



Full maxilla and partial mandible reconstruction- case report and considerations regarding necessary number of implants and the necessity for the incorporation of a rigidly cemented metal-enforced first bridge for immediate loading treatment protocols

Authors

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Abstract

Corticobasal implants (Strategic Implant®) are first choice devices when it comes to treating full jaws or segments with implant-based constructions [1]. Contrary to traditional implants, which are designed for “osseointegration”, corticobasal implants are osseofixed in the 2nd or 3rd cortical bone. Since peri-implantitis does not occur in corticobasal implants, the treatment provider can easily increase their number to gain more contact areas with the cortical and thereby more primary stability.

In this case report we present the procedure and explain the choice of positions for the implants and for their number.

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Corticobasal implants provide safe grounds for fixed prosthetics, if the rules of the Technology of the Strategic Implant® are obeyed.

Key Words

Immediate functional loading;
Strategic Implant®

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Introduction

Traditional dental implants hardly allow to carry out treatment protocols in immediate functional loading, because in most patients the necessary amount of bone is missing and the rules are not widely known. Many dentists still believe that specific implant surfaces have influence on the healing time and they are still waiting for the “most advanced (endosseous) implant surface” to appear on the market, the surface which will finally allow for immediate loading [2-9]. Unfortunately, bone biology tells us that this will quite surely never happen [5-8].

3D-augmentations of the jaw bone with bone substitutes in combination with immediate loading do not make much sense either, because augmentation material first has to remodel and integrate with the existing bone [10]. Corticobasal implants bypass this problem by using (sometimes remote) cortical bone areals in “strategic positions” for anchorage and, as a result, they provide the possibility of immediate functional loading [11].

It is, however, necessary to follow a strict prosthetic protocol for these implants, because uncontrolled masticatory forces may cause overload osteolysis around the load transmitting surfaces. In the maxilla, the floor of the nose and the pterygoid

plate of the sphenoid bone as well as the disto-palatal region are preferred place for anchorage. Lazarov as well as Dobrinin et al. have shown, that these sites resulted in very high survival rates for the implant, regardless of the type of prosthetic construction built thereon [12, 13].

Material and Methods

A 46-year old, healthy non-smoking female patient requested dental implant treatment in the maxilla due to severe deterioration of the remnants of her dentition and limited chewing possibilities. Radiological examination revealed severely destroyed dentition in the maxilla and missing 1st and 2nd molars on the left side of the mandible, as shown in Fig. 1. The treatment included removal of all the teeth in the maxilla and placement of three implants to in the place of tooth 36 also in an immediate loading procedure, Fig. 2.

After having received first metal-to-acryl bridge for the maxilla within three days, the patient remained with this bridge for 18 months. During this period massive abrasions on the maxilla bridge were observed which resulted in choosing MFC (metal-fused-ceramic) as material for the final bridge. The exchange of two implants was necessary, as the temporary bridge partly decemented leading to mechanical

overloading of the bone around two implants.

Exchanging implants simultaneously with prosthetic construction is a standard procedure in corticobasal implantology. The new implant(s) must again reach healthy and mineralized (2nd) cortical anchorage in order to contribute to the load transmission [14]. However, it must be taken into consideration that implant constructions on eight or more corticobasal implants per jaw can be stable also with one or two implants fewer in function. In the mandible, it is not always recommended to place new implant into the place where the mobile implant was. In the maxilla, there are no such limitations [14].

Each corticobasal implant was placed following one or several of the defined methods for corticobasal implants [15]:

Implant Position	Method used
37	5a
17, 27	10
16	6, 8
15	6
13, 11, 21, 23	7a
24, 25	8

Table 1: Overview of the methods used for the placement of all implants in the maxilla and for implant 37. Two compression screws in area 36 were just compressing the spongy bone without having basal cortical anchorage.

The frontal group of the final bridge (Fig. 4) was positioned slightly anteriorly to the alveolar crest. After the extraction of the patients' own teeth the alveolar crest had undergone shrinkage, i.e. vertical and horizontal atrophy [16-18]. The tooth position in the bridge had remained unchanged however. This allowed for a good support of the upper lip and natural perioral function and speaking function compared to the pre-treatment conditions. When the technology of Strategic Implant® is applied, the points of anchorage are chosen independently of the (later) tooth position. Therefore, this concept (just as "All-on-4" concept) [19-22] does not follow the older (in our view outdated and rather dangerous) methods in dental implantology, according to which the implant has to be positioned in the "prosthetically desired position" [23-28].

Both prosthetic constructions are stable, the patient eats without pain and very comfortably and she has been equipped with fixed bridges on implants over the last 5.5 years almost without interruption. The bridge exchange after 18 months took 2 days.

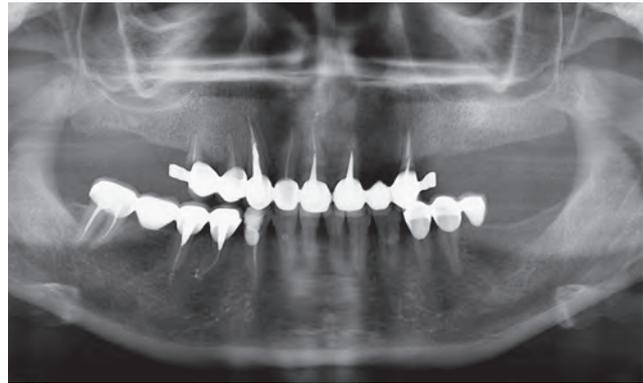


Fig. 1: Chewing possibilities presented by the patient were rather limited, after the bridges in the maxilla became mobile and the retention for the removable posterior denture had been lost. The patient complained about condition of the maxilla.

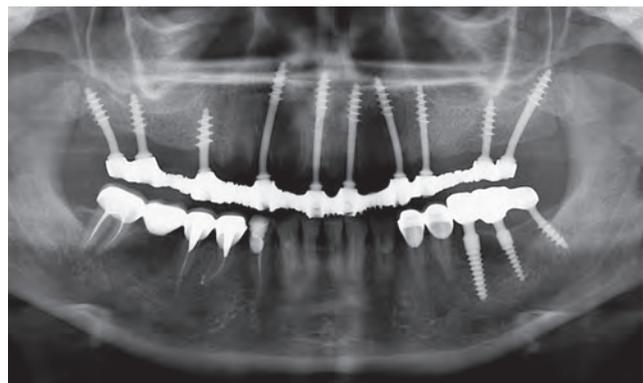


Fig. 2: In the maxilla 10 BCS® implants were placed and splinted within 3 days with the help of a fixed metal-to acrylic bridge. Instead of the pontic for tooth 36, a full crown on three implants (anteriorly 2 compression KOS® screws, and one cortico-basal implant) was installed. Contacts for the mandible were restricted to teeth 4-6 on both sides. No front contacts were installed, neither in occlusion nor in mastication. This very successful concept for immediate loading was described by Ihde & Ihde [29].

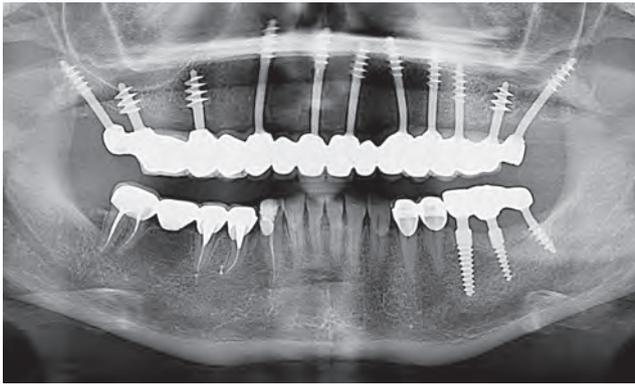


Fig. 3: During prosthetic bridge exchange procedures in the maxilla to a final metal-ceramic bridge, the implants in area 15, 17 and 27 seemed mobile. They were removed and immediately replaced by two implants with larger diameters (4.6 mm in area 15, and 5.5mm in area 17) and in area 27 one implant was added. Then, the bridge was fabricated and cemented within three days. The bone level has stayed unaltered from the beginning, no peri-implant infection or bone loss have appeared.

Results

18 months after the onset of the treatment the first long term temporary bridge was replaced with MFC bridge in the maxilla (lower segment construction has been produced in MFC from the beginning). Both prosthetic constructions have been stable, the patient eats without pain and very comfortably and has been equipped with fixed bridges on the implants over last 5.5 years almost without interruption. The bridge exchange after 18 months took 2 days. Control OPG was taken after 5.5 years revealing no irregularities, as shown in Fig. 3.



Fig. 4: A highly aesthetic MFC bridge in the maxilla with the upper frontal group being positioned anteriorly to the crest, leaving sufficient gaps between the bridge and the mucosa for easy cleaning and self cleaning.

As for the final bridge material zirconium and metal-to-composite were also available. Composite shows less abrasion compared to unfilled acrylic and it allows for bite raising. Nevertheless, this material was not chosen, because strong abrasion was observed on the 1st long term temporary bridge. Zirconium, on the other hand, is very hard and the adjustments of the masticatory slopes (during check-up visits) are hard to perform on this material. Therefore we opted for metal-fused-ceramic bridge.

Discussion

(Private) health insurers tend to request that a small number of implants are being placed in order to reduce the treatment costs which they have to cover. Likewise,



the necessity for an immediate fixed splinting and second bridge are questioned by such companies.

Corticobasal implants utilize only the 2nd or 3rd cortical bone for anchorage, their shaft (initially) only passes through the spongy bone between the 1st and 2nd cortical without creating any traction. Hence, the spongy bone around the vertical polished shaft does not contribute to the load transmission of the implants, unless after some months. Moreover, this (typically endosseous) implant part osseointegrates. It is advisable to place rather more than “enough” implants in the first place because we cannot know if all the implants are going to be stable after the first few months of healing under full functional load. Increasing the number of implants (compared to the number used in 2-stage implantology) also reduces the chances of damages that may be done due to errors in occlusion and wrong (e.g. unilateral) mastication.

2-stage implantologists are typically not aware of the importance of bilateral and equal function and loading, because by the time they load the implants, the implants are already well osseointegrated. Wrong loading will usually not destroy the osseointegration, however other damages will occur: fractures of prosthetic screws and

abutments or even fractures of the implant or the whole prosthetic restoration [30-33].

This strategy is similar to the concepts known in traditional dental implantology, where plenty of implants are placed in the first stage of treatment, and those which have not osseointegrated will be removed before prosthetic procedures are even started. Hence traditional implantologists hope that enough implants will be available after the healing time is over. In corticobasal implantology, all implants are loaded immediately (i.e. within 72 hours). Right after they have been placed, the next big investment into prosthetics must follow. Placing a larger number of implants (i.e. 10-14 in the maxilla) reduces the risk of repeating the prosthetic phase if single implants lose cortical contact or if the cortical bone gets osteolytic through overload. Moreover, traditional dental implantology (2-stage implantology; 2-phase implantology) faces the unsolvable problem called “peri-implantitis”.

We know today that the incidence of peri-implantitis in the maxilla increases significantly as soon as five or more such implants are placed there [34]. Hence implantologists who do not know the working principle of the technology wrongly criticize Strategic Implant® concept. Placing

so many 2-stage implants (10 or more in the maxilla) with large diameter and rough endosseous surface would obviously end up in significant bone loss. Around Strategic Implant® implants peri-implantitis has never been reported, as well as bone loss beyond the natural atrophy (i.e. after extraction) [9].

In conclusion, advantages offered by Strategic Implant® system make it an obvious choice for clinicians. Replacing tooth 36 safely can require three implants as shown in this article. Those implants will be in full functional loading from the beginning, because the masticatory system will not function properly, if this important tooth is missing. This can create misloading in other areas of the skeleton and lead to unpredictable conditions and the stability of dental implants may suffer from the change in function.

Conclusion

The Strategic Implant® technology offers simple solutions for fully or partially edentulous jaws. Placing enough cortically anchored implants (i.e. ten or more in the maxilla and eight in the mandible) is essential to achieve sufficient stability especially during the first 3-6 months when the postoperative osteonal remodelling takes place.

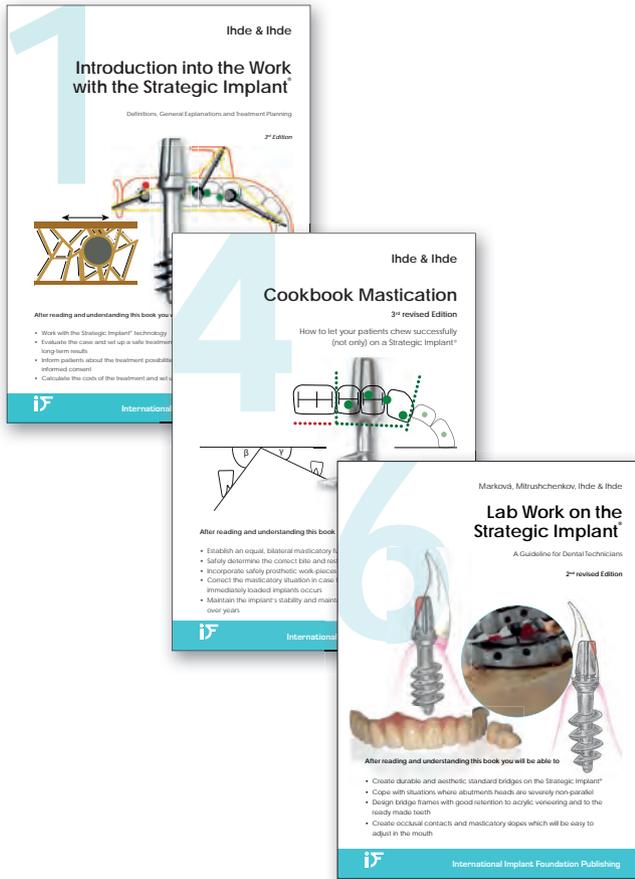
Single molars are replaced by two or three implants due to the expected high chewing forces in that area.

We have to understand today, that for the permanent fixation of dental implants nothing works as reliably as (even the smallest amount) of cortical bone in its natural position (non transplanted).

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