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CASE REPORT

Design Elements for the Success of Maryland Bridge Revisited: A Case Report

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***ABSTRACT*:**
Resin bonded bridges are a minimally invasive option for replacing missing teeth. Although they were first described over 32 years ago, evidence regarding their longevity remains limited and these restorations have developed an undeserved reputation for failure. This article provides a brief review regarding design aspects and clinical procedure to bring about success of a Maryland bridge.
Key words: Maryland Bridge, Resin cement.

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INTRODUCTION

A space in the anterior region of the dental arch of youngster, either due to trauma or a congenital missing tooth can produce colossal amount of psychological impact on the patient. The various treatment options including implants, removable partial denture and fixed partial denture are available for adults but these treatment options cannot be applicable for an adolescent due to reasons like growth of the jaws and the amount of tooth reduction in such an early age. In such situation a resin- bonded fixed partial denture (RBFPD) such as Maryland bridge fulfils all the requirements of an ideal interim solution till growth completion is achieved. The "Maryland Bridge" or the etched metal-composite bonded retainer has experienced a variety of clinical applications since its inception in the year 1982.[1,2]

Resin bonded or resin retained bridges (RBBs/RRBs) are minimally invasive fixed prostheses which rely on composite resin cements for retention. But certain clinical and radiographic criteria must be satisfied prior to using Maryland bridge as a mode of treatment in prescribed cases.[3,4,5]

These restorations were first described in the 1970s and since this time they have evolved significantly.[6] 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. The term 'Maryland Bridge' resulted from the development of a type of electrochemical etching at the University of Maryland.[7,8] 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. From a clinician's perspective, the main advantage of RBB in comparison to conventional bridge preparations is the conservation of tooth structure. This is especially important for young patients who may be more likely to experience endodontic complications as a result of extensive tooth preparation.[9,10]

CASE REPORT

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. In order to emphasize the design elements involved in the success of such type of prosthesis a case presentation is done over here.

A female patient, aged 16 years presented with missing central incisors (11, 21).Patient gave a history of loss of tooth due to trauma 2 years back. Clinical examination revealed well defined space and perfectly healed ridge with respect to missing central incisors (Fig 1).

Fig 1 Preoperative photograph showing missing central incisors

An intra-oral periapical radiograph was taken and the radiograph revealed complete root formation of the adjacent teeth (12 & 22). After considering the patients wish and the clinical situation, the option of removable partial denture, fixed partial denture and implant were eliminated and it was decided to replace it with a Maryland bridge as an interim solution. Tooth preparation for both 12 and 22 was done following standard technique. Lingual preparation ended 1mm from the incisal edge and a chamfer finish line was prepared 1 mm supragingivally (Fig. 2).

Fig 2 Tooth preparation -12, and 22

An impression was made in custom tray with single stage double mix technique using polyvinyl siloxane impression material and sent to the laboratory (Fig 3).Wax pattern was fabricated with the inlay casting wax. The laboratory technician was instructed to keep the metal wings of the prosthesis off the incisal third to prevent darkening of the tooth because of the inhibition of light transmission. In addition, care was taken to make sure metal would not be visible interproximally or at the embrasure areas (Fig 4). After the metal try-in was successful (Fig 4), shade selection was done using Vita 3D master shade guide. The final trial fit of the prosthesis was done and then esthetics, mastication and speech were evaluated. After isolation with a rubber dam, the Maryland bridge was cemented using a resin cement (Panavia F2, Figs 5 and 6). An Oxygen inhibiter supplied with the cement was placed over the restoration margins for complete margin resin setting.

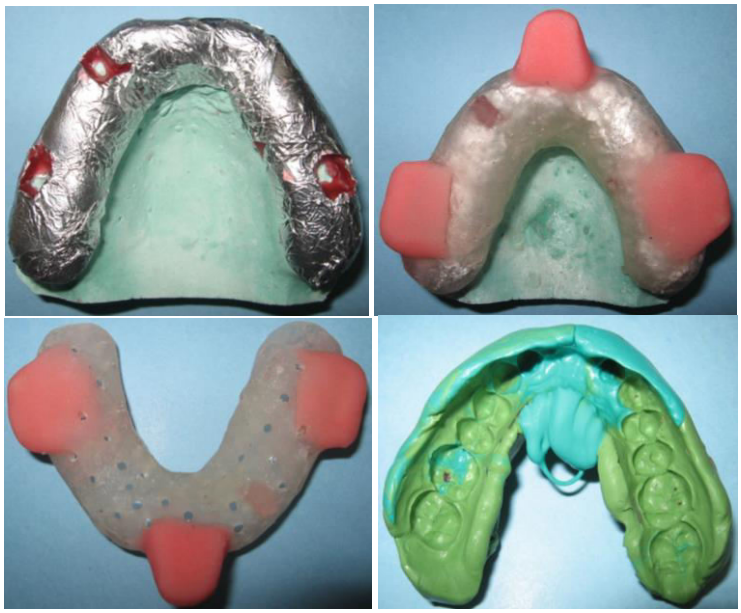

Fig 3 Custom tray fabrication and final impression using light and heavy body PVS impression material

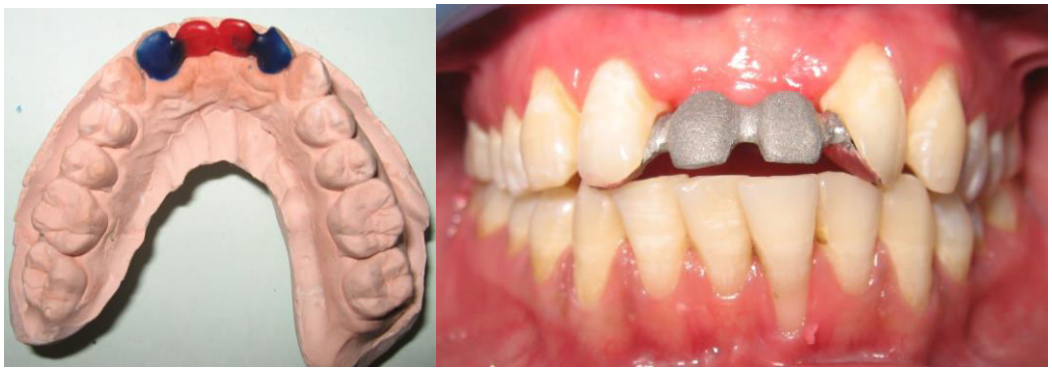

Fig 4 Wax pattern fabrication and clinical trial of the framework

Fig 5 Maryland bridge with resin cement on metal wings and application of oxygen inhibitor

Fig 6 Post operative view: cemented Maryland bridge

Table 1: Phases of treatment for fabrication of Maryland bridge

Preparation of Abutment Teeth	Framework Design	Bonding Procedure
1. Preparation in enamel only. **2.** 1mm of the enamel is left untouched form incisal or occlusal edge. **3.** Supragingival chamfer margins **4.** >180 wraparound is particularly important to achieve resistance form. **5.** 0.5mm deep slot, prepared with a carbide tapered bur should be placed slightly lingual to the labial termination of the proximal reduction. **6.** Paralleling of proximal groves. **7.** 2-3 occlusal stops are required and should be prepared in enamel only.	1. Framework is either waxed with Inlay Casting wax or is designed with the helpof cold cure acrylic resin. 2. Ni- Cr alloy is used for casting of the framework. 3. After verifying the final fit of the framework, the fitting surface is cleaned with a particle unit using aluminium oxide (50µm) at 40psi pressure.	1. Panavia F2 composite rein cement is used for cementation of the framework as it exhibits excellent bond strength with Ni- Cr alloy. 2. Panavia F2 has an anaerobic setting reaction and does not set in the presence of oxygen. Oxygen inhibiter is supplied with the cement and it is a polyethylene glycol gel i.e. placed over the restoration margins.

DISCUSSION

A missing tooth in the anterior region is not only a physical loss, but also may be atraumatic emotional experience for the patient particularly children. To remove healthy tooth structure of adjacent teeth in such a case is a very aggressive treatment option. Each treatment modality was considered and explained to the patient. Patient awareness of the advantages and disadvantages of different treatment modalities is very important for decision making, therefore many factors make single-tooth replacement one of the most challenging restorations in dentistry. General factors such as the health, age of the patient, their expectations, local factors related to dental health and the missing tooth itself need to be taken into account.[1,2,5]

Considering the patients individual needs, Maryland bridge was planned to replace the missing central incisors. Healthy lateral incisors with sufficient clinical crown length were the planned abutments. Patient was evaluated for parafunctional habits and deep bite. In the fabrication of resin-bonded bridge attention was given to three phases of treatment viz. preparation of abutment teeth, laboratory procedure for framework fabrication and finally bonding of the framework with resin based cements(Table I).[2]

The traditional treatment for a single edentulous space is a conventional fixed partial denture. A major shortcoming of this alternative is the significant tooth reduction of the abutments. The use of fixed partial denture should be avoided in young actively growing patients because the rigid fixed partial denture could interfere with the development of occlusion in such patients. It has been proven in the literature that even after 10 years of service, the periodontal response for resin bonded fixed partial dentures is minimal. The three most common complications associated with resin-bonded prosthesis are debonding (21%), tooth discoloration (18%) and caries (7%).[1] Inspite of this, implication of interim prosthesis for pediatric patients with proper treatment plan can serve as a shelter from ill effects related to edentulous space and invasive replacement procedure like fixed partial denture and implants in growing patients.[7] One of the basic principles of tooth preparation for fixed prosthodontics is conservation of tooth structure. This remains the primary and most important advantage of resin bonded bridges.

CONCLUSION

Careful patient selection has been an important factor in determining clinical success of any prosthesis so is the case with Resin bonded bridges. This prosthesis can be highly effective in replacing missing teeth, restoring oral function and aesthetics and result in high levels of patient satisfaction if certain design elements are taken care. Finally they represent a minimally invasive, cost effective and long lasting treatment modality if done meticulously..

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