

Cantilever Resin-Bonded Bridges: A Minimally Invasive Approach to Manage Congenitally Missing Maxillary Lateral Incisors

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Abstract

Congenitally missing lateral incisors cause an aesthetic challenge that may require specific orthodontic and prosthetic solutions. The treatment is complex but offers valuable aesthetic options, such as orthodontic space opening followed by the prosthetic replacement of the lateral incisors. This is made possible by advancements in the design of bonded bridges, particularly cantilever bonded bridges.

The cantilever design offers a minimally invasive, conservative approach, preserving the adjacent teeth while providing a stable and aesthetically pleasing outcome. Through this article, we demonstrate that the cantilever resin-bonded bridge does not only achieve satisfactory aesthetic outcomes but also shows high survival rates, especially when paired with a careful pre-prosthetic approach. This treatment option is particularly beneficial for young patients who may not be ideal candidates for implants due to their age or other considerations. These findings highlight the significance of a multidisciplinary approach that combines orthodontic and prosthetic expertise to ensure long-term success in managing congenitally missing lateral incisors.

Keywords: Resin-bonded bridge; Cantilever resin-bonded bridge; maxillary lateral incisor agenesis

Introduction

Maxillary lateral incisor agenesis is a common congenital tooth agenesis that is frequently bilateral and related to altered relative lower incisor position and reduced maxillary sagittal growth. It may be related to non-syndromic systemic issues, syndromic conditions, or other oral anomalies [1].

Tooth agenesis is not considered as a public health issue, however it can lead to masticatory dysfunction, as well as aesthetic and functional issues [2].

In the orthodontics population, congenital absence of the upper lateral incisor is responsible for approximately 3.6% of all tooth agenesis (7.8% overall). It affects a significant number of orthodontic patients. Agenesis is more common in females and occurs bilaterally [3].

The treatment can be a challenging process that requires a multi-disciplinary approach to restore both aesthetic appearance and function. Clinicians commonly recommend creating space where the tooth is missing, followed by prosthetic replacement [4].

In specific clinical cases, Ceramic cantilever resin-bonded fixed dental prostheses (RBFDPs) have been proposed as a conservative treatment for replacing a single missing tooth [4]. The primary interest would be the significant tissue preservation that these bonded

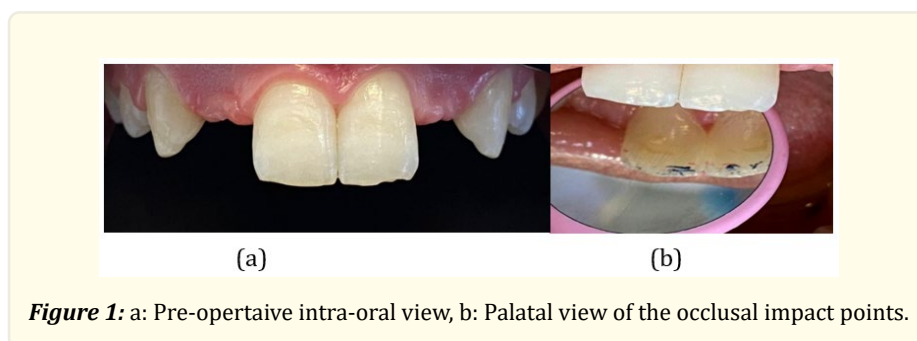
restorations would allow when compared with conventional bridges in the context of minimally invasive dentistry [5].

In the early 1990s, all-ceramic resin-bonded fixed dental prostheses were introduced initially with two traditional retainers experienced a relatively high rate of fracture within the first year of clinical use however, many unilaterally fractured RBFDPs remained functioning as cantilever over five to ten years [6].

In this article, we present a case involving a 20-year-old female patient with congenitally missing both upper lateral incisors, which caused aesthetic concerns, this case is discussed in and was treated with a single unit cantilevered resin-bonded bridge.

Case report

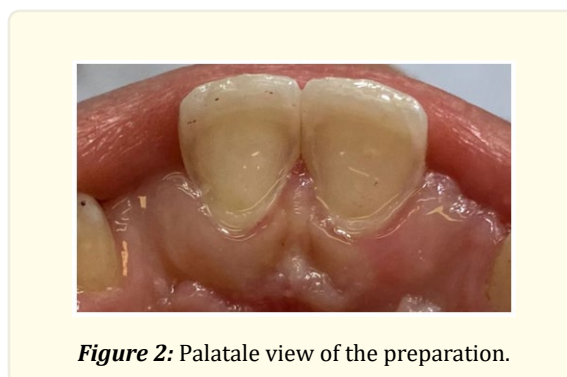
A 20-year-old female patient with congenitally missing bi- lateral incisors reported to the department of fixed prosthodontics in the dental clinic of Monastir. An orthodontic treatment was first indicated to create space. Upon examination, the medical and family history revealed no significant details. The analysis of the teeth bordering the edentulous area showed that teeth 13,23,11 and 21 had a satisfactory shape and correct positions. (Figure 1a)



The patient had the option of implant prosthesis, fixed partial denture or removable partial denture. The patient opted for an esthetic solution with a reduced treatment period.

We chose the most conservative approach by indicating a lithium disilicate cantilever resin-bonded bridge, due to the high failure rates associated with the traditional two-retainer resin bonded bridge. The preparation focused on the palatal surface of teeth 11 and 21.

We opted for central incisors as abutment teeth because they have enough surface area for bonding due to their length. An articulator paper was used to identify impact points on the occlusal scheme, and our preparation limits were set behind these points. (Figure 1b)



The palatal surfaces were reduced by approximately 0.7 mm, with a supra-gingival deep chamfer finish line positioned about 0.5 mm from gingival collar. The preparation extends to the interproximal surfaces to improve retention and increase strength of bonded bridges. The tooth preparation design, allowing an optimal form of resistance while keeping the preparation conservative and in the enamel. (Figure 2)



After a proper gingival retraction, a two-step dual impression was made and sent to the laboratory to the bridge. The vita shade classic guide was used under a natural light to choose the shade 2M1 was selected. (Figure 3)

Adhesive procedures were conducted in an isolated setting using a rubber dam before the final restorations are bonded (Figure 4). The cementation of the cantilevered resin bonded bridge was carried out in accordance with the appropriate bonding protocol which involved treating both the tooth surfaces and the intaglio surfaces of the prosthesis. The ceramic surfaces were etched with hydrofluoric acid for 30 seconds, then rinsed and dried. Then, a silane coupling agent was applied for 60 seconds. The tooth surface was treated with phosphoric acid for 30 seconds, rinsed, and dried. An adhesive was applied and light-cured, followed by the application of resin cement. (Figure 5)





Figure 5: Dental surface treatment with phosphoric acid.



Figure 6: Buccal view of the final result.



Figure 7: Palatal view of the final result.

Discussion

Teeth genesis is a common condition among dental patients. It affects approximately 4.2% of patients. The maxillary lateral incisors, with the exception of the third molars, are the most common congenitally missing teeth, accounting for about 2%. It seems to result from a combination of genetic and environmental factors [7, 8].

Orthodontic treatment is in high demand among individuals with this condition considering its impact on dental and facial appearance. Maxillary lateral incisors that are congenitally missing and treated orthodontically by space opening often require complementary aesthetic rehabilitation.

In recent years, implant-supported prostheses have become an important option for replacing missing single teeth. However, implant placement is not always possible in every patient, especially when there is a deficiency of both hard and soft tissues in the edentulous area. In these cases, procedures such as bone augmentation and connective tissue grafting may be required before the implant can be placed. Due to the complexity of these surgical procedures, the increased cost of treatment, and patient concerns about surgery, some patients may opt for tooth-supported prostheses as an alternative [9].

Resin bonded fixed bridges provide a minimally invasive fixed prosthetic solution for tooth replacement for patients who are not candidates for implant therapy [8]. There are two types of resin-bonded bridges: one featuring two commonly used retainers and the other designed with a single retainer, known as a cantilevered bridge.

A cantilever resin-bonded bridge offers several advantages over a traditional resin bonded bridge. In fact researches have shown that single unit cantilevered resin bonded bridges has a significantly lower risk of failure and a greater longevity compared to double two-retainers' resin bonded bridges [8]. Using this type of prosthesis decreases stress in the bonding interface caused by abutment teeth's differential mobility in the two-retainer configuration. When using a two-retainer design, both abutments should have equivalent mobility to avoid the weaker abutment detaching from the enamel and risking the overall outcome.

When choosing abutment teeth, we have to consider occlusion, crown height, periodontal health, and enamel availability. Although the central incisor usually serves as an abutment tooth, the canine has been also reported as an option. [10] in this case, after discussion, both central incisors were used as abutment due to a slight open and bite their sufficient surface area for bonding, owing to their length.

The major advantage of cantilever resin bonded bridge is the conservative preparation which is limited to the enamel surface. In fact, literature reviews stressed that the preparation offers no mechanical retention and depended entirely on the resin bond, however it allows a precise placement of the restoration during the bonding process and optimizes bonding [8, 11].

The introduction of advanced adhesive cements and surface treatments has greatly enhanced the longevity of resin bonded bridge. As long as the adhesive protocol is executed correctly. It is essential to adhere to the general guideline that the pontic should maintain light contact in the intercuspal position while avoiding involvement in guidance, ensuring it is free from contact during protrusive and lateral movements [10].

Conclusion

Management missing lateral incisors is a challenging and complex process that requires a multidisciplinary approach in order to restore both esthetics and function. We believe that the use of bonded cantilever bridge to replace incisors after an orthodontic treatment is an excellent solution for the young patients. As it has shown promising results and high survival rates. However, the key to its success is a comprehensive pre-prosthetic analysis, which is essential for achieving lasting outcomes.

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