

## Case Report

# All Ceramic Bonded Bridge: Clinical Procedure and Requirements

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### Abstract

One of the basic principles of tooth preparation for fixed prosthodontics is conservation of tooth structure. This is the major advantage of bonded bridge as an alternative to implant retained restorations in the esthetic zone. Especially used for juvenile patient who do not come into consideration for implant therapy?. This article describes the use of an all ceramic resin-bonded bridge as a conservative and esthetic solution for the replacement of 2 mandibular incisors for a 17 -year female patient.

**Keywords:** All Ceramic Resin Bonded Bridge; Esthetic Prostheses; Lithium Disilicate; Mini-Invasive Restoration; RBFDP

### Introduction

The frequency of teeth trauma permanent denture reaches 10-35% of the general population, especially, for the central mandibular incisors (3,8 à 13,3 %) [1]; As a result, the need for fixed prostheses becomes necessary, nevertheless, tooth preparation is challenging because of their small axial diameters [2]. Recent developments in the field of implantology have presented a treatment alternative for replacement of missing teeth. However, there are many cases in which implant therapy is not indicated, because of the patient's age or insufficient space between the adjacent roots, or is simply refused by the patient [3,4]. Nowadays, Metalceramic and all-ceramic Resin Bonded Fixed Partial Denture (RBFDPs) with 2-retainers design have been proposed as conservative treatment approach for the replacement of missing teeth with caries-free abutments. This technique of bonded bridges was introduced in 1963 by Rochette. It was the first type of noninvasive fixed prosthesis [5]. It offers further advantages such as applicability to juvenile patients, simplified tooth preparation, low cost, the preservation of alternative treatment options, no risk of pulp irritation, low risk of caries since no unnoticed loss of retention [6]. These adhesive bridges have experienced significant development from their conception to the present. Clinically, the single retainer RBFDPs showed a higher survival rate than the classic two retainer's ones and with the continuous development off dental ceramics, all ceramic Resin bonded bridges were introduced at the begging with

alumina ceramic, then zirconia and glass ceramics nowadays [6]. This clinical report presents resin bonded prosthesis as a viable treatment alternative to conventional fixed or removable prosthesis for the replacement of a missing mandibular anterior tooth fabricated from lithium disilicate ceramic (IPS emax CAD, Ivoclar Vivadent) as a provisional solution.

### Case presentation

Miss A.B, a 17years-old girl with two missing central mandibular incisors (Figure 1) due to a trama, was referred to our department of fixed Prosthodontics fir their replacement. Her medical history was unremarkable. She had a defective removable fixed partial denture (Figure 2). Her chief complaint was the replacement of the missing two mandibular incisors with a fixed prosthesis. The opposing maxillary anterior teeth were favorably positioned and within normal physiological tooth mobility (Figure 3).



**Figure 1:** Facial view of initial situation.



Figure 2: The defective RPD.



Figure 3: Preparation edges.

Implant seems to be a good solution but the patient was 17 years old under the age of minor surgery. As lingual part of mandibular incisors is out of the occlusal bite in the anterior teeth, and the sufficient length of the abutments teeth which were vital and aligned; the indication of resin bonded bridge was retained. As a provisional solution under the age of periodontal maturation is achieved [2]. Patients with small edentulous spans bounded by sound teeth are good candidates for RBFDPs. The potential abutment teeth should be healthy, unrestored or minimally restored, free of caries and periodontal disease, and have an adequate crown height and width. A non-mobile tooth with an adequate surface area of enamel provides an ideal abutment. Although the young are more likely to have sound teeth, debond rates are higher among people under 30 years of age [4].

## Clinical procedure

The diagnostic cast was waxed to model cast to assess the size and form of mandibular incisors. The preparation edges were drawn on the model cast, then reported on teeth (Figure 3) Figure 3: preparation edges the two lateral incisors were minimally prepared. 0,5-mm lingual reduction of the enamel and a 1mm supragingival reduction extending to the centre of the interproximal contact, with an incisal finish line 2 mm short of the incisal edge for optimal esthetics. The indicated preparation provides the seating of the restoration and optimal bond strength but not mechanical retention. A temporary bridge was realized by isomoulage technique

using a silicon index and acrylic resin (Texton, PRIMA Dental group, England) and cemented with temporary non eugenol cement (Rely X tm, Temp NE, 3M Deutschland GmbH) (Figure 4).



Figure 4: Provisional restoration.

A complete arch impression was made with a silicone impression material: high viscosity washed with a low viscosity (Protosyl putty, Vanini dental industry), then was transferred to the laboratory to be casted (Figure 5). The master cast was checked. The limits of prepared surfaces were marked. Then the model was referred to the technician to be scanned. Finally, the bonded bridge was manufactured with E max Cad/ Cam technique which have the advantage of allaying accuracy of adaptation and aesthetic outcome (Figure 6).

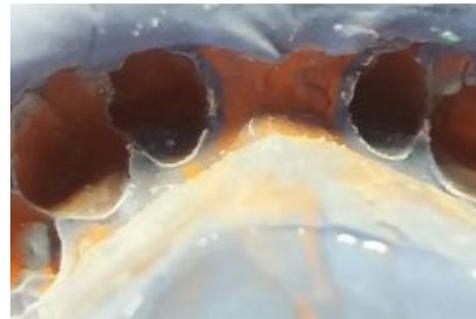


Figure 5: Arch impression.

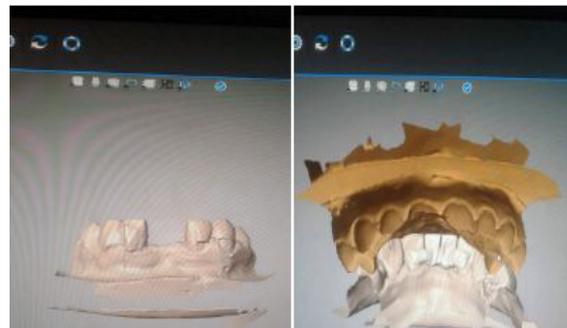


Figure 6: Model scanning (CAD:CAM) and manufacturing.

The resin bonded bridge with 2 retainers was checked intra-orally in order to assess the complete seating of prosthesis, the accuracy of marginal fit besides form of the pontic, and tissue contact

were assessed. Finally, for a secure bonding, the use of rubber dam was necessary (Figure 7), using a self-adhesive and self-etching resin “Total Cem”(ITENA). It was important to clean the prepared area. Teeth surfaces were cleaned and etched for 15sec and rinsed off using 37%phosphoric acid gel (Porcelain etch, Cosmodent). As for the prosthetic surface, hydrofluoric acid was applied for 20 seconds (Figure 8) followed by thorough rinsing and drying (Figure 10), the external surface should be waxed in order to protect it from etching effects (Figure 9). After that application of silane (Figure 11-13). The restoration should be supported while the resin is cured. Gross excess resin can be removed after a spot cure. Light curing is then done in accordance with the resin manufacturer’s recommendations.



Figure 7: The rubber dam placement.



Figure 8: The protection of the external surfaces.



Figure 9: Application of hydrofluoric acid.



Figure 10: Application of silane.



Figure 11: Drying.

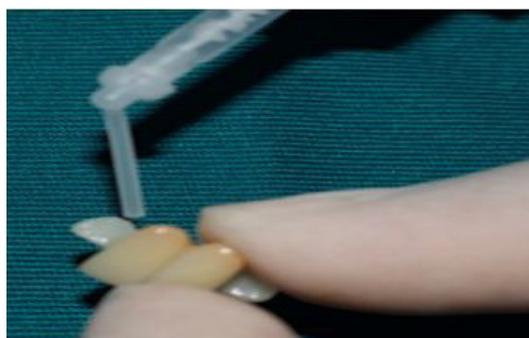


Figure 12: Bonding material.



Figure 13: Seating of the bonded bridge.

The occlusion is checked and the patient is instructed regarding adequate oral hygiene with regard to the restoration (Figure 14, 15).



Figure 14: Final result showing natural mimicry.



Figure 15: Palatal view.

Recalls: A recall appointment should be scheduled 5 To 14 days after bonding for a short check and to take an alginate impression of the treated arch for archiving a model cast. Especially in our case for young patient, this cast might help to detect movement of teeth at an early stage and to fabricate a broken retainer if necessary. The patient subsequently joins a regular recall plan (Figure 16).



Figure 16: Final result after 14 days.

## Discussion

This clinical report describes a treatment option for the provisional replacement of 2 missing mandibular anterior teeth using

all ceramic bonded bridge fabricated from lithium disilicate the patient was satisfied with the outcome. The use of metal retainers would compromise esthetics by display of metal through the gingival embrasures, so the use of an all ceramic resin bonded prosthesis would result in an esthetic outcome: IPS e max cad is a lithium disilicate glass ceramic with flexural strength of about 400 MPA, and it's an etchable ceramic and permits a strong and durable resin-ceramic bond [7]. Case reports on the use of this procedure as a provisional treatment continue to be published [8,9]. Poyser et al. [10] recommend the Rochette bridge as an alternative to an acrylic resin removable partial denture. Al-Wahadni and Al-Omari [11] calculated a 90.5% success rate over the short term (35 months) for 21 RBFDPs used as provisional prostheses immediately following tooth extraction. However, the RBFDP is considered as a definitive solution for short edentulous bounded by healthy teeth [2]. The literature search identified one meta-analysis on survival, success and complication rates of different fixed partial denture [12]; Prospective and retrospective studies on patients with fixed prostheses with a follow-up time of at least 5 years were included. The 5-year survival rate of conventional bridges was 93.8% and 87.7% for resin-bonded bridges for both one and two rings. After 10 years of function, the survival rate decreased to 89.2% conventional bridges and to 65% for resin-bonded bridges [12]. One prospective study examined the survival rates of 38 all-ceramic resin-bonded bridges [13]. The survival rates were 60.3% for the two-retainer resin-bonded bridges and 90.9% for the single-retainer wing resin-bonded bridges. In our case, the use of two retainer design was preferred because two teeth are missing and the similar mobility of mandibular laterals reduces the interabutment stresses that tend to cause debonding. Concerning the use of lithium disilicate, the some initial results of clinical studies showed 90.9% of survival at 15 months. According to Sailer et al in a recent study, a survival rate of 100% at 6 years was reported. Only 5,7% of ceramic chipping are reported [14]. Lam et al seem to prefer restorations by all ceramic RBFDPs to implant restorations, this resin bonded bridges present fewer biological complications than implants [15]. About the preparation El-Mowafy and Rubo recommend an anterior design involving a 0.5-mm lingual reduction of enamel and a 1 mm supragingival reduction extending to the centre of the interproximal contact, with an incisal finish line 2 mm short of the incisal edge for optimal esthetics [16]. In our case, only 0,2 mm lingual reduction because It's a provional solution and preservation of tissue is required. Adequate and parallel axial reduction of the proximal surface adjacent to the edentulous area and extending lingual to the planned interproximal contact is required for a path of insertion and retention. Maximum extension into the proximal surfaces will enhance resistance for the bridge and prevent mesiodistal and faciolingual dislodgement. A cingulum rest with a flat floor is avoided in this situation in order to keep the reversibility of the treatment option [16].

## Conclusion

To maximize the chance of a successful, esthetic, and minimally invasive treatment, the correct indication of all ceramic RBFDPs must be present. The survival rate of RBFDPs is still considerably less than that of conventional fixed partial dentures. The principle reason for failure is possible debonding of the framework from the abutment teeth. The use of RBFDPs made from lithium disilicate is suitable as a fast and safe solution when a perfect clinical procedure is followed; However, further clinical studies are required to evaluate the long term potential of lithium disilicate RBFDP as a definitive solution.

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