The use of zygomatic implants for the rehabilitation of atrophic maxillas with 2 different techniques: Stella and Extrasinus

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The zygomatic implant anchorage is a surgical technique that provides a new perspective for patients with severe maxillary atrophy, increasing predictability and reduced cost of treatment, besides being a tool for the hardships of the rehabilitation of such a challenging region. This article describes 2 clinical cases with zygomatic implants with different techniques (Stella and Extrasinus) and both with immediate loading and accompanying clinical radiographic follow-up procedures of 12 and 24 months, respectively. (Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011; 112:e49-e53)

The rehabilitation of patients with severely atrophied maxillas presents a major challenge owing to the complexity of its implementation. The problem presents itself because of the lack of height and width of the alveolar ridge, this being a result of insufficient bone, extractions, trauma, infection, or maxillary sinus pneumatization.1-3

Several surgical techniques have been developed to successfully increase the volume of bone: iliac crest graft, Le Fort I, guided bone regeneration, sinus lifting, and combinations of these procedures.4-9 These treatments also reduce patient comfort, increase morbidity, require several surgeries, and require the use of removable prostheses for a long period of time.10,11

Implants placed in grafted areas have various success rates, with the literature suggesting a rate of 82% to 84% with a clinical follow-up of 12 to 60 months.12

Aiming to simplify the treatment of these patients, increasing the predictability of outcomes and decreasing morbidity, treatment time, and avoiding bone grafts, Brånemark and his team13 in 1988 implemented the anchoring technique known as zygomatic implants (ZI) in some research centers.

Initially this technique was designed to treat victims of trauma, tumor resection, or congenital defects. These patients present with a considerable loss of bone structure14 and few regions offering anchorage for the implants. These regions consisted of the body of the zygoma or the frontal portion of the zygomatic bone15 presenting a great alternative. With time, the technique has been refined, allowing patients with severe bone resorption to be restored predictably to proper function and esthetics and with a success rate similar to implants placed using the conventional technique.16

There are different techniques for fixation of zygomatic implants. The technique developed by Brånemark17 calls for a Le Fort I incision, allowing the displacement of a large flap to facilitate exposure of the zygomatic bone, and the realization of a window for the displacement of the sinus membrane. The technique of Stella and Warner18 differs from the original technique, as there is no need for a window opening on the wall of the maxillary sinus, only 1 channel orientation, and there is no concern for the integrity of the sinus membrane. The third technique19 has no need for a window opening or a channel in the wall of the maxillary sinus because of the externalization of the zygomatic implants in relation to sinus. This article reports 2 clinical cases that were rehabilitated with different fixation techniques, with a radiographic follow-up of 24 and 48 months, respectively.

CASE DESCRIPTION

Case 1

A 65-year-old female patient at the Center for Teaching and Research in Dental Implants (CEPID) at the Federal University of Santa Catarina (UFSC) presented to perform an
implant reconstruction. Examining the panoramic radiograph revealed bone loss around the upper and lower teeth, observed clinically. With the impossibility of keeping these teeth, treatment options were introduced in the upper arch that would use 4 implants, 2 anchored in the zygomatic bone and 2 in the anterior region. The lower jaw had a treatment plan to place 4 implants. Both treatments had the possibility of immediate loading.

The procedure was performed under general anesthesia and was initiated by tooth extractions and smoothing maxillary and mandibular alveolar ridges. Once the tissue was reflected and the body of the zygoma was located, drilling was initiated. With a round bur, a channel or slot was completed to define the orientation of the trajectory of the drills. Then, the following sequence was used: 2.9-mm drill bit, 2.9-mm twist drill, 3.5-mm pilot drill, and 3.5-mm twist drill, always aiming the position of the platform of the implant to lie as close as possible to the crest of the ridge. The next step was the installation of the zygomatic implants, 4.1 diameter × 52.0 mm in the posterior left ridge and 4.1 diameter 45.0 mm in the right posterior border. Two implants measuring 4.1 Ø × 13.0 mm were placed in the anterior. We used the posterior multiunit abutments on 17º (right side) and 30º (left side), both with a height of 4 mm, in order to have the emergence profile located in the molar region. Because the torque was greater than 40 Ncm for the implants in both arches, an immediate loading protocol was initiated, tissue was sutured, and acrylic resin (Duralay, Reliance) was used to secure the abutment transfers in both arches and an impression for manufacturing the prostheses was completed. After 48 hours, the prostheses were installed, restoring function and esthetics for the patient. Panoramic radiographs were performed at 12 and 24 months for the control treatment (Fig. 1, A-G).

Clinical case 2

A 68-year-old male patient presented to the CEPID at UFSC for rehabilitation of the upper jaw. On clinical examination there was a fixed prosthesis supported by implants in the lower jaw and upper jaw with a thin ridge. It was suggested that the patient have implants anchored in the zygomatic bone owing to the desire not to undergo a complex reconstruction with extraoral donor sites. The procedure started in the hospital with a LeFort type I incision, using the ZI externalized technique. After the flap was reflected, the sequence of drilling included 2.9-mm pilot drill, 2.9-mm twist drill, 3.5-mm pilot drill, and 3.5-mm twist drill. After the placement of the implant platform directly over the ridge, the installation of four zygomatic implants was completed, two on the left side: 4.1 diameter × 48 mm and 4.1 diameter × 45 mm; on the right side 4.1 diameter × 45 mm, 4.1 diameter × 48 mm. We used a microunit-type abutment 17 with a height of 4 mm, so as to have the emergence profile located in the molar region. Because the torque was greater than 40 Ncm for the implants in both arches, an immediate loading protocol was initiated, tissue was sutured, and acrylic resin (Duralay, Reliance) was used to secure the abutment transfers in both arches and an impression for manufacturing the prostheses was completed. After 48 hours, the prostheses were installed, restoring function and esthetics for the patient. Panoramic radiographs were performed at 12 and 24 months for the control treatment (Fig. 1, A-G).

Fig. 1. Patient 1. A, Intraoral photograph. B, Initial radiograph. C, A channel or slot was completed to define the orientation of the trajectory of the drills. D, Zygomatic and conventional implants installed. E, Postoperative radiograph. F, Clinical photograph showing the final prosthetic result. G, Radiographic follow-up at 24 months.
arches and an impression for manufacturing the prosthesis was completed. After 48 hours, the prosthesis was installed, reestablishing the function and esthetics for the patient. Panoramic radiographs were performed at 24 and 48 months for the control treatment (Fig. 2, A-H).

**DISCUSSION**

After extractions, the process of bone remodeling in the jaw suffers, causing inadequate dimensions for implant placement. This atrophy is physiological and occurs in a chronic and irreversible fashion. The lack of internal pressure along with posterior tooth extraction leads to bone resorption of the edentulous alveolar ridge, making the retention of functional prostheses difficult and can lead patients to a disabled state in their mouth with a decreased quality of life.

Patients with major destruction of the premaxilla, maxillary sinus pneumatization, or defects owing to tumor resection have limitations on treatment with oral implants. Maxillary bone atrophy is classified by several authors as a major challenge, with a high difficulty of rehabilitating a severely resorbed maxilla, indicating a major reconstruction with autogenous bone grafts using extraoral donor sites, subsequent to the placement of implants or anchoring techniques, without bone reconstruction.

The reconstruction techniques involve an increase in the jawbone structure, aiming at the application of conventional fixation in places where there is sufficient alveolar height and thickness, providing the use of implants in a much better position and, consequently, better biomechanic distribution. The reconstructions can be made on the alveolar ridge (onlay) or within cavities, particularly the sinus (inlay). The grafts have inevitably some element of risk, because they demand good surgical technique, good quality of recipient bone, soft tissue overlying the graft, great cooperation from the patient, and general health of the patient that encourages healing. The literature shows a variability in the survival percentage of the different techniques of bone grafting being 80% to 95%, with a follow-up time of 12 to 124 months. It also reports that the success rate of implants in bone grafts is 74% to 87%.

Initially, the ZI was designed to treat patients suffering from trauma or surgically resected tumors, where there is great loss of jaw structures. Subsequently, the technique was applied to patients with severe maxillary atrophy to simplify the treatment and avoid a reconstruction. There are different techniques for fixation of zygomatic implants, including the original technique by Brånemark, which recommends opening a window on the wall of the maxillary sinus as well as maintaining the integrity of the sinus membrane. The first case used a protocol originally pro-

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posed by the Stella technique with the use of a channel or slot through which the implant installation is guided into the sinus, eliminating the bony window and the sinus lifting, having a larger implant–bone interface with a vertical orientation and better emergence placement of the implant closest to the crest of the alveolar ridge. In the second case study, the extrasinus zygomatic implant technique traces an imaginary line from the insertion point on the ridge to the point of attachment to the body of the zygoma and the implant can be completely or partially outside the sinus cavity. The choice of technique is determined by the patient’s bone anatomy as well as technical skill of the clinician.

The zygomatic implant requires care in relation to the biomechanical forces of curvature, whose forces may impair the long-term stability of an implant-supported restoration and, because of this, there must be stiff prosthetic work, because flexing of the materials used can cause deformation and deviation resulting in loss of fixation of the implants or loosening of the junction between the prosthesis and fixation. The use of immediate loading with the 1 or 2 ZI on each side is justified by some authors because they believe that the quality of the zygomatic bone, the rigid stabilization and polygons created in the technique, coupled with the benefits provided to the patient (less time, less cost, and possibility of social life) allows this procedure to be used. The use of prototypes seems to be an interesting tool in the planning of this technique, but high cost still hampers its use. An important question is what could cause the presence of zygomatic implants inside the maxillary sinus. A study by Nakai et al. in 2003 reported using computed tomography scans, performed 6 months after the installation of 15 zygomatic implants, in 9 patients and showed no infection or inflammation in the mucosa around the implants. The success rates of implants in the zygomatic bone vary from 95% to 97% with 12 to 124 months of follow-up observation and a patient satisfaction rate of 80% after 1 year of installation of the prosthesis.

CONCLUSIONS

Clinically, the technique of zygomatic implants is an excellent therapeutic modality for patients with atrophic maxillae wishing to avoid a bone graft and therefore increasing predictability and reducing costs and morbidity of treatment. The most important point in this procedure is the clinical mastery of the techniques for this surgical approach, determining the success of the treatment.

REFERENCES


