A REVIEW ON RESIN BONDED PROSTHESIS

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Abstract

Resin bonded bridges are a minimally invasive option for replacing missing teeth. The minimal-preparation, resin retained adhesive bridge may be considered to be an ideal choice of fixed prosthesis to replace a single missing tooth, especially in the anterior region. Many dental practitioners do not use adhesive bridges because of concerns over high failure rates. This article highlights advantages, disadvantages, types of framework and bridge designs and clinical procedure which may improve outcome, with a special mention of all ceramic resin bonded bridges.

Key Words Resin bonded bridges, adhesive bridge, bridge design, minimally invasive, all ceramic resin bonded bridges.

INTRODUCTION

Resin bonded or resin retained bridges (RBBs/RRBs) are minimally invasive fixed prostheses which rely on composite resin cements for retention. These restorations were first described in the 1970s and since this time they have evolved significantly. The first type of RBB was the Rochette Bridge, which relied on the retention generated by resin cement tags through a characteristic perforated metal retainer. However, longevity of this type of restoration was limited and in an effort to address this, methods of altering the surface of the metal retainer to enhance micromechanical retention were developed.2The term 'Maryland Bridge' resulted from the development of a type of electrochemical etching at the University of Maryland. 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.

Advantages of resin bonded prosthesis

- Conservation of tooth structure
- Lack of pulpal involvement
- No anaesthesia required
- Minimum periodontal involvement
- Simplified impression procedures
- Improved esthetics
- Provisionals not usually required
- Possibility of rebonding
- Replacement of missing anterior teeth in children and adolescents
- Caries free abutment teeth or unrestored abutments

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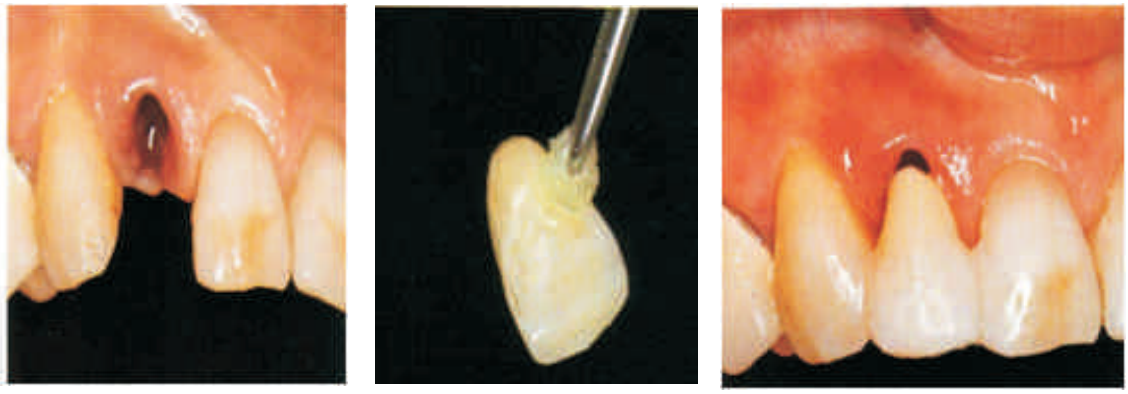


Natural tooth used as pontic

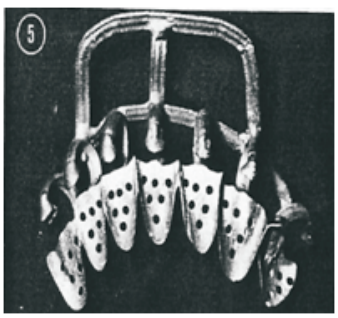
Disadvantages of resin bonded prosthesis

- Irreversible
- Uncertain longevity
- No space corrections
- Good alignment of abutments is required
- Plaque accumulation
- Esthetics compromised on posterior teeth
- Incisal graying
- Dependence on laboratory
- Replacement of missing anterior teeth in children and adolescents
- Caries free abutment teeth or unrestored abutments
- Mandibular &Maxillary incisor replacement
- Periodontal splints
- Post orthodontic stabilisation
- Prolonged placement of interim prosthesis

Types of different resin bonded bridges

Bonded Pontics

- Cast Perforated Resin Retained FPD's
- Etched Cast Resin Retained FPD's
- Macroscopic Mechanical Retention Resin Retained FPD's
- Cast Mesh FPD's
- Chemical Bonding Resin Retained FPD's



- Fibre Reinforced Composite Resin FPD's
- All ceramic resin bonded bridges

Bonded Pontics

ACRYLIC RESIN DENTURE TOOTH Advocated by Ibsen (1974) and Buonocore in (1975).They used acrylic denture tooth. SIMONSEN in 1978 used composit tooth as pontic Simonsen, Davilla and Gwinnet also used natural tooth as same purpose. But these prosthesis had some short comings.

Disadvantages

- Composite resins were brittle
- They required supporting wire or stainless steel mesh framework.
- Their use is limited to short anterior spans.

Limited lifetime with debonding of resin and subsequent fracture

CAST PERFORATED RESIN BONDED FPD (ROCHETTE BRIDGE) Actually rochette bridge first used as periodontal splinting then the concept was used by Livaditis for replacement of posterior teeth. The extension of the wings in this prosthesis interproximally and onto occlusal surfaces. Tooth modification is require. Survival rate -3 years

Disadvantages of Rochette Bridges

- Failure through the resin projections into the perforations
- Wear of composite resin
- Weakening of alloy framework
- Thick lingual retainers

Etched Cast Resin Retained FPDs (Maryland Bridge): *Livaditis and Thompson* (1980) in University of Maryland give an newer oncept of resin bonded prosthesis. Thay studied for etching conditions of non berrylium Ni-Cr alloys by electro chemical method. Thay used Nitric acid : 0.5 N as electrolytes and passed current : 250 mA/sq cm for 5 minutes .Then the metal frame work was immersed in 18% Hcl for 10 minutes. This produced micromechanical retention.

Drawbacks of Maryland Bridge

- Technique sensitive
- Lab dependent
- Varies with metal type
- Prone to contamination
- Cannot be Technique sensitive
- Can not be done with noble metal alloys

Macroscopic Mechanical Retention Resin Retained FPDs

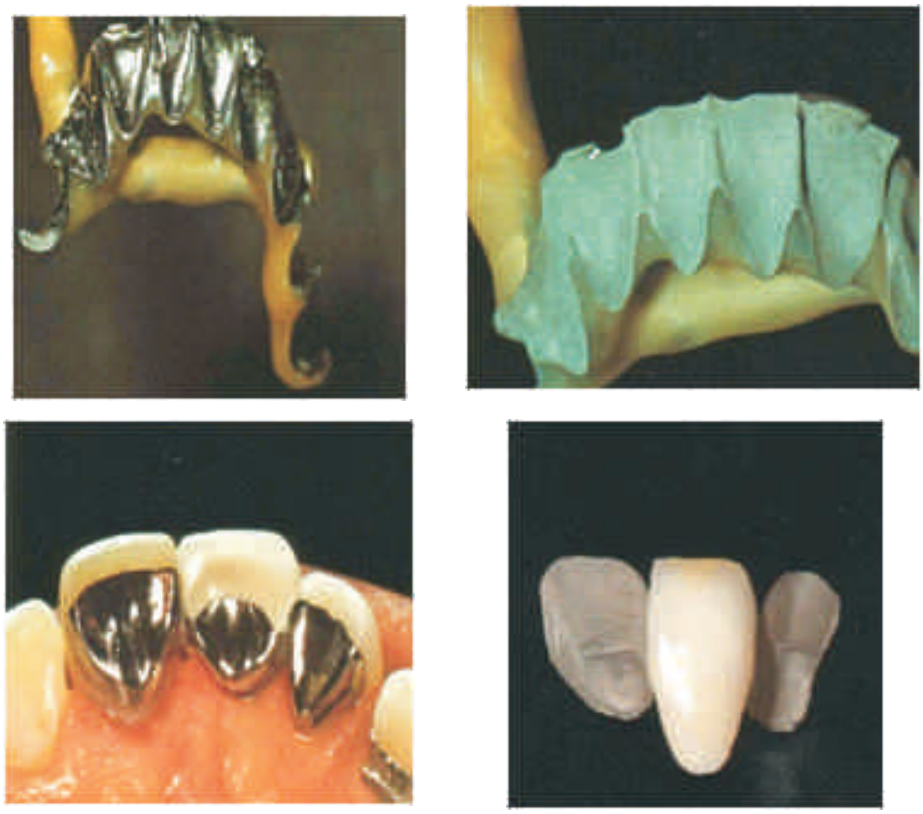
- Developed by Moon & Hudgins et al in Virginia Commonwealth university school of dentistry. This is also called the Virginia bridge. It is prepared by lost salt technique. Salt crystal size 150-250 microns are used. This type of bridges have adequate bond strength , may be used for any metal ceramic alloy.
- Chemical Bonding Resin Retained FPDs

Tiller et al (1985) invent this procedure. Adhesion of the bridges done by surface treatment of metals through sand blasting. Alumina (50 microns) are used for sand blasting. Sandblasting results in a highly activated metal surface which demonstrate increased wett ability of the surface.

Fiber Reinforced Composite Resin FPD Consists of a fibre reinforced substructure veneered with composite material. It has increased flexural strength , fracture resistance & increased tensile strength It is transluscent

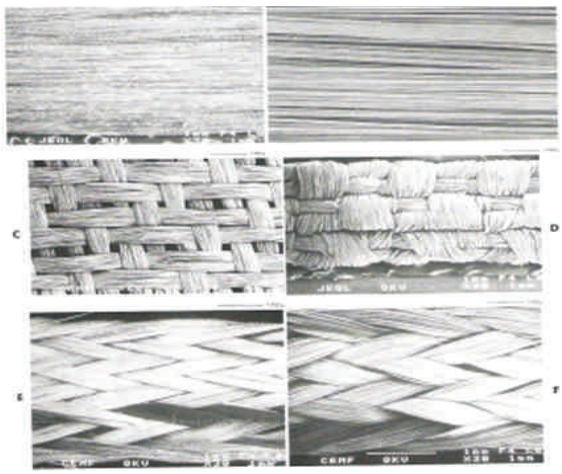
- **Procedure:** Preparation of abutment teeth done. Length is measured.

Moistening of fiber Fiber bar pressed into the preparation & polymerised with resin Pontic build up & curing. One of the basic principles of tooth preparation for fixed prosthodontics is conservation of tooth structure. This is the primary advantage of resin-retained fixed partial dentures. Precision and attention to detail are just as important in the success of the prosthesis.



Maryland bridges produce micro mechanical bonding

Types Of Fibres : Glass, Polyethylene, Polypropylene, carbon



All Ceramic Resin Bonded Bridges

The graying of the incisal edges of thin teeth by metal retainers and metal display from proximal wrap around has been a huge objection to the otherwise esthetically pleasing restoration. Potential of allergy to Nickel is also a concern for many practitioners. In such scenario, the demand for All Ceramic RBBs is ever increasin. With the advent of Zirconia based restorations and reliable adhesive technology, this dream has come true and these restorations are functioning aptly in the oral cavity, although long term studies are lacking.

Tooth preparation

Posterior design principles

- Distinct path of insertion
- Proximal resistance form
- Proximal wrap around
- Maximum bonding area
- Occlusal rest
- Definite gingival margin
- 2 plane reduction for maxillary molar.
- Extension of casting onto occlusal surfaces
- Lingual cusp coverag
- Onlay on tilted molars

Anterior design principles

- Virtical path of incertion
- Extension of framework onto uninvolved marginal ridge
- Definite finish line
- Cingulum notches or counter sinks
- Grooves
- Exsisting restoration may be incorporate

Factors related to success of resin bonded bridges

Case selection

- Patient selection: are they motivated/compliant?
- Does the space need to be restored? What options are there for restoration?
- Abutment tooth quality: is the tooth periapically and periodontally healthy? Is there periodontal support adequate? Is there sufficient enamel surface area for bonding and how translucent is the enamel?
- Tooth position: is spacing and alignment of natural teeth favourable? How large is the pontic span and will the abutment(s) support this span length?
- Occlusal assessment: is there sufficient space for a pontic of the right shape and size and the retainer, or does this need to be created?
- Parafunctional habits: are there any habits that can be eliminated or do they need to be managed as part of the treatment plan?
- Expectations: has enough information been provided? Are the patient's expectations realistic with regard to aesthetics and longevity?

Bridge design

- Retainer of 0.7 mm thickness
- Full retainer extension as allowed by aesthetic demands
- Minimal ICP contact
- Careful management of excursive contacts to avoid undue forces on pontic
- Use of an ovate pontic were aesthetics are important

Clinical techniques

- Replace existing restorations with composite

- Ensure adequate clinical crown height or crown lengthen to increase bonding area if necessary Create space for the restoration: opposing tooth adjustment, preparation of abutment tooth or cement at increased OVD

- Preparation: for unrestored teeth use minimal preparation, on restored teeth, extend preparations into restorations to increase resistance form

- Assess shade accounting for opaque cement and possible grey shine through of retainer wing Prepare the pontic site to improve gingival profile when needed for aesthetics

- Excellent moisture control during cementation and use of a resin cement with a phosphate monomer eg Panavia

- Protect the final result: provide a night guard or orthodontic retention if required.

Clinical success

Despite this recognised advantage, the role of RBBs as definitive restorations remains somewhat controversial due to a lack of long term prospective data regarding success. The majority of information is based on the results of longitudinal studies, many of which have been poorly controlled, used a variety of cements and preparation techniques making it difficult to isolate factors affecting outcome. Recent systematic reviews have estimated the five-year survival rates for bridgework as 87.7% for resin bonded prostheses and just over 90% for conventional bridges depending on design.5 Although these rates are lower than the 94.5% success reported for implant retained single crowns over the same five year follow up, In contrast to these favourable estimations of RBB success, Hussey et al. 7 reported high failure rates when they used the number of recement fees claimed to gauge the success of RBBs in NHS general practice. Additionally, a recent study of RBB designs employed by dentists in both general practice and hospital settings reported that a high proportion of practitioners used unfavourable techniques. It seems reasonable to assume that with improved education and careful planning, outcome could be improved.

SUMMARY AND CONCLUSION

The RBB requires less clinical time and, in most cases, is less demanding to fit than all other forms of tooth replacement. Failure is generally far less catastrophic than with conventional bridges or implant retained prostheses. RBBs can now be considered to be a minimally invasive, relatively reversible, aesthetic and predictable restoration for prescription in general dental practice. More recent studies give data indicating survival times that are good enough for these restorations to be considered permanent, whilst their non-invasive nature is an added benefit. Recent systematic reviews have estimated the five-year survival rates for bridgework as 87.7% for resin bonded prostheses and just over 90% for conventional bridges depending on design. Although these rates are lower than the 94.5% success reported for implant retained single crowns over the same five year follow up, RBBs has the advantages of being less invasive, requiring a shorter total treatment time and less financial commitment.

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