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Case Report

Conservative approach for rehabilitation of anterior esthetic zone

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ABSTRACT

Partial coverage restorations have been used in Prosthodontic practice with variable success rates. Resin Bonded Restorations have been used successfully since 1973. With modifications in design of prosthesis, the need for preparation and with advancements in adhesive technology, the success rate has improved drastically. This treatment option is technique sensitive, but it conserves the natural tooth structure and provides desirable esthetic outcome. Proper case selection and treatment planning is utmost important for execution and success of resin bonded restorations.

1. Introduction

The current practice of Prosthodontics follows the DeVan's dictum of 'perpetual preservation of what remains rather than meticulous replacement of what is missing'.[1] Even with advancements of biocompatible tooth-like materials, conservation of natural tooth structure remains the primary goal. Some techniques that have been tried and recommended in literature like partial coverage designs including three-fourth or seven-eighth crowns, use of cantilever prosthesis, resin bonded restorations and others. With advancements in bonding technology, the success of resin bonded restorations has increased dramatically, and it has become a treatment option specially in esthetic regions. Careful designing and meticulous planning allow successful rehabilitation with preservation of tooth structure in comparison to full coverage restorations.

Resin Bonded Prosthesis is defined as 'a fixed partial denture that is luted to tooth structures, primarily enamel, which has been etched to provide micro mechanical retention for the resin luting agent'.[2] Various types of resin bonded fixed dental prosthesis include Rochette, Virginia, Maryland, Cast Mesh and others. The success depends on various factors including pre-treatment assessment of existing occlusion during centric and eccentric contacts, preparation of retentive features and tooth preparation to provide adequate structural durability, surface treatment and proper bonding. This case report highlights rehabilitation of anterior esthetic zone in a partially edentulous patient using Resin bonded Fixed Dental Prosthesis (RBFDP).

2. Case Report

A 34 years old male reported to a dental centre with complaint of unesthetic appearance due to missing upper front tooth since last 01 year. The history revealed that patient sustained a trauma in which his maxillary left lateral incisor was fractured and had to be extracted. Intraoral examination revealed adequately aligned maxillary and mandibular arches with missing maxillary left lateral incisor. On examination of the site, it was seen that the buccolingual dimension was less and depression was seen on the buccal aspect which could be attributed to traumatic extraction (Figure 1). On assessment of occlusion,

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it was seen that patient had Angle's class I molar relation bilaterally with slight crowding in mandibular anterior region. Mutually protected articulation with group function occlusion was seen during eccentric movement (Figure 2). Based on the examination, a diagnosis of PDI class II partially edentulous arch irt maxillary left lateral incisor was made.[3] The treatment options available were implant placement following grafting of the buccal defect, Resin Bonded Fixed Dental Prosthesis, 03 unit Fixed Dental Prosthesis or a removable prosthesis. The treatment options were discussed with the patient and RBFDP was planned.

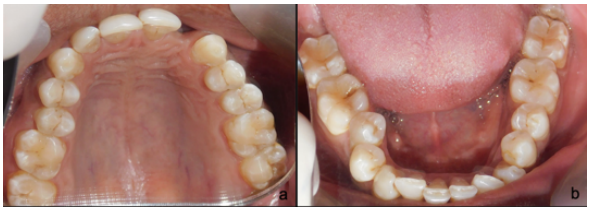

Fig. 1: Pre-treatment intraoral view

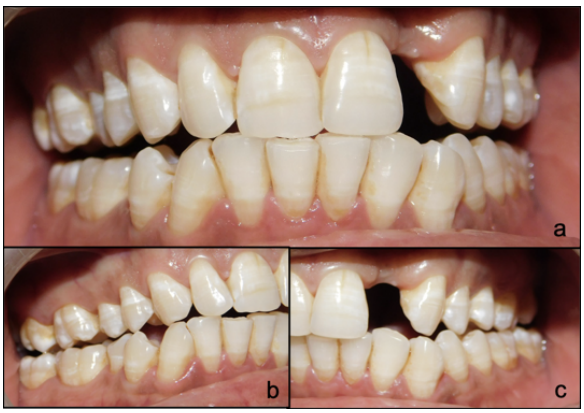

Fig. 2: a: Mutually protected, (b, c) group function occlusion

Diagnostic impression was made using irreversible hydrocolloid impression material (Zelgan 2002, Dentsply, India) and diagnostic mounting was done on a mean value articulator. Diagnostic wax up was done to tentatively assess the post-treatment outcome. Tooth preparation was done according to the biomechanical principle of tooth preparation. About 1mm of tooth reduction was done involving the distal marginal ridge of adjacent central incisor and mesial marginal ridge of adjacent canine. Supragingival chamfer margin was prepared 1.0 mm above the gingival margin. Additional retentive features were provided using a round bur with 0.5 mm diameter at three different locations including cingulum area, mesiopalatal and distopalatal aspect of palatal surface. Care was taken to preserve the mesial marginal ridge of central incisor and distal marginal ridge of canine (Figure 3). Two stage putty wash impression was made using putty and light

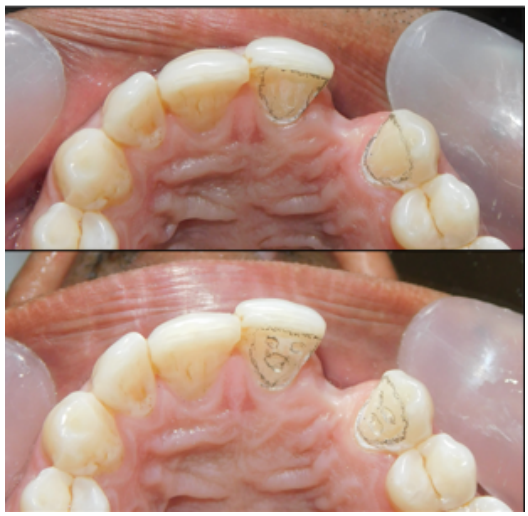

Fig. 3: Tooth preparation with retentive features for RBFDP

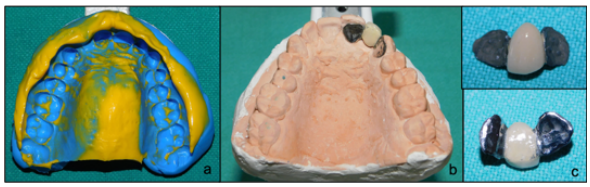

Fig. 4: a: Putty wash impression; (b, c) finished prosthesis

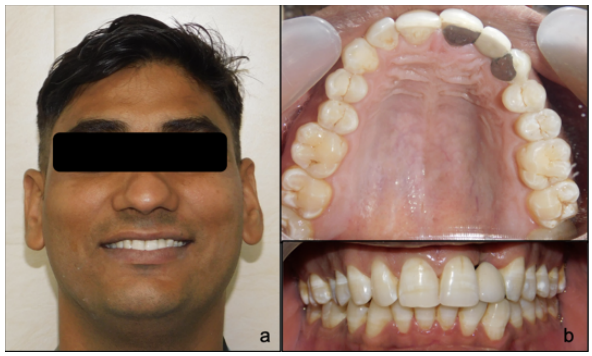

Fig. 5: (a, b): Definitive prosthesis in-situ

body consistency of Polyvinyl siloxane impression material (Elite HD+, Zhermack, Italy) (Figure 4 (a)). The cast was fabricated and mounted on Stratos 200 semi-adjustable articulator using UTS 200 facebow. Provisional prosthesis was fabricated using heat cure polymethylmethacrylate (PMMA) (DPI, India) and luted in-situ. Metal coping and retainer wing extensions were fabricated in Nickel chromium alloy and trial was done. Shade matching was done using Vita classic shade guide (VITA Zahnfabrik, Germany) and ceramic veneering (Ceramco3, Dentsply, India) was done (Figure 4 (b,c)). The intaglio surface of the extension wings were airborne particle abraded using 50 um aluminium oxide particles to create microabrasions.

Table 1: Triad for success of resin bonded restorations

Tooth Preparation[4]	
01.	Maintain existing Incisal Guidance
02.	1.0 mm supragingival margin
03.	Adequate incisal clearance in centric and eccentric contacts
04.	Secondary retentive features like grooves and pinholes
05.	0.5-0.7mm palatal/lingual reduction
06.	Maximum coverage of retainer wings sparing incisal edges and marginal ridges away from edentulous span
Surface Treatment of Prosthesis and Tooth Surface[5]	
01.	Airborne abrasion using Aluminium oxide
02.	Metal primer
03.	Tooth surface treated with 37% Phosphoric acid
Choice of Luting Agent[6]	
01.	Resin luting agent (bis-GMA based resin)

Primer was applied to enhance retention. The prepared tooth surface was etched using 37% Phosphoric acid and luted using self-cure resin luting agent (Rely X, U 200 automix, 3M, India) following manufacturer's instructions under isolation. The prosthesis was checked for clearance during centric and eccentric movement. Hygiene instructions were given to the patient and patient was recalled for follow-up after 02 weeks, 01 month, 03 months, and 06 months. Satisfactory results were seen on subsequent follow up appointments (Figure 5). The key points which were kept in mind during the treatment procedure are summarized in Table 1.

3. Discussion

In 1973, Rochette demonstrated a procedure with no tooth preparation for splinting of periodontally compromised teeth using composite resin as a luting agent to attach cast metal retainers with perforations to treated enamel surface of periodontally compromised mandibular anterior teeth.[7] The advantages of this procedure were conservative procedure with no tooth preparation and perforated wings to enhance retention. The disadvantages were weakening of metal retainers due to perforations, thick lingual retainers not within the contour of tooth, limited adhesion and increased failure rates.

Livaditis et al. and Thompson et al. introduced the 'Maryland Bridge' technique utilizing the electrolytically etched nonprecious Ni-Cr alloys to enhance resin to metal bond. This procedure eliminated the need of perforation of the retainer wings , thereby overcoming the disadvantages of previously documented techniques. The limitations were that the procedure was technique sensitive and restricted only to non-precious alloys.[8]

In 1983 Moon and Knap used salt crystals to create a roughened metal surface and to voids in self-curing acrylic resin patterns. This lost salt technique avoided the limitations of the etched-metal approach. This concept was then known as 'Virginia Bridge'.[9]

Various studies highlight the success of resin bonded restorations. A Meta-analysis of indicated a survival rate of 91.4% after 5 years and 82.9% after 10 years.[10] A systematic review showed the estimated failure rates of resin bonded fixed partial dentures was between 0.53% and 5.10% per year.[11]

The indications for RBFDP includes clinical situations with missing anterior teeth or a short edentulous span with significant clinical crown length and excellent moisture control. They are contraindicated in case of parafunctional habits like bruxism, long edentulous span, compromised enamel surface, compromised abutments and patients with deep bite.

The advantages of RBFDP are that the technique involves minimum tooth preparation, reducing chances of trauma to pulp, supragingival margin, ease in impression making and reduced appointments. The limitations are that good condition of abutment is mandatory and chances of debonding are more.[5]

With the advancements in material and technology, newer materials and techniques have been attempted with variable success rate. Various ceramic materials that have been tried include zirconia, glass-reinforced, alumina-based ceramics, and lithium disilicate glass-ceramics. Digital technology with use of intraoral scanners and Computed aided design/computer assisted manufacturing (CAD/CAM) have also been successfully used in fabrication of resin bonded restorations.[12,13]

4. Conclusion

Resin bonded FDP are a viable treatment option for rehabilitation of anterior esthetic zone. Case selection, occlusal factors, design of tooth preparation, choice of material and luting agent are the key to successful rehabilitation and clinical longevity.[14] The preparation design and technique may differ for different materials like metals, ceramics and zirconia, however the basic considerations remains the same. The triad for success of resin bonded FDP is based on Tooth Preparation and Retentive features, Surface treatment of prosthesis and tooth surface and the Choice of luting agent.

5. Source of Funding

None.

6. Conflict of Interest

None.

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