Rehabilitation of a Patient With Cleft Lip and Palate With an Extremely Edentulous Atrophied Posterior Maxilla Using Zygomatic Implants: Case Report

**Objective:** This case report describes the clinical and surgical management of a patient with a unilateral alveolar cleft and associated extremely atrophied totally edentulous maxilla.

**Method:** Two zygomatic implants and four endosseous oral implants were placed under general anesthesia in a compromised maxilla to rehabilitate a 33-year-old patient with cleft lip and palate. The two specially designed zygomatic implants were utilized to avoid the need for bone grafting in the patient. The final prosthetic rehabilitation was an esthetic and functional maxillary overdenture prosthesis supported by implants.

**Results:** Preliminary results have shown how dental prostheses supported by endosseous implants in grafted alveolar cleft are a reliable possibility in the dental rehabilitation of this malformation.

**Conclusion:** The use of zygomatic implants may be considered a reliable alternative to more resource-demanding techniques such as bone grafting in patients with cleft palate.

**KEY WORDS:** atrophied maxilla, cleft lip and palate, zygomatic implant

The patient with fully edentulous cleft lip and palate with an extremely atrophied maxilla is a challenge for the surgeon as for the prosthodontist. Several techniques have been proposed for the rehabilitation this kind of patient. One of these techniques is the use of oral osseointegrated implants (Lilja et al., 1998). According to the literature, oral osseointegrated implants are a widely accepted, safe, and predictable method for restoring partially or fully edentulous patients (Lekholm et al., 1999).

The presence of sufficient bone volume is one of the most important variables affecting the success rate of oral osseointegrated implants (Van Steenberghe et al., 1997). Nevertheless, bone volume is sometimes insufficient, in which case complementary or alternative techniques are needed (Jansma et al., 1999).

A relatively new technique in this kind of rehabilitation is the zygomatic implant. The zygomatic implant was developed for the treatment of the severely resorbed maxilla in conjunction with standard implants to avoid a posterior bone graft augmentation technique (Malevez et al., 2003). This report describes the surgical and prosthetic procedure of dental rehabilitation of a maxillary full edentulous patient with a repaired alveolar cleft using zygomatic and standard implants for the prosthetic reconstruction of the dental arch.

**CASE REPORT**

This technique was applied in the treatment of a 33-year-old woman. Closure of the congenital complete unilateral cleft lip was performed at 6 months of age. The cleft palate was closed at 24 months, and an oronasal fistula closure was performed at the age of 6 years.

In the intermediate years, the patient has had multiple maxillary teeth extractions. A severe type V or VI resorption of the maxilla according to the Cawood classification also appeared (Cawood and Howell, 1988), particularly in the posterior maxilla. Moreover, the extractions led to complications in the alveolar cleft and oronasal fistula. For this reason, secondary repair surgery and a bone graft using free iliac crest was performed at age 33 years to close the oronasal fistula (Fig. 1).

Prosthodontic rehabilitation supported by oral osseointegrated implants was proposed 6 months later. Considering the
extremely posterior resorption of the maxilla and to avoid an extensive graft technique such as sinus grafting, the placement of zygomatic implants (Nobel Biocare, Gothenburg, Sweden) was preferred by both the practitioner and the patient.

Panoramic radiography and computed tomography scans were requested prior to placing the implants. The zygomatic and standard implants were placed following the protocol described by Brånemark and coworkers under general anesthesia and endonasal intubation (Malevez et al., 2003).

Two zygomatic implants were placed in the patient’s maxilla, one in each zygomatic arch. Three Mk III Brånemark System regular platform implants (Nobel Biocare) were placed in the anterior maxilla and one additional Mk III Brånemark System regular platform implant was placed in the left maxillary tuberosity. Table 1 shows the different lengths and zones of placement of each implant.

Antibiotics (amoxicillin) were prescribed 1 day before the operation, intraoperatively, and continued for 3 days. The postoperative course was uneventful and the patient returned for suture removal 2 weeks after the operation.

The abutment connection was carried out 6 months after placement of the implants. At the time of the abutment connection, mobility at the implant in position 23 was detected. The implant was consequently removed and the decision was made to go ahead with the prosthodontic procedure using only two implants as anterior support. A total of five Multiunit (Nobel Biocare) 1-mm abutments were placed. On the day of the abutment connection, the removable prosthesis of the patient was adapted and screwed onto the implants to prevent micromovements and microfractures, so the patient was given a provisional fixed prosthesis.

During the prosthodontic procedure, some oral hygiene maintenance problems as well as speech difficulties were detected because of the volume of the screwed provisional pros-

**TABLE 1. Distribution and Implant Status at the Placement and Abutment Connection**

<table>
<thead>
<tr>
<th>Implant Distribution</th>
<th>Implant Type</th>
<th>Length (mm)</th>
<th>Abutment Type</th>
<th>Adverse Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxillary right first molar</td>
<td>Zygomatic</td>
<td>47.5</td>
<td>Multiunit 1mm</td>
<td>—</td>
</tr>
<tr>
<td>Maxillary first premolar</td>
<td>RP Mk III</td>
<td>15</td>
<td>Multiunit 1mm</td>
<td>—</td>
</tr>
<tr>
<td>Maxillary right canine</td>
<td>RP Mk III</td>
<td>15</td>
<td>Multiunit 1mm</td>
<td>—</td>
</tr>
<tr>
<td>Maxillary left canine</td>
<td>RP Mk III</td>
<td>13</td>
<td>—</td>
<td>Failure</td>
</tr>
<tr>
<td>Maxillary left first molar</td>
<td>Zygomatic</td>
<td>45</td>
<td>Multiunit 1mm</td>
<td>—</td>
</tr>
<tr>
<td>Maxillary left third molar</td>
<td>RP Mk III</td>
<td>15</td>
<td>Multiunit 1mm</td>
<td>—</td>
</tr>
</tbody>
</table>

* All implants were placed on April 12, 2002, and the abutment connection completed on October 16, 2002.
thesis and the concavity of the palate. For these reasons, an overdenture prosthesis with an implant-supported bar was preferred. The definitive prosthesis was then placed 6 weeks after the abutment connection (Fig. 2).

Check-ups were performed at 1 week, 1 month, 3 months, and 6 months following prosthesis insertion. No complications such as sinusitis, hygiene maintenance, speech impairment, or mobility of the implants were detected. Masticatory function was restored and the patient was satisfied with her appearance (Fig. 3).

**DISCUSSION**

The most advanced surgical reconstruction techniques are required for patients with minimal basal bone volume (Cawood and Howell, 1991). The zygomatic implant is a relatively new alternative in the rehabilitation of the posterior edentulous extremely atrophied maxilla. Recent clinical reports show interesting short- and long-term results (not one zygomatic implant has been lost) when using this type of implant in the rehabilitation of the edentulous patient (Bedrossian et al., 2002; Malveez et al., 2003).

The placement of implants in the zygomatic arch may have advantages over standard bone grafting and implantation technique (e.g., sinus lift), especially in patients who have combined large cleft palate defects and an atrophied posterior maxilla. This procedure could prevent the common surgical complication in patients with cleft palate and those with severe maxillary bone resorption in general.

The clinical success of the treatment of this patient was enhanced by the shorter time span of the treatment process. This technique permits the reduction in the total treatment time by eliminating the months usually required for bone grafts to mature before performing implants and eliminates the necessity of additional healing time required for implants.

The loss of one anterior implant that had been detected as being mobile was not critical in this case because two pre-maxillary implants provide adequate distribution of the occlusal forces for the fabrication of an overdenture or fixed prosthesis (Bedrossian and Stumpel, 2001).

At the time of the abutment connection, the patient’s removable prosthesis was adapted and screwed on the implants. According to the literature, this type of stabilization appears to reduce mechanical stress on the implants effectively by reducing their movements (Brunski et al., 2000).

Adapting the removable prosthesis to the implants enabled...
the prosthodontist to detect some speech defects (whistling of air between gaps and spitting of saliva) and oral hygiene problems linked to the implants. Such problems have been reported by other investigators (Walton and MacEntee, 1994; Jacobs et al., 2001). The prosthodontist was prompted to opt for an overdenture with an implant-supported bar for the final rehabilitation. Follow-up showed that this choice effectively solved the above-mentioned problems (Mericke-Stern, 1998).

In conclusion, the use of zygomatic implants in the rehabilitation of the posterior atrophied maxilla seems to provide an excellent support to dental rehabilitation, both functionally and aesthetically, for this particular type of patient with cleft palate.

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REFERENCES