

Case Report

Resin-Bonded Bridge: Conservative Treatment Option for Single Tooth Replacement

Monika Joshi, Navsharanjit Kaur Chhina, Sanjeev Mittal, Mini Jain¹
Departments of Prosthodontics including Crown and Bridge, ¹Conservative dentistry and Endodontics MM College of Dental Sciences and Research, Mullana, Ambala.

Corresponding Author:

Dr. Monika Joshi

Departments of Prosthodontics

Email: drjoshimonika@gmail.com

Received: 03-10-2013

Revised: 11-11-2013

Accepted: 14-11-2013

Abstract

Resin-bonded fixed partial dentures (RBFDP) were introduced to dentistry around 40 years ago. The typical design of resin-bonded fixed partial denture is characterized by conservation of tooth structure of abutment compared to fixed treatment. This article presents a case report of a patient who reported with missing maxillary central incisor. Multiple treatment options are available for replacement of missing tooth. Use of conventional fixed partial denture in such a situation is criticized because modern dental practice revolves around the principle of preservation of tooth structure. So in such cases resin bonded fixed partial denture is best treatment option.

Keywords: Adhesive, Acid etching, Resin bonded fixed partial denture.

This article may be cited as: Joshi M, Chhina N, Mittal S, Jain M. Resin-Bonded Bridge: Conservative Treatment Option for Single Tooth Replacement. J Adv Med Dent Scie 2013;1(2):162-166.

Introduction

Era of adhesive dentistry dates back to 1955 when Dr. Buonocore introduced enamel acid etching and resin bonding.¹ It not only improved the restorative dentistry but also opened news paths in preventive dentistry. Many enhancements followed this like direct restorations with resins, bondable brackets in orthodontics, fissure sealants in prosthodontics.

In 1973 Dr Rochette of France introduced the idea of bonding a cast metal bar to the lingual surfaces of periodontally involved anterior teeth for splinting purposes using

the acid-etch technique and an unfilled resin cement.²The cast metal splint had perforations made with sloping walls to permit attachment to the resin cement through mechanical interlocking. This idea was applied by Howe and Denehy in 1977 to a specially designed partial denture to the enamel of abutment teeth in the anterior segments of the mouth.³ They used the perforated metal framework design and modified the technique by adding a pontic to replace a missing anterior tooth. This technique provided a fixed partial denture (FPD) tooth replacement with minimal tooth

preparation. Thompson et al refined the framework by electrolytically etching non-precious castings to produce a microscopically roughened surface for providing suitable mechanical retention to the tooth structure through an adhesive luting cement.^{4, 5} This etching process was first described by Dunn and Reisbick and Tanaka et al.^{6,7} (The resin provided mechanical linkage between the micropores of the alloy and the enamel.)

Since that time, a number of significant modifications to this original design have improved its longevity in the oral environment, and currently resin bonded fixed partial dentures (RBFDPs) are considered by many to be a viable alternative to conventional fixed partial dentures. Resin bonded bridges are a minimally invasive option for replacing missing teeth.^{8,9,10} Preparation designs for RBFDPs are strictly limited to the enamel and may comprise palatal veneer preparations, proximal boxes, vertical grooves, guiding planes, or pinholes in the cingulum area.¹¹ This case report describes the use of RBFDP as a valuable treatment plan in restoring smile and oral functions with minimal biological cost.

Case Report

A 17 years old boy reported to the Department of Prosthodontics, Mullana with esthetic disturbance due to missing left maxillary central incisor. (Figure 1 & 2)



Figure 1: Pre operative facial view



Figure 2: palatal view of missing maxillary left central incisor

When replacing an incisor, the dentist has the following options: (1) an implant-supported single crown, (2) a conventional fixed partial denture (FPD), or (3) a resin-bonded fixed partial denture (RBFDP).¹² Patient was also recommended for orthodontics treatment owing to his malocclusion, he refused for this treatment option and also due to economic reasons patient wanted a treatment that is cost effective. So, conservative and cost effective treatment was planned i.e. resin bonded fixed partial denture when compared to conventional FPD and implants. The treatment was then explained in detail and consent was obtained from the patient.

Before preparing the teeth, a diagnostic wax-up was done on study models. Tooth preparation for both 11 and 22 was done following the classical principles for conservative supra-gingival tooth preparations for a resin-bonded fixed partial denture i.e. minimally invasive lingual preparation limited to enamel (0.5 mm), resistance form (lingual chamfer and proximal groove) and maximum covering of the lingual surface area were followed.

A complete final impression of the arch was made with double mix single step technique using polyvinyl siloxane impression material (putty and low viscosity, Aquasil,

Dentsply/Caulk, Milford, DE) with metal stock tray. The impression was poured with die stone and cast was obtained. Die was made on cast obtained. The stone cast was mounted on semi adjustable articulator along with opposing arch. The pattern of retainer and the pontic were fabricated using inlay wax (blue inlay wax, Bego). Modified ridge lap pontic was fabricated, the buccal surface of which was veneered with porcelain. The pattern was invested and then casting was done.

At the try-in appointment, the complete seating of the frameworks, marginal adaptation, pontics form and gingival pressure, esthetics and occlusion were assessed. In this case, the esthetics had to be compromised slightly as edentulous space was narrow. The framework was sent to the laboratory for final porcelain polishing and metal sandblasting.

At the final appointment, a dual-cured resin luting agent (Panavia F 2.0, Kuraray Co. Ltd, Osaka, Japan) was used for cementation. Tooth surface is etched with K Etchant Gel for 10 seconds. ED Primer II is applied to the prepared tooth surface and tooth is air dried gently. Panavia F 2.0 paste is prepared by dispensing equal amount of A paste and B paste and is mixed for 20 seconds. The mixed paste is applied to metal surface of RBFDP and is cemented to the abutment teeth and is light cured for 10 seconds. The excess paste from the margins is removed and then, paste is allowed to cure using OXYGUARD II (Kuraray). After 3 minutes remove OXYGUARD II with water and excess cement adhered to tooth surface is removed by polishing. Evaluation of esthetics is done and minor occlusion adjustments were made. (Figure 3-5) Routine recall visits were performed by the patient to re-evaluate the prosthesis.



Figure 3: Palatal view of resin bonded fixed partial denture replacing maxillary left central incisor



Figure 4: Buccal view of resin bonded fixed partial denture in place



Figure 5: Post operative facial view

Discussion

This case report is an example of the type of clinical situation, the clinicians can encounter in their practice. In such situations, a total management plan should

include dental and oral assessment, evaluation of the patient's complaints, needs, and socioeconomic status.

This treatment modality represents a conservative, esthetically pleasing and rapid solution of a missing tooth when implant placement and/or fixed treatment are not feasible because of financial, social or time restrictions.^{13, 14} This type of conservative treatment allows practitioners to evaluate the clinical condition over time, while offering the patient acceptable restorations. The predictability and longevity of this prosthetic design is less than conventional fixed bridges, but they are less expensive and have low biological cost.¹⁵ Moreover, they offer good esthetics, easy cleaning, less biological damage and no chance of having an undetected debonded retainer with decay underneath it.¹⁶ One major advantage of the resin retained bridge over a conventional bridge is the failure mode is likely to be debonding of the retainer. In conventional Fixed partial denture, the failure mode is likely to be complete fracture of the abutment tooth with difficult-to-manage sequelae, possibly requiring root canal treatment. With a resin retained bridge the prosthesis can usually be cleaned off and rebonded in position with minimal inconvenience to the patient.

According to the literature, the success rate for 2-unit cantilevered resin-bonded restorations with a follow-up of at least 2 years is about 95%.¹⁷ Now a days, all ceramic RBFPDs (IPS Empress 2) are being used for the replacement of the missing teeth because of its minimally invasive technique that does not discolor the abutment teeth.¹⁸ The quality of life of people wearing this type of bridge is, moreover, no different than that of those with implants or fixed partial dentures.¹⁹

Conclusion

This case report presents all the beneficial aspects of choosing this treatment option over the other keeping in view all the clinical and patient conditions. The RBFPDs have undergone significant developments, although the basic advantage of conservation of tooth structure has remained. Their use in carefully selected cases following appropriate preparation designs and cementation procedures can result in long-lasting restorations and a viable treatment modality

References

1. Buonocore M G. A simple method of increasing the adhesion of acrylic filling material to enamel surfaces. *J Dent Res.*1955;34:849.
2. Rochette A L. Attachment of a splint to enamel of lower anterior teeth. *J Prosthet Dent.*1973; 30: 418-23.
3. Howe D F, Denehy G E. Anterior fixed partial dentures utilizing the acid-etch technique and a cast metal framework. *J Prosthet Dent.*1977; 37: 28-31.
4. Thompson V P, Del Castillo E, Livaditis GJ. Resin-Bonded Retainers. Part I: Resin bond to electrolytically etched non-precious alloys. *J Prosthet Dent.*1983; 50:771-9.
5. Burgess J O, McCartney J G. Anterior retainer design for resin-bonded acid-etched fixed partial dentures. *J Prosthet Dent.*1989; 61: 433-6.
6. Dunn B, Reisbick M H. Adherence of ceramic coatings on chromium cobalt structure structures. *J Dent Res.*1976; 55:328.
7. Tanaka T, Atsutz M, Uchiyama Y, Kawashima I. Pitting corrosion for retaining acrylic resin facings. *J Prosthet Dent.*1979; 42:282.

8. Durey KA, Nixon PJ, Chan MF. Resin bonded bridges: techniques for success. *Br Dent J*.2011; 211(3): 113-118.
9. Kern M. Clinical long-term survival of two-retainer and single-retainer all-ceramic resin-bonded fixed partial dentures. *Quintessence Int*.2005; 36: 141-7.
10. Ries S, Wolz J, Richter E J. Effect of design of all-ceramic resin-bonded fixed partial dentures on clinical survival rate. *Int J Periodontics Restorative Dent*.2006; 26: 143-149.
11. Boening K W, Ullmann K. A Retrospective study of the clinical performance of Porcelain-fused-to-metal resin-bonded fixed partial dentures. *Int J Of Prosthodont*.2012; 25: 265-9.
12. Cakan U, Demiralp B, Aksu M, Taner T. Replacement of congenitally missing lateral incisor using a metal-free, resin-bonded fixed partial denture: Case Report. *J Canadian Dent Assoc*.2009; 75: 509-12.
13. Hagiwara Y, Matsumura H, Tanaka S, Woelfel J. Single tooth replacement using a modified metal-ceramic resin-bonded fixed Partial denture: A clinical report. *J Prosthet Dent*.2004; 91: 414-7.
14. Balkaya M C, Gur H, Pamuk S. The use of a resin-bonded prosthesis while maintaining the diastemata: a clinical report. *J Prosthet Dent*.2005; 94:507-10.
15. Wyatt C C. Resin-bonded fixed partial dentures: what's new? *J Can Dent Assoc*.2007;73: 933-8.
16. Briggs P, Dunne S, Bishop K. The single unit, single retainer, cantilever resin-bonded bridge. *Br Dent J*.1996; 181: 373-9.
17. Van Dalen A, Feilzer A J, Kleverlaan C JA.Literature review of two-unit cantilevered FPDs. *Int J Prosthodont*.2004; 17: 281-284.
18. Kara H B, Aykent F. Single tooth replacement using a ceramic resin bonded fixed partial denture: A case report. *Eur J Dent*.2012; 6: 101- 104.
19. Sonoyama W, Kuboki T, Okamoto S, Suzuki H, Arakawa H, Kanyama M, et al. Quality of life assessment in patients with implant-supported and resin-bonded fixed prosthesis for bounded edentulous spaces. *Clin Oral Implants Res*.2002; 13: 359-364.

Source of support: Nil

Conflict of interest: None declared