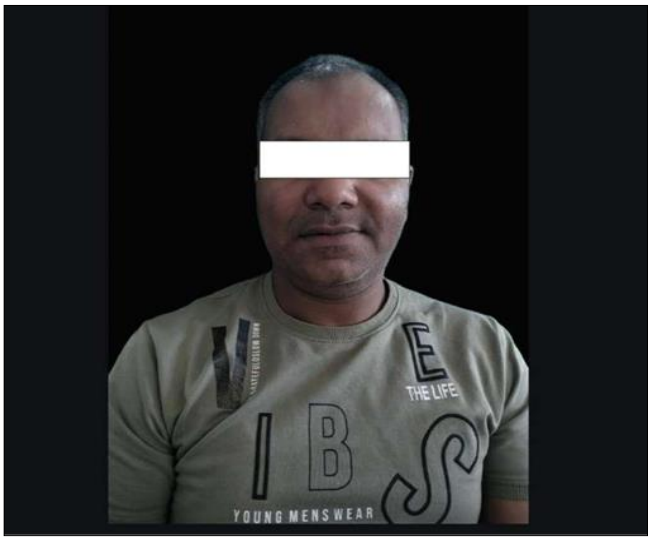

Fig 12: Preoperative Photograph

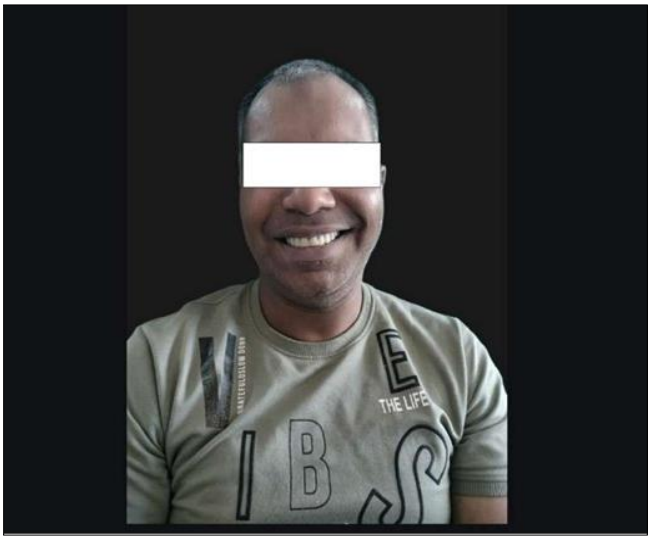

Fig 12: Postoperative Photograph

A maxillary complete denture relies entirely on the soft tissues and residual ridge for support, retention, and stability. Its broad palatal coverage and favorable ridge anatomy help distribute masticatory forces over a wide area, reducing stress per unit area, which enhances comfort and function.

A variety of treatment alternatives were evaluated, each with specific clinical implications. One such option was a conventional clasp-retained RPD, which is cost-effective and has straightforward fabrication. However, its disadvantages include poor esthetics. Another treatment option was implant-supported overdentures (for the mandible and/or maxilla), which significantly improve retention, stability, and masticatory efficiency; reduce ridge resorption; and result in higher patient satisfaction. However, drawbacks include the invasive nature of the surgical procedure, higher cost, longer treatment time, and the need for sufficient bone volume. An implant-supported fixed prosthesis was also considered. It provides excellent function, esthetics, and long-term durability and does not require removal. However, it is the most invasive and expensive option, requiring multiple implants and posing challenges in hygiene maintenance, especially in elderly patients. Although ideal biomechanically, the patient declined surgical options and expressed a preference for removable solutions, rendering this approach inappropriate.

The use of a maxillary complete denture opposing a mandibular cast partial denture represents an effective, economical, and non-invasive prosthodontic rehabilitation approach. When fabricated with sound mechanical and biological principles, and maintained with regular recall and adjustments, this dual-arch prosthetic scheme can deliver acceptable longevity, patient satisfaction, and preservation of oral structures.

COI: No conflict of interest are declared by the authors.

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