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Case Report:
A case of bilateral cleft treated with the Corticobasal® implants and fixed teeth using an immediate functional loading procedure

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A case of bilateral cleft treated with the Corticobasal® implants and fixed teeth using an immediate functional loading procedure

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Abstract

Unilateral or bilateral palatal clefts are difficult to treat using conventional dental implants, because of low bone supply. Our patient presented with a successfully pre-operated bilateral cleft lip and palate, but had failing dentition and wished to maintain a fixed dentition. All the upper jaw teeth were removed, and the upper jaw was equipped with ten Strategic Implants and a circular fixed bridge. Simultaneously, the lower jaw was treated using Strategic Implants. At the 5.5 year follow-up, the patient showed a well-functioning dentition in both jaws. None of the implants showed signs of periimplantitis or bone loss at the crestal bone line. The jawbone was completely healthy and both jaws were mineralised. Patients who present with operated (and thereby closed) clefts do not require bone augmentation if Strategic Implants are used. The patient's expectations can be fulfilled by placing a fixed prosthetic reconstruction in the Strategic Implant®, without any bone augmentation.

Introduction

Clefts of the lip and palate are openings or splits in the upper lip, the roof of the mouth (palate), or both. Cleft lip and cleft palate result when facial structures that are developing in an unborn baby do not close completely, and are among the most common birth defects. They most commonly occur as isolated birth defects, but are also associated with many inherited genetic conditions or syndromes. Clefts can occur on one or both sides lateral to the bone that forms the nasal spine. The malformation develops between the 4th and 6th weeks of gestation, commonly occurring between the lateral incisor and canine, and less commonly between the central and lateral incisors, as seen in our patient (Fig. 1 and 4). The incidence of various types of cleft lip with or without cleft palate is 1 per 700–1000 live foetuses worldwide.[4] Cleft lip with or without cleft palate is the most common foetal craniofacial malformation that can be screened during prenatal ultrasonographic examination.[3]

The patient was diagnosed with type 3 cleft according to the classification by Nyberg et al. [2] The anatomic defect of our 41-year-old, healthy, non-smoker female patient had been operated in her youth with good aesthetic, phonetic, and masticatory results. The indication for our treatment was the failed dentition of some of her teeth and her wish to maintain fixed dentition.

Rehabilitation using corticobasal implants is a fast, safe, and effective method for dental implant rehabilitation,[7] especially in cases with bone deficits (bone atrophy, partial or total part bone resection). Further, such cases can be safely treated in three days using the 16 immediate loading protocols with Strategic Implants, which are recognised and clinically proven methods and sub-methods for placing corticobasal oral implants and for immediate loading prosthetic rehabilitation.[1,5]

Conventional implant treatment in such maxillary defects is very restricted:

1. Most of these patients receive a particulate cancellous bone marrow graft early in life to close the bony defect. However, secondary bone grafting is also required after the teeth are lost.[9] Typically, due to the vast amount of bone required, invasive iliac cortico-cancellous-block grafting techniques are chosen,[10] followed by implant and prosthetic treatment after a considerable period of 9-12 months. The total treatment time typically exceeds 18 months.
2. In situations where the atrophic maxilla does not adequately allow reconstruction, the use of zygomatic implants has been indicated. We assume that these implants can be used for the rehabilitation of patients with lip-palate fissures.[11]

Case Report

A 41-year-old woman visited our clinic for total tooth rehabilitation. The chief complaint was the increased mobility of the upper prosthetic reconstruction and pain during mastication. In addition, the aesthetics were compromised. She had teeth with deep periodontal involvement and high mobility of the upper bridge and lower frontal crestal bone (Fig. 1, 2). The patient was operated in childhood for bilateral cleft lip and palate (Fig. 1, 4, and 6), which resulted in several bone scars on the frontal upper maxillary bone (layers of bone and conjunctive tissue), and nasal cortical bone defects. Pictures were taken before and after treatment (Fig. 1 and 6) and during the follow-up more than 5.5 years after treatment (Fig. 3, 7, and 8).

Fig. 1 *En Face view of the oral and perioral condition of the patient.*

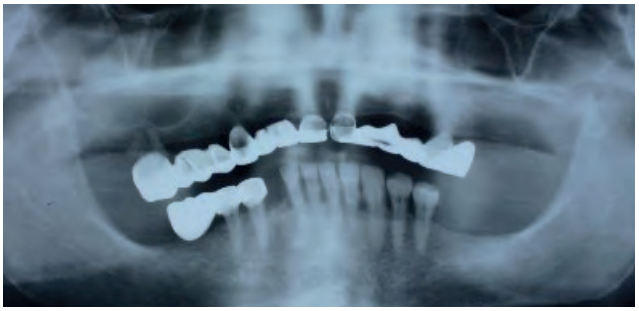

Fig. 2 *Pre-operative panoramic radiograph.*

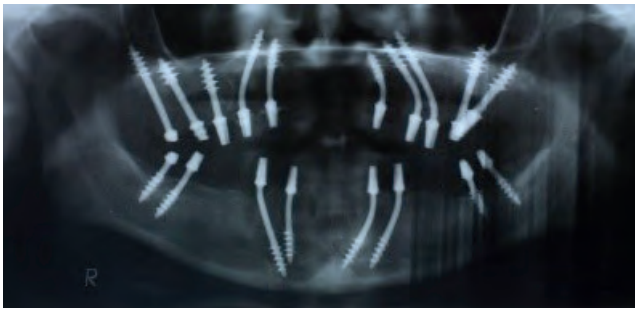

Fig. 3 *Post-operative panoramic radiograph.*

Fig. 4 *Position of the implant-analogues on the upper jaw model.*

Fig. 5 *Finished metal-to-acryl bridges.*

Fig. 6 *Prosthetics in the patients mouth after the bridges had been cemented with Fuji PLUS permanent cement.*

Fig. 7 *Panoramic overview radiograph taken at the 5.5 year follow-up. We observed a completely uneventful healing of the implants and no periimplantitis.*

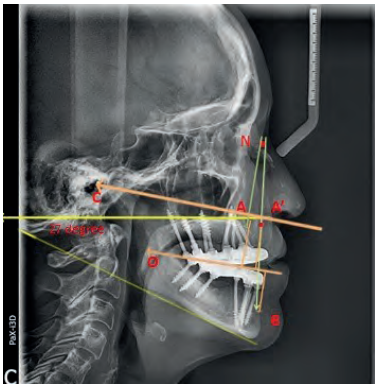

Fig. 8 *The lateral cephalogram taken at the 5.5 year follow-up demonstrates the position of the plane of bite. Also the Wits Appraisal points into the direction of an Angle Class 3 (or an anterior micromaxillia).*

The treatment started with tooth extraction and bone reduction in the frontal alveolar mandibular ridge. The extraction socket was cleaned of granulation tissue, and Betadine 10% mixed with saline was used to reduce the bacteria in the extraction socket and in the patients mouth.

The implants used were BCS® (DIN 19404; manufacturer: Dr. Ihde Dental AG, CH-8737 Gommiswald, Switzerland) with 3.6-4.6 mm diameter apical threads of different lengths. Extraction of the remaining teeth was performed under local anaesthesia using the same intervention as the implant placement. Various International Implant Foundation (IF-) methods for the Strategic Implant® technology were applied:[8] implants in positions 13, 14, 23, 24, and 25 were inserted in the nasal cortical bone: IF Method 7a; implants in positions 15, 16 and 26 were inserted in the sinus cortical bone: IF Method 8a; implants in positions 17 and 27 were placed into the tubero-pterygoid fusion zone: IF Method 10; implants in the regions 33, 34, 43, and 44 were inserted in the interforaminal mandible under an angle: IF Method 2; implants were inserted in the lingual undercut of the mandible below the mylohyoid ridge in the areas 36, 37, 46, 47: IF Method 5a (Fig. 3). The scar areas (11, 12-21, and 22) in the patient's jaw were avoided. One attempt to fix an implant failed during the intervention. Implants inserted in the nasal cortical bone bypassed this area, which had been pre-operated. The metal-acrylic bridge was finished and cemented within three days. The relative position of the tooth arch was changed from skeletal class III to class I.[6] Nevertheless, the prosthetic construction was designed not to allow contact between the frontal groups of the upper and lower jaws.

As there was a lack of vertical dimension for the prosthetic pieces in the distal part of the jaw, the upper 1st molars were left in metal and without any veneering (Fig. 5). Nevertheless, aesthetics were not compromised (Fig. 6). The follow-up period of this case is now more than 5.5 years, from July 2015 to February 2021. A recent panoramic radiograph showed a fully uneventful integration of the implants, no bone loss whatsoever, and no periimplantitis (Fig. 7 and 8). The patient was satisfied with the prosthetic reconstruction incorporated in 2015.

Discussion

Besides the main challenge of bilateral palate clefts, the patient presented various other challenges for dental implants: the bone in the frontal zone of the upper jaw was almost missing, although the cleft had been closed surgically many years ago; both the jaws showed profound periodontal involvement; and the position of the teeth resembled that in Kelly syndrome.

Nevertheless, we were able to place ten corticobasal implants in the lateral zones of the maxilla using the Strategic Implant® technology, thereby bypassing the pre-operated bone sites and scars. In the mandible, vertical bone reduction from the left to the right canine helped to solve the prosthetic problems created by Kelly syndrome and, at the same time, allowed for interference-free mastication. Contacts on the frontal groups were avoided in both occlusion and mastication.

To avoid unaesthetic areas in distal prosthetics, bone reduction must be performed before implant placement. The distance between the jaws must be appreciated, and the distal tuberos-

ity bone must be reduced. As the Strategic Implant® technology requires only minimal amounts of vertical bone, such bone reductions can be performed without augmenting the bone in other areas (e.g. inside the maxillary sinus) to replace the bone that was removed. On the contrary, augmentations inside the maxillary sinus will (regardless of any "positive effects" which the treatment provider tries to reach with such an intervention) lead to a fast resorption of the 2nd cortical bone (the basal cortical areas of the maxillary sinus). This often prevents treatment with corticobasal implants and diminishes the chances of conventional dental implants achieving stability in the maxillofacial skeleton.

The mandibular plane (MnPl) is defined by a line that passes through the gonion and menton. Although the definition varies slightly, MnPl is used to indicate the plane of the lower border of the mandible. The maxillary plane is defined by a line passing through the anterior and posterior nasal spines.[12] Vertical relationship is generally assessed by looking at the maxillary-mandibular plane angle (MMPA), with average values of 27° ± 4° and indicates the facial height proportions. An increased MMPA indicates a backward pattern of mandibular growth and a decreased overbite. In our patient, MMPA was 27° (Fig. 8). The ANB angle, which is 2°-4 ° in Angle class I, was -12° and confirmed Angle class III.

In conclusion, whenever bone atrophy occurs after surgical intervention (partial mandibulectomy or maxillectomy, cleft lip and palate treatment procedures), corticobasal implants are the first choice in immediate loading procedures and prosthetic rehabilitation. Immediate loading and prosthetic rehabilitation three days after surgical intervention help prevent the loosening of teeth and re-establish masticatory, phonetic, and aesthetic aspects.

List of Abbreviations

Abbreviation	Definition
IF	International Implant Foundation
MnPl	Mandibular plane
MMPA	Maxillary-mandibular plane angle

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