



MINIMALLY INVASIVE ESTHETIC REHABILITATION WITH RESIN-BONDED FIXED PARTIAL DENTURE

Prosthodontics

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ABSTRACT

Resin-bonded fixed partial dentures (RBFDPs) are a conservative and minimally invasive option for replacing missing anterior teeth while preserving healthy tooth structure. This clinical case report describes the rehabilitation of a missing maxillary central incisor in a 38-year-old male patient using a porcelain-fused-to-metal RBFDP. Conservative tooth preparation, adhesive bonding, and careful clinical procedures resulted in satisfactory esthetics and function. The patient reported improved appearance and satisfaction with the final restoration. RBFDPs provide an effective, esthetic, and economical treatment option for anterior tooth replacement.

KEYWORDS

Resin-bonded Fixed Partial Denture; Maryland Bridge; Anterior Tooth Replacement; Conservative Prosthodontics; Adhesive Dentistry; Esthetic Rehabilitation; Fixed Partial Denture; Missing Maxillary Central Incisor.

INTRODUCTION

Replacing a missing anterior tooth in the esthetic zone has always been a challenge for clinicians because of the need to restore both function and appearance.[1] Several treatment options are available for the replacement of a missing anterior tooth, including implant-supported prostheses and conventional fixed partial dentures (FPDs). However, implant therapy may not always be feasible because of inadequate bone support, systemic or economic limitations, or patient preference. Similarly, conventional FPDs often require extensive tooth preparation of sound adjacent teeth, resulting in significant loss of healthy tooth structure. [2,3]

In such situations, a resin-bonded fixed partial denture (RBFDP) serves as a conservative and minimally invasive treatment option. RBFDPs preserve maximum tooth structure, provide satisfactory esthetics, and can be completed with relatively simple clinical procedures. Advances in adhesive dentistry and restorative materials have further improved their longevity and clinical success.[4]

This clinical case report describes the rehabilitation of a missing maxillary central incisor using a resin-bonded fixed partial denture as a conservative approach to restore esthetics, function, and patient confidence.

Case Report

A 38-year-old male patient was reported to the Department of Prosthodontics of Government Dental College and Hospital, Mumbai, India, with a chief complaint of replacement of a missing tooth due to an unesthetic smile. The patient expressed concern regarding his appearance and desired a fixed and conservative treatment option for the replacement of the missing anterior tooth.



Figure 1: Intraoral view shows a missing right maxillary central incisor

Intraoral examination revealed a missing right maxillary central incisor. [Figure 1] Radiographic evaluation showed that the adjacent abutment teeth had adequate periodontal ligament and bone support to serve as suitable abutments. After discussing all available treatment options, including their advantages and disadvantages, rehabilitation with a resin-bonded fixed partial denture was planned to replace the missing maxillary central incisor. The procedure, along with its risks and benefits, was explained to the patient, and written informed consent was obtained before treatment.

Clinical Procedures

The following step-by-step clinical procedure was carried out for the oral rehabilitation of the patient.



Figure 2: Intraoral view shows an intra-enamel tooth preparation was performed on the lingual surfaces of the right maxillary lateral incisor and left maxillary central incisor

An intra-enamel tooth preparation was performed on the lingual surfaces of the right maxillary lateral incisor and left maxillary central incisor using wheel-shaped and torpedo diamond burs. [Figure 2] Approximately 0.5 mm of tooth reduction was carried out to accommodate a porcelain-fused-to-metal resin-bonded fixed partial denture with metal wings. Chamfer finish lines were placed supragingivally to improve esthetics and preserve periodontal health. The proximal contours were reduced to establish an adequate path of insertion and to increase the available tooth surface area for bonding of the prosthesis.



Figure 3: final impression made using addition silicone impression material with the putty-wash impression technique.

Following tooth preparation, gingival retraction was carried out using a retraction cord to obtain proper exposure of the finish lines. Final impressions were then made using addition silicone impression material with the putty-wash impression technique. [Figure 3]

An interocclusal record was obtained using bite registration material to record the maxillomandibular relationship accurately. The final impression was poured in Type IV dental stone, and the master cast was retrieved. Die cutting was subsequently performed, and the master cast was mounted on an articulator using the interocclusal record.

The wax pattern for the resin-bonded fixed partial denture was fabricated using inlay wax and was immediately invested in a suitable investment material. Following completion of the investing procedure, casting was carried out using a nickel-chromium (Ni-Cr) alloy.



Figure 4: A Bisque try-in was carried out to verify the fit, marginal adaptation, and proper seating of the prosthesis.

After finishing and polishing of the metal framework, a metal try-in was carried out to verify the fit, marginal adaptation, and proper seating of the prosthesis. Following satisfactory evaluation, ceramic buildup was completed on the pontic to achieve optimal esthetics. [Figure 4]

After completion of the ceramic work, the tissue surface of the metal wings was sandblasted to create microabrasions on the metallic surface. This surface treatment enhanced micromechanical retention by facilitating the formation of resin tags during bonding with the tooth structure.



Figure 5: Intra-oral view shows Cementation of the Prosthesis.

During cementation, meticulous isolation and salivary control were maintained. The prosthesis was cemented using a resin composite luting cement according to the manufacturer's instructions. Excess cement was removed, and occlusion was evaluated and adjusted where necessary. [Figure 5]



Figures 6 and 7: Extra-oral view shows preoperative view and postoperative views of Cementation of the Prosthesis.

Postoperative instructions regarding maintenance of oral hygiene and care of the prosthesis were explained to the patient. The patient was recalled after one week for evaluation of the restoration and assessment of oral hygiene status. The patient was satisfied with the esthetic appearance and functional outcome of the final restoration. [Figures 6 and 7]

DISCUSSION

Replacement of a missing anterior tooth in young patients requires a treatment modality that is conservative, esthetic, functional, and

economically acceptable.[5] Resin-bonded fixed partial dentures (RBFPDs) have gained popularity as a minimally invasive alternative to conventional fixed partial dentures and implant-supported prostheses.[6] The philosophy of RBFPDs is based on the preservation of sound tooth structure while achieving acceptable esthetics and function through adhesive bonding techniques.[7]

The concept of resin-bonded prostheses was first introduced with the Rochette bridge, which utilized perforated metal retainers for mechanical retention. Later, the Maryland bridge was developed using electrolytically etched metal retainers, which significantly improved resin bonding and retention. Modern RBFPDs now employ advanced adhesive systems, improved metal surface treatments, and all-ceramic materials that provide superior esthetics and enhanced clinical performance. [8,9]

Various types of resin-bonded fixed partial dentures are available depending on the material used and design of the retainers. Based on material, RBFPDs may be classified as metal-ceramic resin-bonded prostheses, fiber-reinforced composite prostheses, and all-ceramic prostheses such as zirconia and lithium disilicate restorations. Based on design, they may be categorized as single-wing (cantilever) or double-wing retainers. Single-retainer RBFPDs are currently preferred in many clinical situations because they reduce stresses caused by differential movement of abutment teeth and demonstrate improved long-term survival rates.[10]

The success of RBFPDs depends largely on proper case selection, careful tooth preparation, and adherence to adhesive protocols. Ideal cases include patients with sound abutment teeth, adequate enamel for bonding, favorable occlusion, minimal parafunctional habits, and sufficient interocclusal space. Contraindications include deep overbite, severe malocclusion, inadequate enamel, extensive restorations on abutment teeth, and patients with heavy occlusal forces or bruxism.[11]

In the present case, an intra-enamel preparation design was selected to maximize enamel preservation and improve bonding effectiveness. Supragingival finish lines facilitated oral hygiene maintenance and improved periodontal health. Sandblasting of the metal retainers created surface roughness that enhanced micromechanical retention and improved bonding with resin cement. Resin luting agents play a critical role in the long-term success of RBFPDs because they provide both mechanical and chemical adhesion between the prosthesis and tooth structure. [12,13,14]

Resin-bonded prostheses offer several advantages over conventional fixed prostheses. They require minimal tooth preparation, preserve healthy tooth structure, reduce pulpal trauma, provide excellent esthetics, and are comparatively economical. Clinical procedures are relatively simple and less time-consuming. In addition, RBFPDs can serve as an interim or long-term restoration, particularly in young patients where implant placement may need to be delayed.[15]

Despite these advantages, RBFPDs also have certain limitations. Debonding remains the most common complication associated with these prostheses. Metal retainers may occasionally compromise translucency in highly esthetic regions. Technique sensitivity during bonding procedures and dependence on adequate enamel support can also affect long-term outcomes. Furthermore, occlusal discrepancies and parafunctional habits may increase the risk of prosthesis failure.[16]

Recent advancements in adhesive dentistry and biomaterials have significantly improved the prognosis of RBFPDs. The introduction of high-strength ceramics such as zirconia and lithium disilicate has enhanced esthetics and fracture resistance. Contemporary adhesive resin cements and surface treatment methods, including airborne-particle abrasion, silica coating, laser treatment, and use of MDP-containing primers, have improved bond strength and durability. Digital dentistry and CAD/CAM technology have further enhanced precision, fit, and fabrication efficiency of resin-bonded prostheses. Fiber-reinforced composite RBFPDs have also emerged as a metal-free alternative with improved esthetics and conservative tooth preparation. [17, 18, 19]

Long-term clinical studies have demonstrated favorable survival rates for RBFPDs when proper case selection and clinical protocols are

followed.[20] Therefore, resin-bonded prostheses continue to be a reliable and conservative treatment option for the replacement of missing anterior teeth.

CONCLUSION

Resin-bonded fixed partial dentures represent a conservative, esthetic, and minimally invasive treatment option for the replacement of missing anterior teeth. They preserve maximum tooth structure while restoring function, phonetics, and appearance effectively. Proper case selection, meticulous tooth preparation, and strict adherence to adhesive protocols are essential for achieving long-term clinical success.

Advancements in adhesive systems, ceramic materials, surface treatment techniques, and digital technologies have considerably improved the durability and esthetic outcomes of resin-bonded prostheses. Although debonding and technique sensitivity remain potential limitations, RBFPDs continue to provide predictable clinical results with high patient satisfaction when carefully planned and executed.

The present case demonstrates that a resin-bonded fixed partial denture can successfully rehabilitate a missing maxillary central incisor while maintaining esthetics, function, and conservation of tooth structure.

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