



Therapeutic Options of Missing Maxillary Lateral Incisors: A Clinical Report

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Abstract

The absence of upper lateral incisors is a common developmental anomaly and often results in a serious disorder esthetic problem due to their position in the dental arch.

The management of missing teeth in the anterior esthetic region requires assessment of age, location, space limitations, alveolar ridge deficiencies, uneven gingival margins, occlusion and periodontal factors. uneven gingival margins, occlusion and periodontal factors often require an interdisciplinary approach.

Over the last several decades, dentistry has focused various treatment modalities for replacement of missing teeth. There are various planning options orthodontic planning. For example, closing or opening spaces for future prostheses. And for these patients, dental prostheses such as removable dentures, bridges and implants are indicated. Minimally invasive treatment is desirable if adjacent teeth are intact. Such as the cantilever resin-bonded fixed dental prostheses.

The aim of this case report is to provide a conservative method for the management of bilateral missing lateral incisor with all-ceramic cantilever resin-bonded fixed dental prostheses, based on a clinical case.

Keywords: Tooth Agenesis; Lateral Incisors; Orthodontics; Implant; Multidisciplinary Approach; Resin-Bonded Bridge

Introduction

Missing teeth in the front aesthetic area are a pressing concern require dental intervention and often require early treatment restoring both its aesthetic and functional aspects teeth. Missing anterior teeth can be congenital or occur as a result of traumatic incidents, caries and periodontitis [1].

The tooth is defined as a congenital defect if it has not exploded oral cavity, has not been inadvertently removed or lost and invisible on radiological examination [2].

Etiopathogenesis is not fully understood, but there are indications of environmental influences and hereditary causes and even interactions between them [3].

In the permanent dentition, with the exclusion of third molars, the incidence of congenital missing teeth rang-

es from 0.15% to 16.2% on different continents [4]. Maxillary lateral incisors are the most frequently affected teeth in the anterior region with 3.6% [5]. They are also the most common congenital bilateral missing teeth [1,4]. Over there is a strong genetic influence and is more common in females [6].

The management of patients with unilateral or bilateral lateral incisor agenesis must be multidisciplinary, involving orthodontics, restorative dentistry, implantology and prosthodontics : should determine the patient's treatment plan collaboratively and communicate throughout the course of treatment to ensure that all aspects of treatment are considered and the overall treatment objectives are achieved [7].

The orthodontic approach is the most conservative approach, which may include closing spaces by positioning the maxillary canines in the place of lateral incisors or opening spaces for future

implants and/or prosthetic restorations. This subject divides the opinion of orthodontists and oral rehabilitators, due to the advantages and disadvantages of each treatment option [3,8]. The restorative options could be implant or a tooth supported restoration with conventional Full-Coverage bridge, or cantilever bonding bridge.

However, with the development of new dental materials and computeraided design/computer-aided manufacturing (CAD/CAM) technology, Cantilever all-ceramic bridge are considered a minimally invasive treatment approach to the replacement of single missing anterior teeth, have demonstrated clinically excellent outcomes in terms of durability, outcome, aesthetics and function, and provide excellent clinical outcomes, high survival rates and great patient satisfaction [9-11]. Moreover, these restorations demonstrated a high survival rate of up to 81.8% after 18 years follow up [11].

The aim of this case report is to provide a conservative multidisciplinary approach for the management of bilaterally missing lateral incisors.

Case Report

A 18-year-old female patient, M.A, referred by the Department of Orthodontics to our fixed prosthesis department at the Monastir dental clinic. Her demand was esthetic. She complained that her smile was disgracious, caused by the absence of these two maxillary lateral incisors. The patient's history showed that she had been undergoing ortodontic treatment for 3 years. She had a congenital absence of maxillary lateral incisors and diastemas in the upper frontal region (Figure 1-3).

A orthodontic treatment was provided without extraction of premolars and with extraction of temporary teeth and space opening for prosthetic solutions replacing maxillary lateral incisors (Figure 4); the decision for space opening was adopted taking into account the patient's age, her flat profile, the class I molar occlusal relationships, and the presence of anterior diastemas. After debonding, an Essix splint was installed. (Figure 5,6). Initial photos was taken on the day of the consultation to evaluate the case (Figure 7-9).

Radiographic examination showed convergence of the roots of the edentulous teeth. (Figure 4). A treatment with the cantilever resin-bonded bridge, with E-max[®] CAD/CAM ceramic, was proposed. After the patient's agreement, we started by checking the occlusion with joint paper. and tracing the limits of the preparation. (Figure 10,11).

After teeth preparations, the master impression was made using light and heavy-body consistency polyvinylsiloxane (Virtual 380, IvoclarVivadent, Amherst, NY, USA[®] (Figure 12).

In laboratory, the master cast was then scanned and used to fabricate the cantilever resin-bonded bridge. The ceramist made the restorations with E-max[®] ceramic, using cad/cam technique. (Figure 13).

The bonding protocol was initiated by the placement of the rubber dam isolation. The prepared teeth surfaces were etched with 37% phosphoric acid gel (Condac, FGM[®]) for 15 seconds. (Figure 14). The adhesive system (Syntac-ivoclar[®]) was applied for 30 seconds (fig 15). The restorations received hydrofluoric acid surface treatment (Ceramic Etching Gel, IvoclarVivadent[®]) for 60 seconds followed by rinsing and drying. Then, a silane (Monobond-S, IvoclarVivadent[®]) was applied for 60 seconds. The light color cement (VariolinkEsthetic LC, IvoclarVivadent) was applied to both veneer and crown, which were placed onto the teeth, and the excess cement was removed before light curing for 20 seconds.

The light color cement (VariolinkEsthetic LC, IvoclarVivadent) was applied on the contilever bridge attachment, which were placed onto the teeth, and the excess cement was removed before light curing. Photos was taken after the removal of the the rubber dam isolation. (Figure 16-18).

Discussion



Figure 1



Figure 2



Figure 3

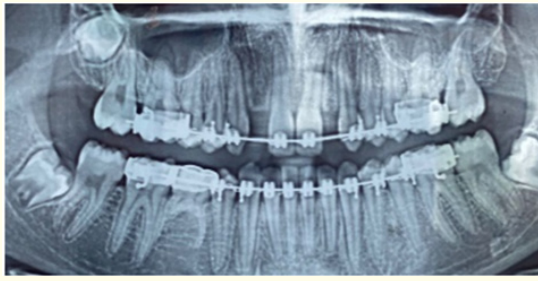


Figure 4



Figure 9



Figure 5



Figure 10



Figure 6



Figure 11



Figure 7

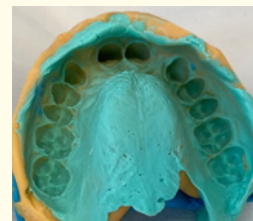


Figure 12



Figure 8



Figure 13



Figure 14



Figure 15



Figure 16



Figure 17



Figure 18

The absence of one or more teeth in the esthetic zone, has a negative impact on the patient's self-confidence, social behavior, work performance and quality of life. Missing upper lateral incisors are the most common, costly and difficult dental anomaly [12].

The etiology of dental agenesis is not yet fully understood. Several hypotheses have been put forward. Genetic factors have been shown to play an important role in dental agenesis. The impact of hereditary and environmental factors on human dentition reduction is illustrated by the prevalence of 36.5% [13].

Therefore, these patients should be treated with care and with a multidisciplinary perspective. Desired therapeutic outcomes can be achieved through teamwork and patient compliance [14]. An

interdisciplinary approach involving all team members, such as orthodontics, restorative dentistry, implantology and prosthodontics, is essential to achieve satisfactory aesthetic and functional results [15].

For the orthodontic approach, in most cases, and given the evolution of aesthetic dentistry, opening the space is the preferred option, as it offers a number of advantages : aesthetic improvement thanks to the harmonious development of the face and teeth; symmetry of the arch, and allows the canine to assume its natural position and ensures a protected occlusion of the canine [15,16]. Once orthodontic treatment has been completed, selection of the adequate retention type and time depends on several factors. A thermoformed splint supporting prosthetic teeth may be indicated as a temporary solution before starting the prosthetic phase, when the retention phase does not exceed six months [5].

The first option for replacing congenitally missing lateral incisors is to use implant-supported prostheses. Before considering implant placement, the quantity and quality of alveolar bone should be evaluated [17]. To accommodate a standard implant, there must be at least 10 mm of alveolar bone and at least 6.0 mm of lingual bone [15]. Also, sufficient space for planting between adjacent roots is required [18]. The average dental implant abutment is 3.75mm wide and a space of 1-2mm is required between the implant and the adjacent roots [19]. At the very least, a distance of 6 to 8 mm of bone is recommended between the central roots and the canines. Special care must be taken to provide adequate space between the roots as the medial roots and canines can join during the initial orthodontic alignment of the teeth [17].

Another approach to congenitally missing lateral incisors is the restorative approach. The resin-bonded bridge are recognized as a minimally invasive approach to replacing missing anterior teeth and offer excellent clinical outcomes, high survival rates, and great patient satisfaction [1]. There are two front resin-bonded bridge designs: fixed-fixed resin bonded bridge and cantilevered resin-bonded bridge . In 2000, Chan and Barnes compared the clinical efficacy of resin-bonded bridge and described the clinical feasibility of cantilever resin-bonded bridge through short-term follow-up [20]. Furthermore, cantilevered bridge are more efficient than fixed bridge as the latter can loosen more easily due to the differential movement of the abutment teeth [21]. A previous review found that most of studies had a 100% survival-rate for the cantilever resin-bonded bridge [22].

The ceramic cantilever bridge has been clinically proven to have excellent function esthetics and viability [11]. In addition, this approach has many advantages. They require simple and conservative preparation and represent a reversible treatment option, with no risk of pulp irritation, no need for anesthesia and minimal risk of caries development; In addition, they are an important option for young patients [1,9].

However, the cantilever bridge may be mesial or distally canti-

levered. The selection criteria for abutment teeth include occlusion, crown height, periodontal status, and enamel availability [23]. When a cantilevered RBB is fabricated for a patient with a missing lateral incisor, the central incisor is usually used as the abutment tooth [11,20]. The abutment teeth were prepared within the enamel to allow a thickness of 0.5 - 0.7 mm for the retainers. The cervical margins were designed as chamfer type. The lingual margin was placed 1 mm above the gingival margin to avoid the effect of excessive contouring of the abutment on the periodontal tissues [22].

Medium- to long-term survival of resin-bonded bridge cantilever has been extensively examined. A systematic review in 2017 reported survival rates of 91.4% after 5 years and 82.9% after 10 years [24]. Anterior prostheses, including lateral incisors, had a higher survival rate and zirconia frameworks performed better than those of metal alloys. Another systematic review in 2018 reported similar results and noted that debonding and fractures were the most common complications [25]. However, bridge debonding can be caused by a multitude of factors. Analysis of the occlusion pattern plays an important role in detachment. Group functional patients with multiple posterior teeth or protective canines are very helpful in terms of the success of cantilever bridge [26]. All pontics should be designed without contact during protrusive and lateral movements [27]. Culture the patient's diet eating candy, corn, nuts or certain habits any abnormal behaviors of the patient such as nail biting, finger sucking or using the front teeth to open or cut hard objects [27]. Fracture of the ceramic can also affect the survival of the resin-bonded bridge and may cause failure in cantilever especially in the abutment area. All cracks in the resin-bonded bridge cantilever brackets were located in the ceramic material (alumina ceramic restorations) [28]. A 2016 literature review considered several factors such as the dimension of the connector and the curvature of the occlusal gingival space around the connector area, the mechanical properties of the materials used, and the rotational movements of the abutment teeth [29].

Conclusion

Missing or lost maxillary lateral incisors present a frequent challenge for the dental team. The treatment of this patients must be multidisciplinary. It can involve orthodontics, esthetic dentistry, implantology and prosthodontics. The interdisciplinary approach can achieve not only an optimal occlusion, but also a well-balanced, natural smile that will be stable over the long-term. Dental teams should inform patients about the alternatives and mutually agree on the treatment solution tailored for each patient that provides the best potential for long-term esthetics and function. The use of resin-bonded bridge cantilever showed successful results, high survival rates, and patient satisfaction.

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