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## Orthodontic-implant treatment of congenital buds defects with the use of ICX templant implant system

**TITLE** > Orthodontic-implant treatment of congenital buds defects. With the use of ICX templant implant system.

**Keywords** > hypodontia, dental implants, orthodontic treatment

**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.

The easiest way to fill a space after a missing tooth is to use prosthetic filling, supported on adjoining teeth and using cemented combined crowns. Nonetheless, such a solution is invasive and destructive both as far as hard tissue and dental pulp of adjacent teeth are concerned.

In recent years the use of intra-osseous implants became a method of choice in treating various missing teeth issues. Due to long-term effects of this therapy we often choose this type of prosthetic solution as being the most advantageous for the patient. A considerable advantage related with this type of solution lies in maintaining individual dental structure intact and simultaneous filling of missing teeth. Together with age, decay and periodontal diseases constitute the main tooth loss factor. Another problem concerns a group of juvenile patients suffering from congenital lack of tooth bud – hypodontia (1). Developmental teeth disorders are relatively frequent teeth irregularities, which may be the reasons underlying complications during masticatory apparatus and bite formation. They are observed in the form of quantitative and qualitative changes, which may be divided into five groups: supernumerary teeth, lack of teeth buds, atypical teeth, lacks in dental structure, improper location of teeth buds (2). Hypodontia stands as a significant problem both when aesthetic and functional features are taken into consideration. There are also cases of adontia, and then implant prosthetics constitutes the best therapeutic treatment (3). The doctor undertaking the effort to recreate teeth losses should have proper knowledge on changes associated with development and its influence on the anchored implant, as well as he should possess skills to schedule proper prosthetic work. The patient should be covered with a complex orthodontic, pedodontic, prosthetic and surgical treatment (4).

The easiest way to fill a space after a missing tooth is to use prosthetic filling, supported on adjoining teeth and using cemented combined crowns. Nonetheless, such a solution is invasive and destructive both as far as hard tissue and dental pulp of adjacent teeth are concerned. The use of prosthetic filling based on intra-osseous implants is an alternative for the above-mentioned treatment. Availability of proper amount of surrounding and supporting tissues is a condition essential to conduct a successful and aesthetic implantation. Frequently, due to a significant loss of tooth bud bone it may be recommended to conduct tissue augmentation, leading to its increased width and height. However, this means an additional surgical intervention, which may result in unexpected complications and prolong the whole time of treatment. Implanting a short and narrow implant into the atrophic bone of alveolar process is an alternative for such treatment (5).

Implantation in lateral maxillary segment frequently constitutes a substantial challenge for implantologists, especially when bone height in this anatomical region is drastically decreased. Maxillary sinus lift is a commonly utilised method, which enables to restore lost bone and to recreate conditions enabling implantation. Nevertheless, this procedure is related with additional surgical intervention and this can cause more unanticipated complications, prolong the period and increase the cost of the whole treatment. This affects not only the maxillary sinus lift, but also the bone block augmentation. According to certain researchers complications observed after maxillary sinus lift may occur in 10% of patients, while sensation disorders after transposition of the inferior alveolar nerve – in 21%. In order to avoid these types of complications, authors suggest using short implants that make it possible to conduct the surgery without complicated regenerating procedures (6).

The thesis presents clinical case of a patient with congenital loss of upper molar teeth buds, who underwent treatment based on ICX templant implant system.

## CASE STUDY

A 20-year-old female patient reported to implant-oriented practice due to lack of the second premolar tooth on the left side of the maxilla and persistent deciduous molar tooth on the right side of the maxilla. During the interview the patient declared that alignment of front teeth is uncomfortable for her and that it is also an aesthetic problem. Intraoral examination revealed retrusion of upper incisors, in addition to gaps between these teeth. Radiological examination confirmed the congenital lack of premolar permanent teeth buds in the maxilla and presence of persistent deciduous molar tooth on the right side of the maxilla (Fig. 1). The patient accepted the plan of orthodontic treatment together with implant placement, which she obtained. The first therapeutic stage included orthodontic closure of gaps between teeth and strengthening front teeth in the maxilla from position tilted towards palate with the use of fixed segmental thin wire arch. The final retention phase covered removal of persistent deciduous molar tooth from the maxilla and diagnostic preimplantation radiological examination. Orthopantomogram analysis revealed the height of the bone between the edge of the alveolar process of maxilla and the sinus lift in the anticipated location where the implant is to be introduced, 8 mm on the right side and 9 mm on the left side (Fig. 2). Intraoral examination showed a partial loss of alveolar bone of maxilla within the bucco-palatal aspect.



- 1 Orthopantomogram preceding the treatment.
- 2 Orthopantomogram in the final stage of retention, prior to implantation.

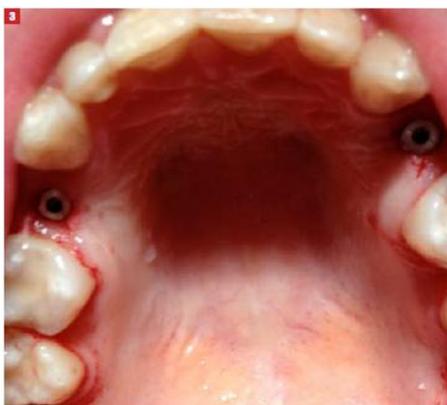
Mapping alveolar bone on a gypsum model enabled precise evaluation of its geometry and width, which equalled 5-5.5 mm. The patient was informed about all possibilities concerning her treatment, however, she did not agree to undergo bone augmentation and maxillary sinus lift procedure. High expectations declared by the patient, as well as very difficult, atrophic anatomic conditions determined the choice of the implant system. Team of implantologists selected the ICX templant implant system. Near the area of teeth 14 and 24 narrow ICX-plus implants were anchored. They had 3.45 mm diameter, 6 mm length and unique, 1.7 mm, pergingival cuff, which simultaneously constituted the element of the future prosthetic connector. The procedure was performed with minimally invasive limited plate technique, and drilling of the bed was performed according to recommended protocol for D2/D3 bones with the use of stopping sleeves. Implant was introduced with the help of a machine, and the torque in the final screwing phase reached 40 Ncm, which enabled to obtain high initial stabilisation. Implanting lumen was closed with a closing screw (Fig. 3). The implemented minimally invasive surgical protocol enabled to shorten the healing process and osseointegration time, which did not lead to any complications or ailments (Fig. 4).

## DISCUSSION

Dental defects often occur simultaneously with other genetically conditioned syndromes. Rehabilitation of patients with such disorders constitutes a considerable challenge for implantologist. These patients are usually young and the change in the look of their teeth is extremely important, as it is directly related with how they are received in their environment. Young age of these patients obliges to search for such therapeutic methods that would on one hand ensure long-term stability concerning the function of masticatory apparatus, while on the other hand they were related with minimal preparation of dental hard tissues. Currently, implants have to be considered as the best method of filling single dental losses (7).

Literature analysis reveals a wide spectrum of results concerning successful implantations, which is caused by utilisation of various implant systems and use of different evaluation criteria by particular authors (8).

Due to clinical, as well as technical and prosthetic advantages, implant systems based on two and more parts are much more often used in implantology than single part systems. What concerns double part implant systems with internal screw connection, the height of bone surrounding the implant may differ, depending on the utilised system and connector. Mechanical and microbiological aspects of connection binding the implant with the connector may influence the height of bone surrounding the implant.



- ⑤ Perioperative intraoral photography of the patient – visible closing screws.
- ④ Orthopantomogram performed after the implantation procedure.

According to researchers, an inadequate adjustment associated with functional loads, may lead to loosening of the connector or to fracture within the connection between the implant and the connector (9). As far as microbiological aspect is concerned, micro-crack between the implant and the connector stands as a certain peculiarity. Due to the occurrence of micro movements it may be assumed that under the influence of functional load the movement results in pumping activity and fluid movement, and bacteria or possibly their endotoxins may penetrate through the micro crack into gingival groove. The micro crack may also constitute a reservoir for bacteria causing periodontitis (10). ICX implants used in case of this patient have a conical shaped connection between the endosteal part and connector, hence bacterial micro leak practically does not occur.

## SUMMARY

Combined orthodontic and implant treatment is the most beneficial therapeutic solution that can be offered to our patients, especially the young ones. This therapy allows us to avoid damaging the structure of adjoining teeth, and we can prevent the loss of alveolar process. Additionally, orthodontic treatment ensures proper occlusion and appropriate shape of the dental arch. We are able to restore the aesthetics and function quite close to natural dentition, and such a result cannot be obtained when implementing solutions offered by conventional prosthetics. Selection of proper implant system is also a noteworthy factor determining treatment. The chosen implant system should fulfil all requirements of a modern prosthetic solution, and at the same time it should be financially available for patients. As it has been shown in the case study, the ICX implant system fulfils these criteria.

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