Modified Technique Using Multiple Zygomatic Implants in Reconstruction of the Atrophic Maxilla: A Technical Note

Stefan Bothur, DDS[1]/Goran Jonsson, DDS[2]/Lars Sandahl, DDS[3]

Zygomatic implants have been in use since the 1990s for the treatment of patients with severely resorbed maxillae. Here, the authors present a modification of the standard zygomatic implant technique that uses up to 3 implants on each side of the maxilla for support of a dental prosthesis. INT J ORAL MAXILLOFAC IMPLANTS 2003;18:902–904

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The zygomatic implant, originated and developed by Dr P-I Brånemark, has been used as posterior anchorage for implant-supported prostheses in patients with atrophic maxillae since 1990.[1,2] The original concept featured a single implant in the zygoma bilaterally, combined with at least 2 conventional implants in the anterior maxilla. Although the method has proved to be predictable, bone grafting to the region below the nasal aperture is sometimes required prior to implant placement.[3,4]

In an effort to provide a graft-free procedure for patients with atrophic maxillae and severe bone resorption in the anterior maxilla, a modified technique utilizing multiple implants anchored in the zygoma is presented.[5,6]

[1]Consultant, Department of Oral and Maxillofacial Surgery, Helsingborgs Lasarett, Helsingborg, Sweden.
[2]Head, Department of Oral Prosthodontics, Lanssjukhuset, Sundsvall, Sweden.
[3]Head, Department of Oral and Maxillofacial Surgery, Lanssjukhuset, Sundsvall, Sweden.

Reprint requests: Dr Stefan Bothur, Department of Oral and Maxillofacial Surgery, Helsingborgs Lasarett, 251 87 Helsingborg, Sweden. Fax: +46-42-102898. E-mail: stefan.bothur@helsingborgslasarett.se

TECHNIQUE

Preoperative considerations should involve shape of the face, degree of resorption, sinus status, maxillomandibular jaw relationship, and patient expectations. A narrow face will be unfavorable as far as intraoperative access and implant inclination are concerned. An edentulous mandible will facilitate access. An alveolar crest that is very thin but vertically sufficient tends to encourage implant entrance palatally, and thus buccal onlay bone grafting might be considered as an alternative treatment approach.

A crestal incision is used. For wider exposure of the midface, a relieving incision is made in the vestibular midline and posterior to the parotid orifice to avoid a laceration through the papilla when raising the flap.

The maxillary sinus wall is exposed from the nasal aperture to the orbital rim and posteriorly onto the zygomatic arch. Dissection on the lateral side of the zygomatic arch is carried out using the inferior border as an anatomic guideline.

Often at the posterior, the angle between the zygomatic arch and the frontal process of the zygomatic bone can be identified by moving the elevator in a cranial direction. The inferior border of the zygomatic arch is then stripped from the masseter

muscle attachment to expose the medial side of the arch and the posterior side of the zygomatic buttress.

A palatal flap is raised back to the greater palatine foramina to ensure good exposure of the palatal side of the alveolar crest. A window is made in the lateral sinus wall along the infrazygomatic crest and the alveolar crest. Sinus mucosa is removed from the area where the implants will pass, ensuring a cleared entrance at the crestal site as well as the zygomatic site. During dissection of the zygoma and positioning of the implants, access is enhanced by retracting only the section of the operating field needed for direct visualization and control. In patients with existing implant-supported prostheses in the mandible, the prosthesis should be removed prior to the operation.

It is essential to use a kit with extended drills for better access. These drills are 50 mm longer than the standard drills, making it possible to maneuver the handpiece outside the mouth.

The most posterior implant is placed first (Fig 1). The palatal entrance is made in the second molar region, with the implant running slightly posterior to the buttress and perforating the zygoma from the medial side. The entrance in the zygoma should be low and posterior. Care must be taken to retract the soft tissue. It is important to use sharp twist drills; otherwise the drill will bend and slide along the medial side of the zygoma, or it may cause a fracture of the arch.

The second implant is placed in the premolar region, running along the infrazygomatic crest inside the sinus and perforating the middle aspect of the zygoma.

The third implant is placed in the lateral incisor region, running along the lateral nasal wall initially and perforating the zygoma high, close to the lateral orbital rim. Care must be taken to retract the nasal mucosa and protect the orbit. While the third implant is placed, the implant head and carrier may interfere with the alveolar crest on the opposite side or in the anterior, causing tension between the palate and the zygoma. Removal of interfering crestal bone is suggested.

Ideally, each implant should be supported by surrounding bone, at both the neck and the apex. Often the crestal bone is very thin, and thus it is easy to create an entrance hole that is wider than the implant. In patients with severe resorption, the entrance is sometimes located in compact palatal bone. It is then important that the palatal hole and the hole in the zygoma have exactly the same direction to avoid tension and difficulties during placement of the implant.

Fig 1 Dry skull showing implant inclination, degree of resorption, and window in lateral sinus wall.

DISCUSSION

During surgical treatment of the atrophic maxilla, the zygomatic implant technique can provide access to existing bone of good quality. When maxillary sinuses extend anteriorly to the nasal cavity and there is insufficient bone beneath the aperture, the anterior part of the maxilla can still present a problem. Total resorption of the alveolar crest may be advantageous if the zygoma is intended for anchorage. In these situations, only the palatal process of the maxillary bone remains, revealing a flat and wider palate. Greater freedom of position for the implant in the transverse and sagittal aspect can facilitate the placement of multiple zygomatic implants on the same side.

In describing this modified technique, the authors have described 3 possible positions for the implant location on one side (Fig 2), but in the authors' experience, the placement of 2 zygomatic implants bilaterally is usually sufficient for reconstruction. A healing period of 3 to 4 months before connection of abutments is suggested. The implant-supported restoration (Fig 3) is fabricated in 10 days, while the patient remains without a prosthesis. It is important that the connecting framework be in place before the implants are loaded in any way, but shortening the prosthesis fabrication time rather than providing a temporary prosthesis is desirable.[7] The metal framework should be very low in profile at the implant level, so that the restoration can restore the shape of the natural alveolar process.

Since 1999, the authors' experience with the zygomatic implant technique has involved 25 patients and 69 implants. Ten patients have been treated with multiple zygomatic implants. A number of these patients had previously been subjected to different bone grafting procedures that failed. Complications related to the multiple zygomatic implant

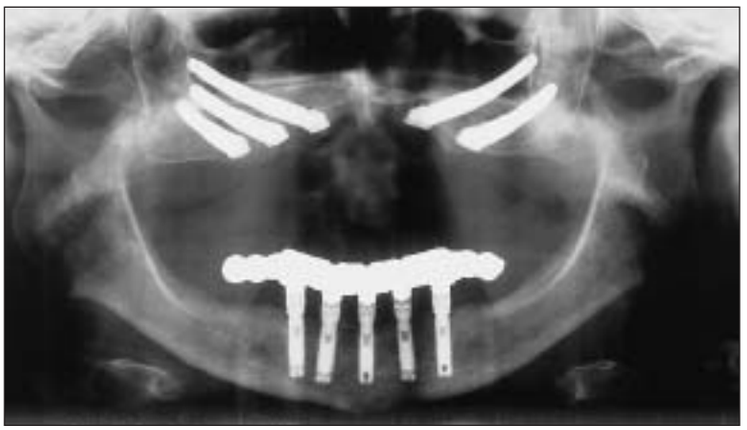

Fig 2 Orthopantomogram of a 64-year-old woman with extensive maxillary sinuses and severe bone resorption in the anterior maxilla resulting from earlier implant failure. Length of implants: R3, 35 mm; R2, 35 mm; R1, 45 mm; L1, 42.5 mm; L2, 40 mm.

technique have been similar to those experienced with the original technique: postoperative oroantral fistulae, initial phonetic problems, local gingival irritation at the palatal entrance of the implant, and maxillary sinusitis. Sinusitis in patients treated with zygomatic implants can have a rapid course, with infraorbital swelling related to the surgical perforation of the lateral wall of the maxillary sinus. Sinusitis has been successfully managed in the usual way, with antibiotics and local irrigation of the maxillary sinus cavity. Trimming of the palatal mucosa and bone grafting to the palatal entrance of the implant may sometimes be needed to get a good seal around the implant head. Generally, patients seem to adapt well to their prosthesis and speech therapy is required only occasionally.

Fig 3 Palatal view with implant-supported prosthesis in place.

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