CONSERVATIVE BRIDGES - AN UNEXPLORED TREATMENT OPTION

ABSTRACT

Conservative bridges are a minimally invasive treatment option for replacing missing teeth. When compared to conventional bridges that causes pulpal trauma and bone resorption, they require minimal tooth preparation and are ideal for both young and geriatric patients. Since their introduction in the early 1970s, they have undergone various changes in their method of retention and materials used in their construction. Perceptive patient selection with ideal execution of clinical procedures will ensure long lasting clinical outcome when one or possibly two teeth are to be replaced. This review article details the history, advantages, indications, survival, and designs of resin-retained bridges.

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INTRODUCTION

Various treatment options are available for the replacement of the missing teeth such as implant, removable partial denture, and fixed partial denture. Removable partial denture may cause bone resorption and flattening of the interdental papillae in the long term. Conventional bridges require adequate amount of tooth preparation of all the surfaces of the abutment tooth which may lead to pulpal trauma and hypersensitivity in young adult patients. In teeth with large pulp chambers and insufficient enamel, a more conservative and less invasive resin bonded prosthesis may be an alternative treatment to replace the missing tooth as well as to preserve the remaining tooth structure.¹

In 1973, Rochette pioneered the use of a a perforated type IV gold cast alloy framework with acid etch composite for periodontal splinting of anterior teeth². In 1977, Howe and Denehye described a technique for the fabrication and attachment of an anterior fixed partial denture (FPD) to the lingual surface of abutment teeth using composite resin and acid-etch enamel³. In 1980, the first resin bonded bridge utilizing a framework for the replacement of posterior teeth was described by Lividitis⁴. Since then there has been tremendous development in surface treatments, enamel and dentine bonding agents and resin cements, thus increasing the popularity of conservative bridges.

INDICATIONS

- a) The ideal site for a conservative bridge is where the edentulous space is no wider than one or two teeth.⁵
- b) In young patients, because the teeth usually have large pulp chambers and short clinical crowns.
- c) Older patients with gingival recession and mobile teeth because splinting can be incorporated with the bridge.
- d) Un-restored/minimally restored teeth⁶.

CONTRAINDICATIONS

- a. Insufficient tooth enamel.⁷
- b. If the abutement teeth has very high mobility and has large restorations.
- c. Excessive occlusal loading. Debonding may occur when occlusal contacts are present on the pontics in excursive movements.⁸
- d. Difficulty in isolation for cementation to achieve a dry field.⁹



Illustration of stepwise fabrication of Maryland bridge for missing 21

A) preoperative photograph B) outline for final preparation C) lingual view D) facial view of conservative bridge (Photo Courtesy - Dr. Prasanth Dhanapal)

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CLASSIFICATION

Conservative bridges are classified according to the type of pontic: A. Natural Tooth Pontic; The crowns of natural teeth (primarily incisors) often can be used as acid-etched, resin-bonded pontics.¹⁰

Indications

- a. Periodontally involved teeth that warrant extraction.
- b. Teeth with fractured roots
- c. Teeth that are unsuccessfully reimplanted after avulsion.
- d. Teeth with unsuccessful root canal treatment.

B. Denture Tooth Pontic; An acrylic resin denture tooth can be used as a pontic for the replacement of missing maxillary or mandibular incisors by using the acid etchresin bonding technique(11). This type of bridge is sometimes used as an interim prosthesis and is called a temporary bridge, it can be a viable alternative to a conventional bridge.

C. Pontic, Either Of Porcelain-Fused-To-Metal Pontic Or All-Metal Pontic With Metal Retainers; A stronger and more permanent type of acidetched,resin-bonded bridge is possible by use of a cast metal framework .In anterior areas where esthetics is a consideration, the design of the bridge includes a porcelain fused-tometal pontic with metal winged retainers extending mesially and distally for attachment to the proximal and lingual surfaces of the abutment teeth. In posterior areas where esthetics is not a critical factor, the bridge can have either a porcelain-fused-to-metal or an all-metal pontic.

Types of Resin-Bonded Bridges with Metal Retainers

1. Rochette Bridges

This type uses small countersunk perforations in the retainer sections for retention and is best suited for anterior bridges. The perforations should be approximately 1.5 to 2 mm apart and have a maximum diameter of 1.5 mm on the tooth side. Each hole is countersunk so that the widest diameter is toward the outside of the retainer. When the bridge is bonded with a bonding medium, it is mechanically locked in place by microscopic undercuts in the etched enamel and the countersunk holes in the retainer.

2. Maryland Bridges

Instead of perforations, the tooth side of the



Illustration of stepwise fabrication of Maryland bridge for missing 31 A)preoperative photograph B)outline for final preparation C)metal coping D)lingual view E)facial view of resin bonded bridge (Photo Courtesy – Dr.Prasanth Dhanapal)

metal framework is electrolytically or chemically etched, which produces microscopic undercuts. The bridge is attached with a self-cured, resin-bonding medium that locks into the microscopic undercuts of both the etched retainer and the etched enamel. It can be used for both anterior and posterior bridges. Recently, Maryland bridges are fabricated with no electrolytic etching of the surface and chemically bonded to the tooth by a process called silicoating¹². 4-META or phosphate ester-containing, resin bonding medium that is capable of strongly bonding to metal surfaces can also used.13 These types of Maryland bridges are referred to as adhesion bridges.

D. All-Porcelain Pontics: Improvements in dental porcelains along with the capacity to etch and bond strongly to porcelain surface have made all-porcelain pontics a viable alternative to pontics with metal, "winged" retainers.¹⁴ They are indicated when the tooth anatomy precludes or restricts the preparation and placement of a metal, in adolescents and young adults with virgin unrestored teeth due to less invasive preparation. In young patients all-porcelain pontics can also be placed as interim restorations until implants or a more permanent prosthesis can be done at an older age. They are contraindicated if the abutment teeth has no intact proximal enamel surfaces, contain large composite restorations or if it unstable due to high mobility.

Fibre Reinforced Composite Resin Bridges

These bridges are adhesive, minimally invasive, and economic single unit restorations that can be used for single visit replacement of a missing tooth. Ribbond is a bondable, polyethylene, lock-stitch multidirectional reinforcement ribbon for composite resin.¹⁵ It has been reported that the lock-stitch weave of Ribbond are easier for clinician's to manipulate, increase flexural strength and flexural modulus of composite resins and resists cracking.

Predictability of Survival Rate

Based on statistical analysis, the predicted survival rate for 5 years and 10 years are 83.6% and 64.9% respectively.¹⁶ Retention of RBB in

maxilla when compared to mandible is 1.774. 77% of the complications were due to debond of RBBs and 13% were due to porcelain fracture. Parafunctional habits might increase the risk of failure of restorations. Silicoating has been reported to show better retention than other surface treatments¹⁷.

CONCLUSION

Conservative bridges can be considered as minimally invasive, reversible, aesthetic, and predictable restorations for fixed replacement of missing teeth. These can be ideal restorations for fixed replacement of teeth if good survival rates can be achieved .Proper patient selection, treatment planning will help to fabricate successful restorations with longer survival rate.

REFERENCES

- Lividitis G. J. (1980) Cast metal resinbonded retainers for posterior teeth. J. Am Dent. Assoc. 101,926-929.
- 2. Rochette AL. Attachment of a splint to enamel of lower anterior teeth. J Prosthet Dent 1973;30:418-23.
- 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.
- Edelhoff D, Sorensen J A. Tooth structure removal associated with various preparation designs for anterior teeth. J Prosthet Dent 2002; 87: 503–509.
- 5. Ritter AV. Sturdevant's art & science of operative dentistry-e-book. Elsevier Health Sciences; 2017 Dec 20
- George G, Hemmings K, Patel K. Resinretained bridges re-visited part 1. history and indications. Primary Dental Care. 2002 Jul 1;9(3):87-91
- Creugers NH. Resin-retained bridges in the treatment of traumatized dentition. Dental Traumatology. 1993 Apr;9(2):53
- Durey KA, Nixon PJ, Robinson S, Chan MY. Resin bonded bridges: techniques for success. British dental journal. 2011 Aug;211(3):113-8

- Balasubramaniam GR. Predictability of resin bonded bridges–a systematic review. British Dental Journal. 2017 Jun;222(11):849-58.
- 10. Ibsen RL. Fixed prosthetics with a natural crown pontic using an adhesive composite.Case history. J South Calif Dent Assoc1973;41:100-2
- Stolpa J. B. (1975) An adhesive technique for small anterior fixed partial dentures. J. Prosthet. Dent. 34,5 13-5 19
- Musil R, Tiller HJ. The Adhesion of Dental Resins to Metal Surfaces. The KulzerSilicoater Technique. Wehreim: Kulzer &GmbH, 1984
- Cooley RL, Burger KM, Chain MC: Evaluation of a 4-META adhesive cement, J Esthet Dent 3(1):7, 1991
- 14. Moore DL et al: Retentive strength of anterior etched porcelain bridges attached with composite resin: an in vitro comparison.
- 15. Strassler HE, Taler D, Sensi L. Single visit natural tooth pontic bridge with fiber reinforcement ribbon. Oral Health. 2007 Jul;97(7):24.
- 16. Pjetursson B E, Tan W C, Tan K, Brägger U, Zwahlen M, Lang N P. A systematic review of the survival and complication rates of resin-bonded bridges after an observation period of at least 5 years. Clin Oral Implants Res 2002; 19: 131–141
- 17. De kanter R J, Creugers N H, Verzijden C W, Vant hof M A. Five-year multi-practice clinical study on posterior resin-bonded bridges. J Dent Res 1998; 77: 609–614