

Resin Bonded Prosthesis :- A Conservative Approach-Case Report

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Introduction

Fixed prosthodontic treatment involves the replacement and restoration of teeth by artificial substitute that cannot be removed from mouth by the patient. Fixed prosthodontics can offer exceptional satisfaction for both patient and dentist. However fabrication of conventional metal ceramic fixed partial denture involves substantial removal of tooth structure needed to create strong, anatomically contoured esthetic restorations.

Introduction of resin bonded prosthesis had variable popularity since its introduction by Rochette¹ in 1973 who suggested an alternative to conventional metal ceramic restoration by describing the technique for splinting mandibular anterior teeth with a perforated metal casting. The prosthesis requires minimal removal of tooth structure which is appealing, particularly for abutment teeth that are intact and caries free. The primary goal of the resin bonded partial FPD is the replacement of missing teeth and maximum conservation of tooth structure.

Resin bonded fixed partial dentures are minimally invasive fixed prostheses which depend on metal retainer design & composite resin cements for retention. Rochette Bridge gained retention generated by resin cement tags through a characteristic perforated metal retainer. Over the years lots of variations have been developed for improving the longevity of this type of prosthesis. Methods of altering the surface of the metal retainer to enhance micromechanical retention were developed. The term 'Maryland Bridge' resulted from the development of a type of electrochemical etching at the University of Maryland². More recently bridge retention has been enhanced by the development of resin cements which bond chemically to both the tooth surface and the metal alloy.

The restoration is simple in concept and consists of one or more pontics supported by thin metal retainers bonded lingually and proximally to the enamel of the abutment teeth. The basis of retention can be variable like macromechanical, micromechanical retention & chemical. Different types of resin bonded fixed partial denture depending on mode of retention include cast perforated resin bonded fixed dental prosthesis (Mechanical retention "Rochette bridge"), etched cast resin bonded fixed dental prosthesis (Micromechanical retention

"Maryland bridge"), Macroscopic mechanical retention resin "Virginia bridge" and Chemical bonding resin-bonded (Adhesion bridges)³.

The present article focuses on various methods for improving retention of metal retainers followed by a case report describing the design and steps in fabrication of Rochette bridge.

Cast Perforated Restorations^{1,3}:

Rochette in 1973 introduced the concept of bonding metal to teeth by using flared perforations of metal casting to provide mechanical retention. Later Howe and Denehy⁴ recognized the metal framework's improved retention over bonded pontics and began using FPDs with cast perforated metal retainers bonded to abutment teeth and metal ceramic pontics to replace missing anterior teeth. Perforated metal retainers were extended interproximal and on lingual surface of abutment teeth. Main disadvantage of such restorations is weakening of metal retainers by the perforations⁵

Etched Cast Resin Bonded Fixed Dental Prosthesis^{2,3}:

Thompson and livaditis at university of Maryland developed a technique for the electrolytic etching of cast base metal retainers. This type of restoration is also known as Maryland Bridge. Mode of retention for such restoration is micromechanical. Two main advantage of such restoration include

1. Resin to etched metal bond is better than resin to etched enamel thus improving the retention. The retainers can be thinner and still resist flexing.
2. The oral surface of the cast retainers is highly polished and resists plaque accumulation.

Macroscopic Mechanical Retention Resin Bonded Fixed Dental Prosthesis^{6,7}:

In order to improve retention of prosthesis, Virginia commonwealth university school of dentistry developed "lost salt crystals technique". The technique involves coating the abutment teeth with a model spray, followed by application of lubricant. Within the outlines of retainers, specially sized salt crystals (150-250µm) are sprinkled over the surface leaving the 0.5mm of peripheral borders. This is followed by fabrication of resin pattern and invested for casting. During the investment and dewaxing procedure the salt crystals are lost, leaving the surface rough for macromechanical retention. This type of resin bonded prosthesis was named as "Virginia Bridge".

Chemical Bonding Resin-bonded Fixed Dental Prosthesis^{8,9}:

This system is based on a chemical adhesion of resin prosthesis with the modified super-bond cement. This type of prosthesis was named as adhesion bridges. Bis GMA-based composite resin luting cement that is modified with the adhesion protomotor 10-methacryloxydecyl dihydrogen phosphate (MDP).

Panavia resin luting agent has shown excellent bonds to particle abraded Ni-Cr and Cr-Co alloys.

Case Report

A 23 years old male patient reported to the Department of Prosthodontics, S.G.T Dental College, Gurgaon, Haryana, with chief complaint of missing anterior teeth. Patient reported with a history of tooth evulsion from trauma one month back. No significant medical history was reported. On clinical and radiographic examination, right central incisor was missing with partially healed socket and loss of buccal cortical plate was noted (Fig. 1a, 1b).



Fig. 1a Pre-Operative Extraoral View



Fig. 1b Pre-Operative Intraoral View

Various treatment options for replacing

missing central incisor were suggested to the patient, which included: Removable prosthesis, Conventional fixed partial denture & Resin modified fixed partial denture, Rehabilitation with implant supported prosthesis with grafting. Out of all options, patient opted for more conservative resin bonded fixed prosthesis.



Fig.2 Tooth Preparation Done on Lingual & Proximal Surface

This clinical report describes a technique for the fabrication Resin modified fixed prosthesis for replacement of missing central incisor.

Technique

Preparation of the Abutment Teeth for Retentive Retainers (wings) (fig.3)



Fig.3 Metal try-in done

Preparation was restricted to lingual and proximal surface of adjacent abutment teeth i.e. left central incisor and right lateral incisor.

Lingual reduction was done leaving 1mm short from incisal edge. Chamfer Finish line with supragingival margins was given (approximately 1mm above free gingival margin). 0.5mm of lingual reduction was done to create interocclusal clearance.

Proximal reduction, bur was held parallel to the path of placement with slight lingual inclination. Sufficient reduction was done so that we get sufficient space for metal connector. Proximal contact area was included but care was taken not to extend preparation too far buccally for esthetics reasons. Care should be taken to prevent formation of any undercut.

Proximal grooves were provided on both mesial and distal proximal surface of both abutment teeth with the help of 0.5mm tapered diamond bur. Groove were placed 0.5mm short of finish line so that it does not interfere with marginal integrity of prosthesis. Also should be 0.5mm lingually to the labial termination of tooth preparation. Paralleling of proximal grooves was given utmost importance so as to have single path of insertion.

Inter occlusal clearance of 0.5mm was given in maximum intercuspation and eccentric

movements, for metal retainer on both abutment teeth. Reduction was restricted to enamel so as to make acid etching more effective for luting cement (Dentsply, Aquasil) to make effective bond.

Impression was recorded using addition silicon impression material. Putty and light body consistency was used to make two step impression procedure and poured using Die stone. Shade selection was done using VITA 3 D shade guide. Temporary occlusal stops were created on the lingual surface of abutment teeth using composite resin so as to prevent any supra eruption. Metal try in was done followed by porcelain layering of the prosthesis (Fig 4).



Fig.4 Funnel shaped perforations were made on metal retainers for mechanical retention & followed by porcelain layering on pontic Cementation of the prosthesis was done using dual cure resin luting agent (3M ESPE Rely X) (Fig.5)



Fig.5 Prosthesis Was Cemented Using Resin Luting Cement

Discussion

The primary goal of the resin bonded partial FPD is the replacement of missing teeth and maximum conservation of tooth structure. Involving adjacent teeth for replacing a missing maxillary anterior with conventional fixed partial denture makes esthetics compromised and also it is a less conservative method. Resin bonded fixed prosthesis suggested a good alternative to conventional metal ceramic fixed partial denture and its substantial removal of tooth structure needed to create a strong, anatomically contoured and esthetic restorations. A prosthesis that requires minimal

removal of tooth structure is appealing, particularly for abutment teeth that are intact and caries free.^{10,11}

Most important criteria's for success of resin bonded prosthesis are the retention gained by metal retainers or wings. Various methods to improve the bond strength of resin bonded prosthesis with abutment teeth have been advocated in literature. Bonding is affected by design of retainer and the adhesive cements being used.

In this article cast perforated resin bonded fixed dental prosthesis has been used to replace missing central incisor. This design used flared perforations of the metal casing to provide mechanical retention. These perforations were funnel shaped.

This method also has some disadvantages associated with it like weakening of metal and also resin exposed through these perforations is subjected to wear. However this is an easier and effective method of replacing single anterior teeth as this segment is less liable to masticatory forces. Now a day's 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. 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.^{12,13,14}

Conclusion

Resin bonded prosthesis had undergone lots of design changes for metal retainers in order to improve retention and increase the longevity of restoration. Various adhesive resin cements had been used over years with continuous modifications. These changes have improved the bond strength of resin bonded prosthesis and they have come out with a promising option for replacing anterior teeth with even removing much tooth structure from the abutment teeth.

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