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Case Report

Single-Retained E Max Cad Resin-Bonded Bridge for the Replacement of Central Mandibular Incisor

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Abstract

With the advent of adhesive dentistry, many approaches have been advocated for the conservative replacement of missing anterior teeth. A myriad of bonded bridge designs have been introduced over the years.

This clinical report presents a single retainer wing resin-bonded bridge as a definitive and conservative prosthesis indicated for the replacement of a central mandibular incisor. This bridge is fabricated from lithium disilicate ceramic (Emax CAD) by CAD/CAM system.

Keywords: *Single Missing Incisor; Resin-Bonded Bridge; Esthetics; e max CAD; Zirconia Bonded Bridge*

Introduction

The replacement of anterior tooth is a daily problem in dental practice. Different prosthetic solutions exist to replace it. Among these solutions, we find implant-supported prosthesis, conventional fixed denture prosthesis (FDP), and resin-bonded fixed dental prosthesis (RBFDP) [1].

Resin-bonded bridge can be, in some situations, an option of choice including functional, biological and esthetic requirements. Mostly the resin-bonded bridges are made of metallic retainers. An alternative excluding the use of metal, is all-ceramic resin-bonded bridge [2].

This paper is a reflexion about the use of all ceramic resin-bonded bridges and is illustrated with a case which describes the replacement of a missing mandibular central incisor by one wing e-max CAD bonded bridge.

Case Report

At 34 years-old female consulted our department of fixed prosthodontics to replace her mandibular central incisor with prosthesis (Figure 1 and 2). We performed a rigorous clinical and radiological examinations. Adjacent teeth (≠ 41, ≠ 32) were healthy, non-mobile, in good position and had adequate height and width. The different treatment options were discussed with the patient.

Figure 1: *Facial view of initial situation.*

Figure 2: *Endobuccal view.*

An implant-supported crown seems to be an ideal solution but the patient refused it for financial reasons. The indication of single retainer wing resin-bonded bridge was retained as a definitive prosthetic solution. We selected the lithium disilicate (e.max CAD) as a ceramic to benefit from its mechanical and optical qualities and its high biocompatibility. Clinical examination has shown that the lateral incisor has a more developed lingual surface than the central incisor, so it has been chosen as a bridge support tooth since it allowed a more developed bonding surface (Figure 3).

Clinical procedure

We made Wax-up in the anterior region of the mandibular cast. The preparation of the lateral incisor was made according to the general guidelines of a porcelain veneer preparation. We began with a rigorous examination of static and dynamic occlusion. We marked occlusal contacts using articulating paper (Figure 3).

Figure 3a and 3b: *Occlusal contacts were marked and the limits of the preparation are drawn.*

The lateral incisor was minimally prepared with 0.5 mm lingual reduction of the enamel and a 1 mm supragingival reduction extending to the center of the proximal contacts, with an incisal finish line 2 mm short of the incisal edge for optimal esthetics (Figure 4).

Figure 4: *a: Lingual View. B: Proximal View.*

A provisional bridge was fabricated from autopolymerizing acryl resin material according to the wax-up and were cemented with a temporary free eugenol cement (Temp Bond NE) (Figure 5).

Figure 5: *Provisional restoration.*

A one-phase impression was taken with putty and light body polyvinyl siloxane material and sent to the laboratory to be casted. The one winged bonded bridge was fabricated by CAD/CAM system (Figure 6).

Figure 6: *E max one winged bonded bridge fabricated by CAD/CAM system.*

A first try-in was performed to assess complete seating of the prosthesis, marginal adaptation of the retainer, tissue contact, form, occlusion, and shade matching. Then, by application of stains, the final shade was obtained. The bridge was cemented with transparent light polymerizing resin cement in accordance with the manufacturer's instructions. Teeth lingual surface was cleaned and etched for 15 seconds and rinsed off using 37% phosphoric acid gel (Figure 7 and 8).

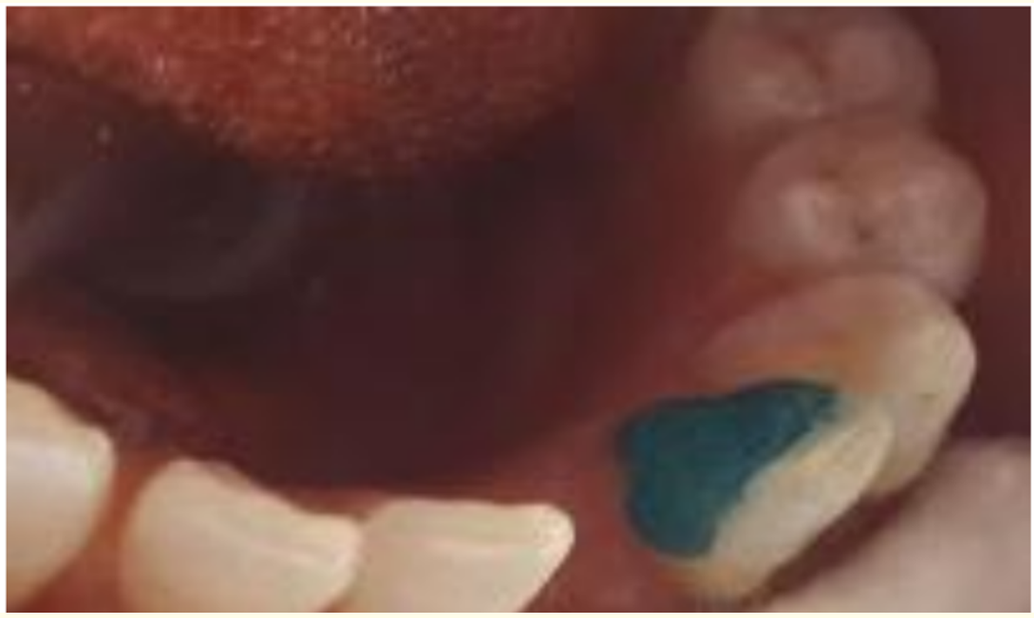

Figure 7: *Etching of the lingual surface of lateral incisor for 15 seconds.*

Figure 8: *Etching of the lingual surface of lateral incisor for 15 seconds.*

As for the prosthetic surface, hydrofluoric acid was applied in the inner surface of the lateral incisor for 20 seconds followed by thorough rinsing and drying (Figure 9), the external surface was waxed in order to be protected it from etching effects (Figure 9).

Figure 9: *Application of the hydrofluoric acid for 20s in the inner surface.*

The etched surface was treated with a silane coupling agent for 60 seconds, and the agent was dispersed with a strong stream of air. We applied a bonding agent to all bonding surfaces (Figure 10) of the one wing bridge and the abutments. Then we applied the light polymerizing resin cement directly to the intaglio surface of the retainer. Finally, we bonded the bridge to the abutment tooth.

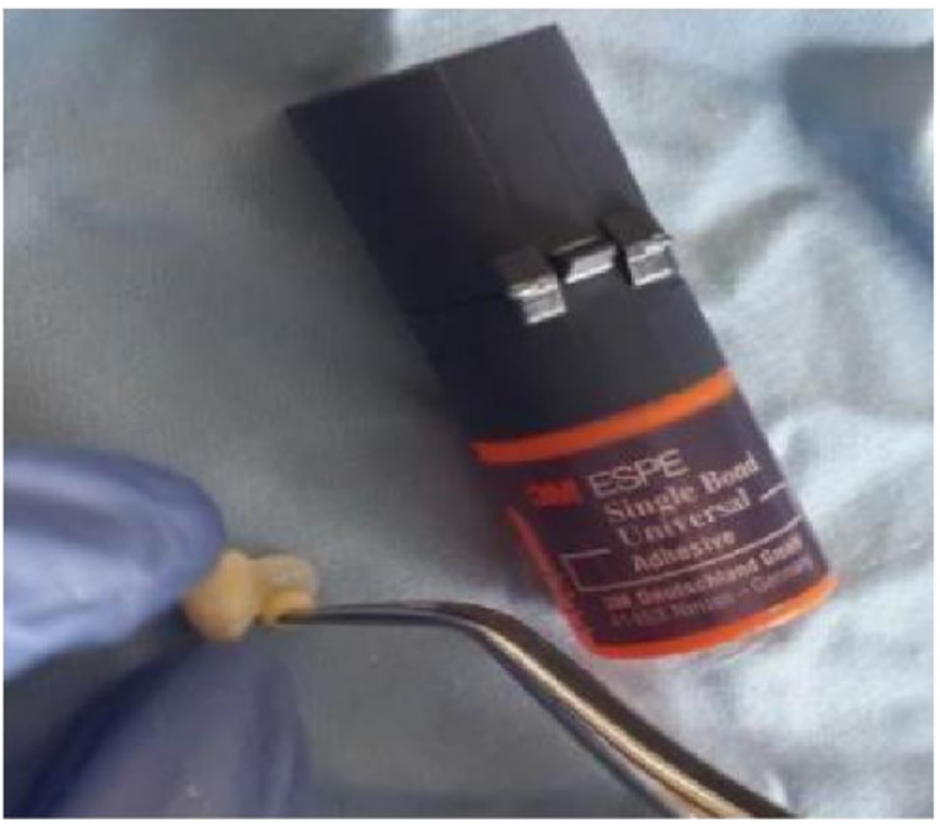

Figure 10: *Application of the bonding agent.*

The excess resin cement was removed (Figure 11) and each surface was light polymerized for 60 seconds (Figure 12). We evaluated the occlusion and we made the necessary occlusal adjustments (Figure 13-15).

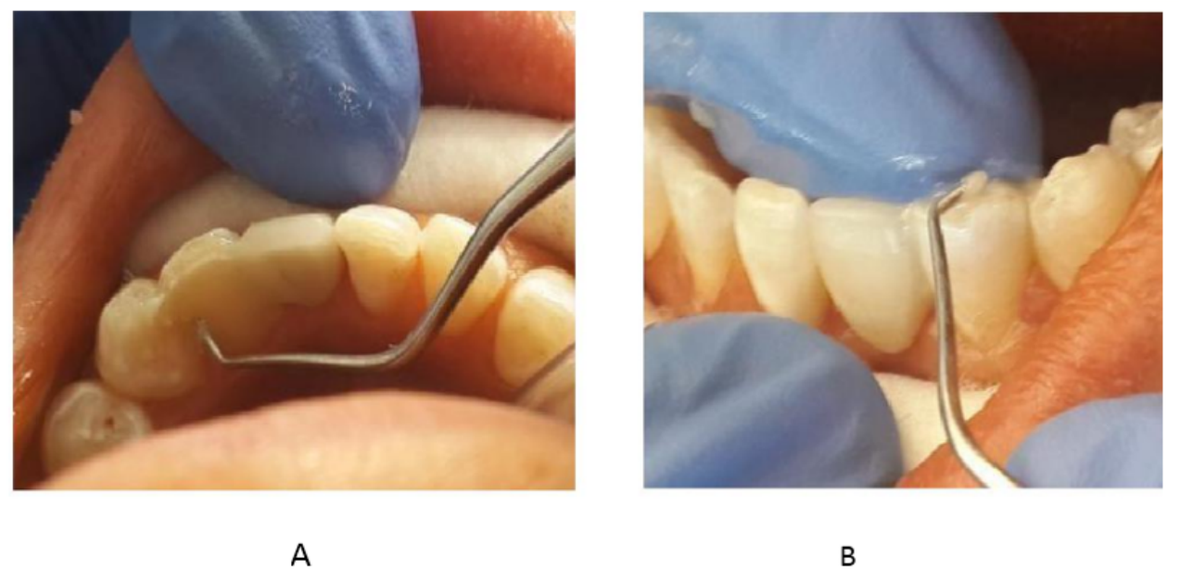

Figure 11: *A and B: Removing of the excess resin.*

Figure 12: *Light polymerization of each surface for 60 seconds.*

Figure 13: *The static occlusion was checked.*

Figure 14: *Dynamic occlusion: A: Anterior guidance, B: Left laterality, C: Right laterality.*

Figure 15: *Final result (Patient's smile).*

Discussion

The implant prosthesis is a prosthetic solution frequently indicated to replace a missing tooth [3]. But in some situations, this type of prosthesis can be counter indicated. A conventional prosthesis is necessary in this case. An RBFDP is more conservative than a conventional FDP [4].

Bonding of resin cement to the bonding surfaces of both the abutments and the prosthesis guarantees the success of RBFDPs [5].

More than 25 years ago, an all-ceramic RBFDPs were introduced as a conservative prosthetic option [6]. The survival rates of 38 all ceramic resin-bonded bridges was examined by one prospective study. The survival rates of all-ceramic bridges were 90.9% for the single retainer wing resin-bonded bridges and 60.3% for the two-retainer resin-bonded bridges [7]. Failures with 2-wing restorations were related to fractures in the connector region at one side, and restorations were kept as 1-wing resin-bonded FDPs. To avoid excessive loading of the lever arm in 1-wing restorations, occlusal and functional contacts at the cantilever should be Minimized [8].

An all-ceramic prosthesis is more aesthetic and biocompatible compared to a metal-ceramic prosthesis [9]. To ensure optimal esthetics and a long-term success, some parameters must be respected. Among these parameters, we find position, mobility, thickness, and translucency of the abutment teeth as well as the overall occlusion [10].

The glass ceramic and the natural tooth have a same coefficient of wear. This quality allows harmonious relations with natural antagonistic teeth [11]. The availability of an adequate interproximally surface area allowing optimum resin composite connectors presents the key to success [12].

The performance of RBFDPs made from lithium disilicate glass-ceramic are evaluated by several *in vivo* and *in vitro* studies. The results are encouraging [13]. Furthermore, an additional strength is offered thanks to the full-anatomic design rather than building layering porcelain over a framework [14]. The indication for lithium disilicate is restricted to anterior tooth replacement because of its limited fracture resistance and the required dimensions of the connector, which should be at least 8 to 10 mm^2 [8].

Ceramic chipping, but no fractures or debonding, have been reported with lithium disilicate 1-wing resin-bonded FDPs, which were mainly inserted in the anterior region with large connector sizes of 16 mm^2 [7].

The improvements in long-term results with resin-bonded FDPs are mainly related to new cementation techniques. The adhesion obtained relies both on micro-mechanical retention and on chemical interactions of specific monomers (preferably phosphate monomers in Panavia F2.0; Kuraray, or RelyX; 3M ESPE) with the bonding substrate [10].

Conclusion

The all ceramic bonded cantilever bridge sign a contemporary evolution of conventional metal bonded bridges in response to patient demand, which is extremely strong in the choice of an alternative material to metal alloys.

A ceramic resin-bonded fixed dental prosthesis with 1 retainer is an excellent treatment solution for the interim period; It may also serve as a long-term restoration, providing that sound enamel structure is present.

However, There is a need for further prospective studies to observe the performance of cantilever resin bonded bridges made With lithium disilicate ceramics over the long term, and to compare this performance versus other bridge designs in the anterior.

Conflict of Interest

None declared.

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