

# Maxillary lateral incisor agenesis- case report for clinical management

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## Abstract

The following case-report represents the trouble and treatment management of a young patient with a congenitally missing upper lateral incisor. MLIA (Maxillary Lateral Incisor Agenesis) is a state that affects dental aesthetics as well as function. After an interdisciplinary evaluation for the proper treatment plan, whether it should be treated by orthodontic space closure or by space opening and implantation, the treatment option of orthodontic space opening followed by insertion of Bicon® short implants was chosen. With this manageable treatment protocol and a minimum of sections for all involved parties, the individual optimum that satisfied the needs of the patient as best as possible was achieved.

## Introduction

Hypodontia, the absence of at least one tooth, is the most common dental anomaly reported in humans [1] with a wide range of prevalence values reported in the permanent dentition ranging between 3.4–10.1% in prevalence studies including white populations [2]. After the wisdom teeth and second premolars in the lower jaw, the upper lateral incisors are the third most frequently missing teeth with a prevalence of 1-2% [3]. Bilaterally cases are more common than unilaterally ones [4]. Unilateral agenesis is often associated with microdontia of the corresponding contralateral tooth, which in turn requires higher biomechanical claims in orthodontic therapy or often leads to extraction of the hypoplastic tooth to prevent any asymmetric effects as well as a midline shift. However, the exact etiology of congenitally missing teeth is still controversial. Furthermore females have a slightly higher frequency as males [5]. Phylogenetic reduction of human dentition, heredity as well as developmental disorders and exogenous influences can represent possible reasons, as well as the significant familial aggregation of MLIA (Maxillary Lateral Incisor Agenesis) [6]. In this context, it was proven that the relative risk for a first-degree relative of an individual with MLIA to have the same type of agenesis was 15 times higher when compared with a relative of an individual without that agenesis [7]. MLIA represents a clinical problem impairing dental aesthetics as well as function from a very young age. The latter can be seen in the importance of the lateral incisors as a guide in the normal eruption of the permanent canine, absent upper lateral incisors may lead to canine impaction [8]. A significant correlation between canine displacement and tooth agenesis was demonstrated in a recent study, genetic association as well as the lack of canine guidance can give an explanation of canine displacement in the presence of agenesis of the maxillary lateral incisor [9]. The persistence of a primary lateral incisor in the arch beyond the expected time of eruption of its successor often suggests the agenesis. The definitive diagnosis requires a mandatory X-ray examination in order to confirm the assumed diagnosis. After clinical and radiological proof, a decision regarding the treatment options must be made, whether it should be treated by orthodontic

space closure or by space opening and implantation [10]. Individual evaluation of the treatment choices requires a multidisciplinary approach to achieve the best possible result for the patient [11]. The treatment depends on a number of factors such as facial, occlusal, functional and periodontal features, as well as individual long-term stability [12]. Each of the available means of rehabilitation has its own advantages, disadvantages, indications and limitations. In orthodontic space opening followed by dental implantation, the number of teeth can be completed and the patient's canine guidance remains preserved, even a neutral occlusion can be adjusted. Furthermore, the risk of midline shift, which can occur in unilateral MLIA, as well as the risk of occurrence of moderate to severe resorption which is even greater given in lateral incisors after orthodontic treatment can be prevented [13]. Recent literature has demonstrated high success as well as great survival rates of placing short implants [14,15]. In those cases in which space opening is indicated due to occlusion or skeletal pattern, Bicon® short implants can produce superior aesthetics especially in maxillary anterior restorations as well as long-term results. A study regarding the survival rate of short implants (6x5.7mm) and crestal bone level maintenance demonstrated a 100% 5-years-survival rate and a crestal bone level maintenance similar to conventional used implants (>8 mm) [15]. Likewise, when compared to implants of greater length, Gentile et al. could not find any difference in the short implant survival rate. Shorter implants can reduce a patient's treatment time and discomfort as well as the costs related to possible graft procedures [16].

The patients that are presented in the following passages represent

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such cases with unilateral MILA successfully treated with Bicon short implants and functional and aesthetic preferable results.

**Case in Images**

In the present case report, after interdisciplinary evaluation regarding aesthetics as well as function, due to the agenesis of 22, the treatment option of orthodontic space opening followed by insertion of Bicon® Short Implant was chosen to achieve a secure indentation and neutral occlusion and to bypass the risk of midline shift which precisely consists in unilateral aplasia. This case demonstrates the two stage placement, uncovering, implant level transfer impression and restoration of a congenitally missing upper left lateral incisor with Bicon® IAC (Integrated Abutment Crown). Figure 1 shows the X-ray image in the region of 21-23 of a young man with congenital absence of 22 who introduced himself with the desire for aesthetic care. The orthodontic space opening has already taken place and should now be supplied by Bicon Implant (Figure 2).

Figures 3 and 4 show the implant preparation and positioning considering aesthetic criteria: the osteotomy was enlarged with a teal 3.0mm latch reamer rotating at 50 RPM (Revolutions Per Minute) without water irrigation after the initial osteotomy was made with the 2mm pilot bur. It should be noted that all drills are (in ascending order in 0.5mm) used up to the planned implant diameter which was 4.5mm in this case. The gained autologous bone was removed from the grooves of the latch reamer and stored for later use in a silicone dappen dish. Then the implant well was curetted to remove all possible left bone splints. A Bicon SHORT® Implant of 4.5mm diameter and 6mm length HA (hydroxylapatite) coated implant (Bicon® Dental Implants, Boston, MA, USA) was inserted into the implant well with an implant seating



Figure 1. Pre-operative radiograph after orthodontic space opening by a young male patient with a congenitally missing 22 and fix braces in situ.



Figure 2. Clinical intraoral image after orthodontic space opening as a preparation for the insertion of a Bicon® short implant (4.5x6 mm).



Figure 3. Enlarging the osteotomy with a teal 3.0mm latch reamer as implant preparation.



Figure 4. Removing the autologous gained bone from the latch reamer for later use.



Figure 5. Inserting a Bicon® Short Implant of 4.5 mm diameter and 6 mm length.

tip threaded onto a straight driver (Figure 5). The implant shoulder was covered with the harvested bone and the trimmed polyethylene healing plug was inserted into the seated implant (Figures 6 and 7). A tight suture closure was placed. The control X-ray (Figure 8) shows the correct position of the implant immediately after insertion. Four months after healing the patient had his second clinical visit, where the bonded prosthesis (Figure 9) prior was removed for the making of implant level transfer impression. A crescent-shaped incision was placed (Figure 10), the healing plug was removed (Figure 11) and an impression reamer was rotated on guide pin to remove any tissue which might inhibit the complete seating of an impression post. A green 3.0mm plastic impression post was being inserted into the 3.0mm well of an integrated implant for the making of an implant level transfer impression (Figure 12), receiving its mandatory seating tap impression material being injected post for the making of a full arch implant level transfer impression (Figure 13). The impression



Figure 6. The implant shoulder was covered with the harvested autologous bone.



Figure 7. A trimmed polyethylene healing plug was inserted into the seated implant.



Figure 8. A post-operative radiograph showing the exact position of the inserted implant.



Figure 9. Clinical image of a patient's supply with the bonded temporary prosthesis.



Figure 10. Four months after healing a crescent-shaped incision was placed to remove the healing plug.



Figure 11. Removing the healing plug with a special healing plug removal instrument.

post was removed and an appropriate healing abutment tapped in. In the laboratory, the dental technician selects, regardless of the implant diameter, the right abutment diameter size to achieve an optimal tooth position. The IAC (Integrated Abutment Crown) (Figures 14 and 15) excels in their gap-free unit, since the crown is one unit with the abutment (Figure 16), thus it avoids the microbial leakage issues



Figure 12. A green 3.0 mm plastic impression post was being inserted into the 3.0 mm well of an integrated implant for the making of an implant level transfer impression.



Figure 13. Injection of impression material around the plastic impression post for the making of a full arch implant level transfer impression.



Figure 14. The Integrated Abutment crown (IAC) as a gap-free unit (the crown is one unit with the abutment).



Figure 15. The lateral view of the IAC which excels through its superior aesthetics and easily retrievable adjustments if necessary.



that can result in inflammation of the soft tissue around the implant, which could lead not only to bone loss around the implant but also to the loss of the implant itself. To insert the IAC a relieving incision was made to facilitate the seating of the IAC. The well of implant was cleaned with alcohol on cotton tipped applicator (Figure 17) and any interference to the engagement of the locking taper connection had to be removed. The IAC was supplied with an acrylic orientation jig (Figure 18), which was used to initially position the IAC whereby the interproximal contacts must be passive. If they are too tight, they will prevent proper orientation, seating and engagement of the locking taper. After checking the aesthetics, position and proximal contacts, it could finally be tapped in with a small hammer by tapping forces in the long axis of the abutment post (Figure 19). Thus, an internal screw is no longer necessary because the sole adhesive force generated during the impaction is responsible for the maintenance. The IAC then could easily be adapted and polished (Figure 20). Figures 21-24 show clinical and radiological evaluation fourteen months post insertion. The individual shape of the mucogingival interfaces is crucial important for the natural result.



Figure 16. Removal of the abutment for the final supply.



Figure 17. The well of implant is being cleaned with alcohol on cotton tipped applicator.



Figure 18. The IAC is supplied with an acrylic orientation jig to facilitate the initially position.



Figure 19. After checking the position and aesthetics the IAC can finally be tapped in by tapping forces in the long axis of the abutment post with a small hammer.



Figure 20. The IAC can easily be adapted and polished at any time.



Figure 21. The view of maxillary left lateral incisor IAC immediately after implantation and its benefits by its gap-free unit.



Figure 22. The frontal view of the maxillary left lateral incisor IAC one month post insertion shows the favorable adaption of the gingiva.



Figure 23. The IAC one month post insertion shows superior gingival aesthetics in maxillary anterior restorations.



Figure 24. The X-ray of the implant one month post insertion shows great healing and maintenance of the crestal bone level.

### Summary

In conclusion one can say that placing Bicon® short implants is a very manageable treatment protocol with a minimum of sections for all involved parties. According to the "Konsensus"- conference in February 2016 in Cologne/Germany, long-term reliable results are expected, since long-term studies demonstrate that the 5-year-implant-

survival rate and the bone preservation surrounding the Bicon Implant do not differ compared to implants with longer length. The cement less and screw less bacterially sealed, locking taper, implant abutment connection helps to prevent peri-implant inflammation caused by cement residues and therefore it supports long term preservation of the implant, thus an ambitious result with short workload is offered. The IAC offers superior gingival aesthetics and is easily retrievable for adjustments of contour or color, which is of great importance to the patient and his aesthetics, especially in maxillary anterior areas. Not only is the aesthetics of great advantage, but also the function regarding the preserved canine guidance as well as neutral occlusion and prevention of any possible midline shift. Of course MLIA must be observed individually to determine whether the gap should be treated by orthodontic space closure or space opening, regarding aesthetics and function of the individual optimum, which would satisfy the needs of the patient as best as possible.

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