

ZYGOMATIC IMPLANTS FOR EDENTULOUS MAXILLA

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Abstract:

Because of osseous resorption and the enlargement of the maxillary sinus, it may be challenging to treat edentulous areas of the posterior maxilla. It may be challenging to treat such conditions using traditional dental implants, and the patient's treatment duration, morbidity, and expenses may all significantly increase as a result. Dentists now have the option of employing the zygomatic method to immediately set and secure implants, which enables quick use of the restored teeth when treating severely resorbed, partially, or fully edentulous maxillae. This procedure is used to treat severely resorbed maxillae. It is not necessary to perform substantial bone grafting in order to put implants into the denser, more stable bone of the posterior maxilla because of its location.

Keywords: Zygomatic implants, edentulous maxilla, grafts, CBCT, success rate.

INTRODUCTION:

It is well-known that the quantity of healthy bone in the jaw is one of the most important considerations when placing an implant. The viability of dental implants is called into doubt if not enough bone is present for their insertion [1]. Due to the loss of bone, soft tissues, and muscles, implant insertion, and the subsequent prosthetic therapy become very challenging in severe maxillary abnormalities after surgical resection. Implants at an angle, short implants, broad implants, small implants, zygoma implants, bone grafts, grafting the maxillary floors, and other methods have all been proposed as ways to treat an atrophying maxilla [1- 4]. In these cases, bone augmentation is often necessary so that implants of adequate quantity and length may be placed. The prosthetic platform of these implants is being placed with the use of guided surgical procedures. It is assessed by a cone-beam computed tomography (CBCT) scan whether or not the severely resorbed maxilla has sufficient bone density for a standard All-on-4® (Nobel Biocare, nobelbiocare.com) or comparable treatment, or whether zygomatic implants are needed [4].

The use of ZIs offers several benefits, including a shorter treatment period, decreased morbidity due to the elimination of the need for a graft (and hence a graft donor site), fewer implants required to maintain fixed prostheses and lower patient expenditures. By inserting a ZI, a surgeon may compensate for a lack of bone in a specific area by anchoring an obturator or prosthesis to the more distant zygomatic bone, therefore improving retention and stability. However, there are drawbacks to the method that should be taken into account. To begin, ZI implantation is a complex surgical process that requires the expertise of qualified medical professionals. A significant risk of soft tissue problems and sinusitis exists around the abutments. When ZIs have to be positioned higher in the mouth (palatally), a more elaborate prosthetic design may be

required. Moreover, unlike traditional implants, treating a ZI's ultimate failure may need greater complexity and surgery [5]. It is common practice to introduce these implants from the palatal side, and their dimensions are 30–50 mm in length and 4 mm in width. They're anchored in place by the zygomaxillary bone and feature a platform that's slanted at an angle of 45 degrees. For strong primary support, they extend into the zygomatic process. They're hidden behind the sinus's lateral wall mucosa (several studies have shown that employing two-stage procedures greatly increases implant survival rate, from almost 98 percent to 100 percent, with minimal problems being observed). After this, the patient waits for six months before loading the prosthesis. Since the zygomatic bone is of higher quality than the posterior maxilla, it is an ideal location for implant anchoring. The fundamental stability of the implant, before loading, is best provided by the wider and thicker trabecular bone of the zygomatic bone. Indications Zygomatic implants have many proponents among experienced dentists and surgeons, but they shouldn't be your first choice. There aren't many situations in which you might use them. Here is a rundown of the items: When there is enough bone in the front area and it is required to offer implant stability in the back, the zygomatic implant may be indicated to avoid the requirement for grafting. In a similar vein, zygomatic fasteners may be used to anchor the posterior maxilla in place, limiting the need for grafting to the front of the arch. 2) When there are teeth up front but significant bone loss and edentulous areas in the back. In the event of a maxillectomy, prostheses have also been supported with zygomatic implants. Four) People who already have enormous sinuses and will need grafting surgeries.

Although zygomatic implants are an option for these individuals, more evaluation is required before treatment may begin. One of them would be a pre-treatment evaluation to see whether or not the patient is healthy enough for surgery. The process of determining whether or not to proceed with an operation, often known as the pre-operative One need is that the patient's sinuses be symptom-free. 2) The location of the prolonged implantation shows no signs of infection in either the hard or soft tissues.

Radiographic evaluation of the implant site is crucial. Methods such as the one described below might be implemented. 1) Intraoral radiography to rule out ridge crest pathology. Panoramic radiographs, which rule out jaw disease and help identify anatomical components, are the second essential test. On a lateral cephalogram, the size and position of the upper and lower jaws may be assessed. Fourth, tomographic imaging allows for better visibility and quantification of the peri-implant bone [6].

Advantages The need for surgical procedures has been decreased, which leads to 1) a better recovery time. Second, the overall time required has been reduced Three) A method that does not need grafting 4) Zygomatic implant surgery, performed in the doctor's office, which restores the patient's ability to keep their previous maxillary dentures. 5) In the realm of orthodontics, infra zygomatic micro implants inserted in the vertical and horizontal planes give sufficient anchoring.

Disadvantages The benefits of this surgery are many, but there are also some downsides to consider. When repairing an edentulous maxilla or one with missing molar teeth, the zygomatic implant is only useful in

exceptional circumstances and should never be regarded as a first line of treatment. Multiple zygoma implants can cause difficulties with communication. As is discussed more below, there are a number of potential difficulties that might arise from improper implementation of the approach. Two key aspects of the tooth loss issue that need assessing are 1) its nature and 2) potential solutions. Thirdly, it's important to think about both global and regional issues.

In addition to these considerations, there are also several glaring drawbacks, the most notable of which is access to the surgical site. Because these implants are placed in the palate, the tongue has less room to move, which may be problematic while speaking (see also: [6] Complications). Despite these benefits, zygomatic implants are not without their share of potential problems, as shown below. Implants are inserted into the nasal cavity or antral cavity, Chronic infection, Overloading, Modifications to one's speech, Hygiene issues, Infratemporal excess apical eruptive apex, buccosinus fistula due to inadequate surgical closure, and persistent gingivitis, Painful and persistent sinusitis. (As a result of a perforated sinus.), A zygomatic implant implanted in the pterygoid area has broken through to the brain. Careful placement of the implant in the pterygoid area is required. It is recommended to employ 3D computer-assisted transfer for preoperative planning. It is recommended that all patients get post-operative CT scans to rule out problems. Also, the patient's neurological health should be closely monitored following surgery, as any change might indicate a potentially serious complication [7-9].

GRAFTING PROCEDURES

When the maxillary sinus has grown owing to tooth loss and periodontal disease, it might be difficult to put implants in the jawbone at the location of a molar. The past two decades have seen a proliferation of published, well-documented procedures for bone grafting to restore maxillary edentulousness, either in part or in whole [10-12]. It is assessed by a cone-beam computed tomography (CBCT) scan whether or not the severely resorbed maxilla has sufficient bone density for a standard All-on-4® (Nobel BioCare, nobelbiocare.com) or comparable treatment, or whether zygomatic implants are needed. All of these treatments have demonstrated varying degrees of long-term effectiveness, but they often need numerous operations, and the patient cannot use a prosthesis throughout the healing process. Moreover, these methods add time to the treatment process before the final prosthesis can be commenced; in the event of difficult or many grafting surgeries, this might be a year or more. Extreme resorption makes it difficult, if not impossible, to insert implants at the time of initial grafting, which might extend the duration of therapy.

ANGLED DENTAL IMPLANT PLACEMENT/IMMEDIATE FUNCTION

Patients with significantly resorbed maxillae and enlarged sinuses may benefit from having dental implants placed at an angle to reduce the risk of injury to the maxillary sinus, lateral pyriform nasal plate, or nasal floor. Maló's All-on-4 idea for treating patients who are either completely or partially dentate ("terminal dentitions") offers a grafting-free, immediate-functioning alternative; the patient receives a permanent, maxillary-palate-less prosthesis in a single procedure [13]. Immediate implant fixation and loading is

essential to ensure long-term success, but this may be hindered if the implants cannot be placed with enough insertion torque, anterior-posterior (A-P) spread (i.e. A-P distance between implants), or bone in the anterior at the lateral nasal wall. In such cases, it may be necessary to postpone loading until after the implants have been integrated. In atrophic patients, Jensen et al. found that the vomer/nasal crest may be exploited to immediately support implants by making contact with the dense cortical bone. However, care for implants in the rear of the mouth is not included.

ZYGOMATIC IMPLANTS

Zygomatic implants may be a possibility when there is insufficient maxillary bone, particularly in the paranasal area or lateral pyriform rim, and when the sinuses have been pneumatized anterior to the canine region. This is especially true when it is taboo to do many types of grafting. After that, the dental implants could be immediately stabilized, and the fixed prosthesis could be used straight away. If you need to install a lengthier implant (between 30 and 55 millimeters in length), Brnemark first suggested utilizing the zygomatic approach since it results in a higher insertion torque. Several articles have described a treatment option for the severely resorbed maxilla in which a full-arch fixed prosthesis is immediately loaded onto zygomatic implants [14,15].

Zygomatic implants are available in lengths between 30 mm and 60 mm to effectively engage the zygomatic bone, which is much longer than the lengths of standard implants. The widths commonly fall between 3.5mm and 4.5mm in diameter. According to the Aparicio classification, there are many different varieties of these implants available to match the various bone types that may be present.¹⁷ For instance, Southern Implants (southernimplants.com) is a company that offers both 3.5 mm apical diameter and 4.3 mm apical diameter designs. The angular adjustment at the implant's base accounts for the need to position the implant at an angle that skirts or has a trajectory across the maxillary sinus so that its apical end may make contact with the zygoma. Zygomatic implants may be found with a 45-degree correction from Nobel Biocare and a 55-degree correction from Southern Implants. Different people have different relationships between the zygoma and the ridge crest and the lateral wall of the sinus. According to Aparicio, there are five distinct classifications of zygomatic implants depending on how close the implant will be to the sinus's lateral wall [17]. The implant will pass through a section of the maxillary sinus regardless of whatever category it is assigned to (the crest inferiorly or the zygoma superiorly). At the location where the implant's body crosses through the sinus, the implant may not be anchored in bone but rather in the lateral sinus wall. The length of these implants (30-60 mm) is selected to ensure that the apical part sits firmly in the thick zygomatic bone. If there is enough bone in the paranasal area to allow the insertion of anterior implant fixtures, then zygomatic implants may be inserted into the severely resorbed maxilla as part of an All-on-4 treatment plan. When the available bone in the paranasal area is inadequate for implant placement, the procedure may be extended to the quad zygoma approach, which involves the implantation of four zygomatic implants, two on each side of the upper jaw. Zygomatic implants are not only for those who are missing all of their teeth. Patients who are

completely edentulous due to considerable tooth loss in the posterior regions of the mouth and substantial horizontal and vertical bone loss volume in the ridge crest have no treatment options. Using implants to restore function and aesthetics in a partially edentulous maxilla is a possibility when there is not enough bone for sinus or crest grafting. Time commitment increases if an implant is to be put at the time of sinus augmentation due to the graft's need to develop before implant loading can commence. In the event that the implant cannot be inserted during sinus augmentation, restoration may have to wait up to a year.

DISCUSSION

It is possible to repair a maxilla that has been significantly resorbed utilizing a combination of grafts. Inlays into the floor of the maxillary antrum, Le Fort 1 osteotomies with interpositional bone grafting, and iliac block grafts are only a few of the grafting methods that have been used. On the other hand, there are risks associated with these operations, such as longer recovery times, the need for further surgeries, and various postoperative problems, including Onlay difficulties [17-20]. A combination of anterior bone grafts and posterior zygomatic implants has been shown to be effective in treating atrophic maxilla, avoiding the need for a transplant in most cases. This not only decreases the likelihood of postoperative morbidity but also keeps the patient from spending extra time in the hospital.

Zygomatic implants have been used in the clinic for over 20 years to treat patients with significantly resorbed, either completely or partly edentulous maxillary arches. However, there are hazards associated with zygomatic implants, thus their placement requires a surgeon with knowledge in the field. Sinusitis is the most often documented complication in the medical literature [21]. Since the implant will pass partially into the maxillary sinus, sinus problems might arise in certain patients. After having a zygomatic implant put in, some patients have sinusitis at a rate of 26.6%. It's possible to have sinusitis years after getting an implant. According to the available research, zygomatic implant placement does not seem to increase the risk of severe sinusitis problems. D'Agostino discovered asymptomatic radiologic alterations to the paranasal sinuses in a large population of people who had zygomatic implants. The reported success rates for these implants have been relatively high, despite the fact that asymptomatic chronic sinusitis with osteitis and the eventual collapse of the maxillary sinus cavity should be anticipated [22].

There have been reports of postoperative complications such as periorbital/subconjunctival hematoma or edema, acute nasal bleeding lasting 1-3 days, vestibular cerebral fenestration, and the creation of an oroantral fistula. These problems may be more common in patients with significant buccal concavities of the lateral side of the maxillary sinus, particularly when an unguided surgical technique is performed. This surgical treatment is technically challenging due to poor intraoperative vision and the anatomical intricacy of the zygoma's components and nuances. Cone beam computed tomography (CBCT), virtual implant planning, and CAD/CAM surgical guides have the potential to greatly lessen challenges and make installation far less stressful.

While zygomatic implants aren't without their risks, several studies have shown they're successful. Maló et al. Long-term success rates of 97% and 98.8%, related to patient and implant, respectively, were encouraging for patients with totally edentulous, severely atrophic maxillae supported by instantaneously loaded zygomatic implants alone or in combination with conventional implants. All 220 zygomatic implants in 34 persons were remained in place after 10 years, confirming Maló's results. 107 zygomatic implants were implanted altogether, with 49 on each side of the face and 9 on just one side, according to a different study. The average follow-up period per zygomatic implant was 8.4 years, while the duration of observation ranged from 5 to 13 years. No zygomatic implant failures were documented, and there were no severe problems during surgery or restoration. Twenty-five full-text papers were deemed clinically relevant after a 2014 systematic assessment of research on zygomatic implant survival published between 2000 and 2012. According to these investigations, out of a total of 1541 zygomatic implants, 33 were unsuccessful. These failures often manifested themselves during the first year and were associated with clinical consequences including acute and chronic sinusitis that persisted after treatment. After 36 months, 98.16% of patients were still alive [23].

It's generally accepted that a freshly grafted maxilla needs at least six months without any stress on it to recover properly. Nevertheless, the patient will be in an embarrassing social limbo without a prosthesis throughout this period. The research shows that zygomatic implants may be immediately loaded. More research is needed to determine the long-term success rate. The success rate of ZIs in patients with resected maxillae may be lowered due to factors such as recurrent infection, overgrowth of soft tissue around the implant affecting the abutment connection, overloading leverage in large maxillectomies, and tumor recurrence. The biomechanical drawbacks of a lengthy lever arm, a 30- to a 60-degree angle relative to occlusal pressures, and a small volume of accessible bone for anchoring and osseointegration prevent the use of ZIs in severe maxillary deficits after tumor removal. Peri-implant pockets, formed by the soft tissue surrounding the implant's head and abutment, may serve as entry points for bacteria that cause infection in the area around an implant. Radiotherapy reduces bone reparative ability and may affect the effectiveness of ZIs [24]. Radiation therapy to the maxillofacial area reduces the success rate of conventional implants. The success of ZIs implanted in patients after the ablation of neoplasia's may have been affected by a number of circumstances.

In addition to enhancing performance, instant loading [25] is not just in terms of cosmetics, but also patient happiness. The posterior maxilla may be rehabilitated after severe atrophy using zygoma implants. When inserted outside the maxilla and secured in the zygomatic bone, these very lengthy implants provide superior support and stability.

CONCLUSION

Zygomatic implants are now being used after maxillofacial surgery or in cases when a traditional implant cannot be used. The topic of implant treatment in a resorbed maxilla with inadequate bone has been resolved

with the help of these implants. Although it may be tempting to choose this route, you must be aware of the risks and limitations of these implants before deciding to do so. Zygomatic implants should only be considered after receiving informed permission from the patient and when the practitioner has received adequate training.

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