

ORTHODONTIC-IMPLANT TREATMENT OF CONGENITAL ABSENCE OF THE LATERAL INCISORS GERM IN THE MAXILLA WITH THE USE OF SHORT IMPLANTS

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Summary

In recent years the use of intra-osseous implants has become a method of choice in the treatment of various missing teeth. Disorders of tooth development are relatively common abnormality occurring, which might cause complications during the development of the masticatory system and the formation of a bite. Doctor taking the treatments reproducing missing teeth, should have adequate knowledge about the changes to the development and its impact on the embedded implant and have the ability to plan appropriate prosthetic work. We present a case report of a patient with congenitally missing left lateral incisor tooth germ in the maxilla, treated by ICX templant - Implant system.

Introduction

During recent years the use of intra-osseous implants has become a method of choice in treating various missing teeth. Due to long-term results of such therapy, we often opt for this type of prosthetic solution as being the most beneficial for the patient. The advantage related with solutions of this kind is maintaining an intact structure of patient's teeth with simultaneous filling of missing teeth. Together with age, decay and periodontopathy constitute the main factor underlying missing teeth issues. Another problem is associated with juvenile patients suffering from congenital loss of teeth – hypodontia [1]. Developmental dental defects are a relatively common abnormality, which may cause complications during the development of the masticatory system and the formation of a bite. They can be reflected both in qualitative, as well as quantitative changes that can be classified into five groups: supernumerary teeth formation, absence of tooth buds, atypical teeth, dental structure defects as well as abnormal tooth bud location [2]. Hypodontia stands as a significant problem not only because of aesthetic reasons, but also due to functional issues. There are also patients with anodontia, and in such cases prosthetic implants seem to be the best possible therapeutic

option [3]. Doctor undertaking the treatments aiming to reproduce missing teeth, should have adequate knowledge on changes relating the development and its impact on the embedded implant, not to mention the ability to schedule appropriate prosthetic work. Patient should be covered with a complete treatment course: orthodontic, pedodontic, prosthetic and surgical [4].

The fixed prosthetic filling, based on adjoining teeth with the help of cemented combined crowns, is the least complicated manner to substitute missing teeth. Nevertheless, this type of solution is invasive and can be destructive as far as hard tissues and mash of the neighbouring teeth are concerned. What is more, it does not protect the alveolar bone against reduction concerning the alveolar process. Prosthetic filling basing on intra-osseous implants is the alternative option. An efficient and aesthetic implantation procedure can be performed only with sufficient amount of surrounding and supporting tissues. Quite frequently, due to significant loss of alveolar bone, it may be recommended to conduct tissue augmentation, as this leads to its increased width and height. However, this procedure is related with additional surgical intervention, which can cause more unanticipated complications, and prolong the period of the whole treatment. Implanting a short and narrow implant into the atrophic alveolar bone is a good alternative for the above-mentioned surgery [5].

Implantation within the anterior segment of the maxilla is a frequent challenge faced by implantologists, especially with substantially decreased transverse dimension of the bone, which is quite often observed in the area with missing lateral incisor. The thesis presents the clinical case of sixteen-year-old patient with congenital loss of lateral incisor, who was treated with the ICX templant implant system.

Case study

15-year-old patient reported to implant and orthodontics clinic in order to improve the aesthetic look of his teeth within the anterior maxillary section. Clinical examination, confirmed with an X-ray verification revealed lack of left incisor tooth in the maxilla (Fig. 1). Intraoral examination enabled to state a distoposition of tooth 22. The patient commenced an orthodontic treatment with fixed thin archwire appliance aiming to reconstruct the place where it could be possible to insert an implant at the end of the orthodontic therapy. The space in the oral cavity between tooth 21 and tooth 23 was wide enough after 14 months of treatment. A subsequent panoramic X-ray was performed to thoroughly evaluate the available size of the implantation site. Analysis concerning arrangement of teeth revealed a decreased interradicular space between tooth 21 and tooth 23, despite using mesialising bends on the orthodontic arch and changing position of the lock on tooth 21 (Fig. 2). Due to the above, the team of implantology specialists decided to choose a short implant from the ICX templant system, which was 6.45mm long, had a diameter equalling 3.45mm and was characterized by a unique 1.7mm long intragingival collar that simultaneously stood as an element of the future prosthetic connection. After using the last osseous drill, an inspection of the drilled part was performed with periodontal probe, which confirmed presence of only bone limitations to the implant bed. The implant was implemented according to the ICS system protocol, based on minimally invasive limited plate technique, with applied torque reaching 40Nm, and this led to high initial stabilization of an implant. Lumen of the implant was sealed with a closing screw. Digital panoramic X-ray was performed after the procedure (Fig. 3). The healing time and osseointegration period did not reveal any complications and lasted 3 months. In the nearest future the patient shall undergo prosthetic reconstruction with a ceramic crown on a standard type of connection.

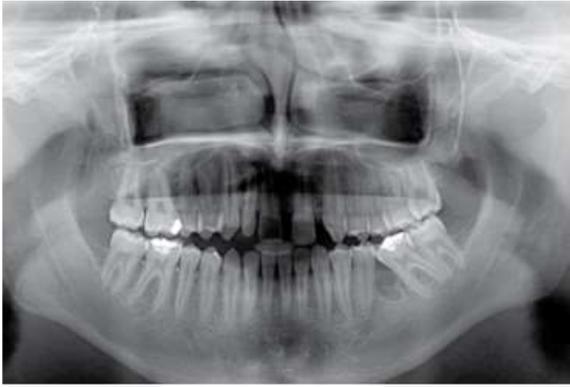


Fig. 1: Panoramic X - ray before treatment.



Fig. 2: Panoramic X - ray before implantation.



Fig. 3: Panoramic X - ray after implantation.

Discussion

Modern implantology faced an enormous progress throughout recent years. Implementing intra-osseous implants for reconstructing partial or complete missing teeth is a very well documented treatment method, and the effect of their osseointegration has been thoroughly acknowledged. Increasing pressure from patients associated not only with shortening the treatment time, but also obtaining the best possible aesthetics relating the prosthetic filling, forces doctors to select the most advantageous type of prosthetic filling, as well as to constantly modify the surgical protocol. The necessity to extract at least one tooth and failure to perform prosthetic reconstruction leads to irreversible destructive changes within surrounding hard and soft tissues. The fixed prosthetic filling, based on adjoining teeth with the help of cemented combined crowns, is the easiest method to substitute missing teeth. However, this type of solution is invasive and can be destructive as far as hard tissues and mash of the neighbouring teeth are concerned [12]. What is more, it does not protect the alveolar bone against reduction concerning the alveolar process. Prosthetic filling basing on intra-osseous implants is the alternative option. An efficient and aesthetic implantation procedure can be performed only with sufficient amount of surrounding and supporting tissues. Quite frequently, due to significant loss of alveolar bone, it may be recommended to conduct tissue augmentation, as this leads to its increased width and height [13]. Nonetheless, this procedure is related with additional surgical intervention, which can cause more unanticipated complications, and prolong the period of the whole treatment [14]. Implanting a shorter intra-osseous implants, namely short implants, seems to be a good alternative for the above-mentioned surgery [15]. Short implants are implants with intra-osseous length, undergoing the osseointegration process, does not exceed or equals 9mm. Clinical studies and experiments that have been conducted for many years prove the propriety of using short

implants in atrophic regions within mandible and maxilla. Retrospective study covered 311 short, 7mm and 8.5mm, Osseotite implants from Biomet 3i Company. Percentage of successful therapy was quite high and equalled 95.8% [16]. 6.45mm implant used in our patient is enumerated within this group of implants.

Another noteworthy aspect posing influence on long-term clinical results concerning the use of short implants lies in the proper geometry of their surface. Implants with smooth machine surface are characterized by a greater percentage of failures, reaching as much as 18.5-26% for administered 7mm long implants [17]. Enhancing the implant surface geometry by proper conditioning, leading to a more porous structure, covering it with plasma, and using special granules increases the contact with the bone tissue. This enables spreading active forces on a bigger surface of an implant. Published researches indicate worse results when short implants with smooth surface are used, compared to implants having a porous surface [18]. This is also confirmed by the clinical case presented here by authors.

Another manner to increase the surface of an implant is to increase its diameter. According to what Misch states, every enhancement in the width of an implant by 1mm may increase its functional surface from 30% to 200%, depending on the shape [19]. Studies with the use of Periotest (PTV) revealed a clear improvement in implant stability following the enlargement of its diameter during the control period immediately after the implantation, as well as after 6 months, 1 year and 2 years [20]. Subsequent, crucial element posing influence on the long-term success in short implant therapy is the utilization of a proper surgical protocol. During their work, authors paid particular attention to the treatment plan, manner of preparing the bone bed, injury related with lack of cooling, leading to bone overheating and necrosis, not to mention selection of proper and sharp tools, including single use bone drills dedicated for the given patient.

During retrospective studies conducted by Fugazzotto between 2000 and 2007, researchers examined 2073 6mm and 9mm long implants implanted in 1774 patients. Implants have been introduced according to elaborated surgical protocol, covering atraumatic proceedings concerning tissues, avoiding lateral pressure in osteotomy, as well as not using manual dynamometric wrenches when introducing implants. Results of the study proved that the average success percentage reached as much as 98.4% [21].

Summary

Numerous studies show that the use of modern implant systems, like ICX implant system, next to observing minimally invasive surgical protocol limits recommendations concerning tissue-augmenting procedures and using long implants or standard implants. Due to unique features presented by ICX implants, including special osteotomic thread, microporosity, hydrophilic surface, platform switching or internal conical connections, it can be declared that an implant based rehabilitation of congenital teeth losses with short implants stands as a predictable, effective and modern treatment method.

Literature

Available in the editorial office.

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