Fat grafts are easy to harvest and very useful in supplying the volume required for the bony prominences. Our use of coenzyme Q10 tablets as a supplement to fat grafting may be proposed as a routine practice for treating patients with lipoatrophy as a useful adjunct.

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Intraoral Transposition of Pedicled Temporalis Muscle Flap Followed by Zygomatic Implant Placement

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Abstract: Despite the recent advances of sophisticated reconstructive surgical techniques, management of maxillectomy defects continues to be challenging. For a selected group of patients, who cannot sustain a sophisticated microsurgical reconstructive procedure, a prosthetic obturator is indicated to separate the oral cavity from the sinonasal cavities. After the development of the osseointegration concept, dental implants have proven to be indicated for the rehabilitation of patients who underwent maxillectomy. Recently, surgeons can use a computer-assisted software package, which enables them to insert implants after a detailed analysis of the residual bone. For some patients with limited amount of residual maxillary bone, unusual surgical sites such as the zygomatic complex have been tested. We introduce a successful 2-step surgical procedure using a pedicled temporalis muscle flap and zygomatic implant placement to reconstruct a maxillary defect after oncological resection.

Key Words: Temporalis muscle flap, hemimaxillectomy, zygomatic implants

Minor salivary gland tumors are uncommon and represent less than 25% of all salivary neoplasm. About one half of the tumors that arise in these glands are malignant. The peak incident is during the sixth decade of life, and it is rare during childhood (<10 y).[1]

The oral cavity is the most common site, and the hard palate is the most common subsite.[2] The growth of these neoplasms is slow and insidious; usually, the intraoral neoplasm cause a painless submucosal swelling; the mucosal layer is frequently adherent to the mass with a small ulcer.[3]

At clinical presentation, these tumors are often at T1 stage (42.6%) with no lymphonodal metastasis N0 (93.4%).[4] Cervical lymph nodes are associated with decreased survival in minor salivary gland cancer; it is known that certain types of these tumors, such as adenoid cystic and acinic cell carcinomas, are associated with less risk of neck metastasis; however, adenocarcinomas and mucoepidermoid carcinomas are more likely to present with lymph node metastasis when they are of high grade. High tumor grade is correlated with occult metastasis, and T and N stages emerged as significant predictors of overall survival.[5]

Physical examination is the most important tool for the diagnosis; computed tomography (CT) or magnetic resonance imaging may be useful. Magnetic resonance imaging is particularly recommended for the study of oral neoplasm because of the elimination of dental artifacts; moreover, it is possible to study the full extension of those neoplasm that cannot be precisely defined using a clinical examination alone.[6]

According to the National Comprehensive Cancer Network guidelines, the standard treatment of resectable carcinomas of the minor salivary glands is the surgical excision; however, after the surgical approach, mostly for the demolitions of oral cavity (hard palate and maxilla), a surgical reconstruction is often necessary because surgical excision leads to inevitable problems related to speech, mastication, swallowing, and aesthetics. According to the scientific literature, many reconstructive options are described.[7,8]

Although with the advent of the recent advances of sophisticated surgical techniques, management of maxillectomy defects continues to be challenging; moreover, surgical reconstruction is not always possible owing to local and/or general factors.[9,10]

For a selected group of patients, who cannot sustain a reconstructive procedure, a prosthetic obturator is indicated to separate the oral cavity from the sinonasal cavities. For dentate patients, the

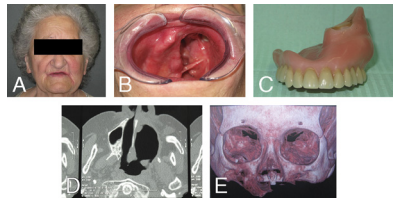

FIGURE 1. Preoperative clinical and radiologic conditions. The defect comprised the left side of the hard palate, extending posteriorly onto the soft palate, resulting in an opening to the nasal cavity; the resection site was free of inflammation and covered with mucosa (Figs. 1A-E).

support of the prosthesis is secured by the residual teeth; nevertheless, the larger the oncological resection, the less the dental support.[11]

After the development of the osseointegration concept, dental implants have proven to be indicated for the rehabilitation of patients who underwent maxillectomy. Recently, surgeons can use a computer-assisted software package, which enables them to insert implants after a digital analysis of the residual alveolar and basal bones that makes for greater implant osseointegration.[12]

For some patients with limited amount of residual maxillary bone, unusual surgical sites such as the zygomatic complex have been experimentally and clinically tested; different approaches and techniques have been proposed based on different patients to rehabilitate the oral cavity.[13,14]

CLINICAL REPORT

We introduce the case of a 77-year-old white woman who underwent (Ear, Nose, and Throat Department of Novara University Hospital, Italy) on July 2003 a left hemimaxillectomy with resection of the hard and soft palate, amputation of pterygoidal process and exposure of Bichat space for a minor salivary gland malignancy (low-grade polymorphic adenocarcinoma cT2 N0, pT1 N0 Mx), who hesitated to a bucconasal communication. This functional defect of the palate was temporarily corrected with a palatal obturator prosthesis.

On January 2010, the patient came to the Department of Maxillo-Facial Surgery as referred by her general practitioner for aesthetic and functional oral rehabilitation; during the first visit, clinical and radiographic examinations were performed, revealing that the patient was edentulous and with severe atrophy of the maxillary and mandibular arches with collapse of the soft tissues of the left midface. The defect comprised the left side of the hard palate, extending posteriorly onto the soft palate, resulting in an opening to the nasal cavity; the resection site was free of inflammation and covered with mucosa (Figs. 1A, B).

The patient required a definitive rehabilitation to improve speech, mastication, swallowing, and aesthetics; for these reasons, the microsurgical rehabilitation followed by implant placement was not indicated due to the poor general status of the patient and the compromised vascular supply of the area after radiotherapy, so we decided to treat the patient using a protocol that scheduled a pedicled temporalis muscle flap and delayed zygomatic implant placement.

The patient underwent the first step of the treatment planning; through a left hemicoronal incision, a temporal myofascial flap was dissected and transposed into the oral cavity, filling the maxillary loss of substance and separating the oral cavity from the left nasal cavity (Fig. 2).

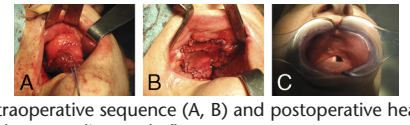

FIGURE 2. Intraoperative sequence (A, B) and postoperative healing (C) of the pedicled temporalis muscle flap.

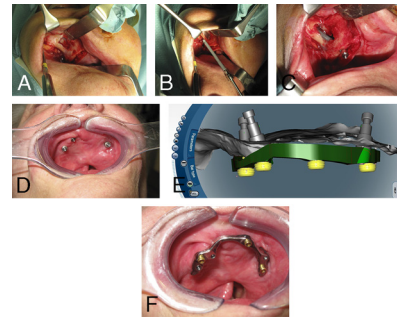

FIGURE 3. Intraoperative views of the zygomatic implant placement (A–C); the titanium bar positioned to load all the 3 implants (D–F).

Six months later, after a satisfactory healing of the temporalis muscle flap (Fig. 2C), the second step of the definitive treatment, the implant placement, was planned using a computer-assisted surgery software package (NobelGuide; Nobel Biocare Services AG, Gothenburg, Sweden); this system is commonly used to plan the position of the implants after a three-dimensional CT scan permitting sagittal, coronal, and axial views.

Impressions of both arches were obtained with silicone; the patient was referred to a radiologic center for a CT scan (spiral CT, gantry tilt at 0°, slice thickness of 0.5 mm, and slice increment of 0.3 mm). The CT scan data were processed using a specific surgical planning software package to create a three-dimensional image of the maxilla, evaluating the anatomic structures (Procera; Nobel Biocare).

The procedure began with the insertion of 1 implant (Nobel Speedy Replace; Nobel Biocare) on the right side of the maxillary arch (sites: 1.2); consequently, the upper right side of the maxilla was reached through a crestal incision, whereas the left zygomatic bone was reached through an incision along the previous transposed temporalis muscle.

After raising the mucoperiosteal flaps, soft tissue dissection was performed along the inferior and frontal lateral surfaces of the zygomatic bones. The right maxillary sinus was fenestrated while keeping the Schneider membrane intact. This window allowed the visualization of the implant placement. The drilling sequence started allowing visual control of the insertion of 2 zygomatic implants: 1 for each side (Brånemark System Zygoma; Nobel Biocare). Simple absorbable sutures were placed to close the flap (Fig. 3).

After 2 weeks, the prosthesis (Molinaro & Massaro Snc, Turin, Italy) supported by a titanium bar (Procera; Nobel Biocare) was positioned to load all the 3 implants. The patient was instructed to follow a proper oral hygiene and was prescribed a soft diet for 30 days. Postoperative plain radiographs demonstrated the correct insertion and angulation of the implants in the zygomatic bone. At 12-month follow-up examination, all the implants were correctly osseointegrated and the prosthesis appeared to be perfectly functional with a satisfactory occlusion and facial balance except for a left temporal hollowing, without signs or symptoms of local complications such as sinusitis, peri-implant mucositis, or implant mobility (Figs. 4A, B).

DISCUSSION

According to the National Comprehensive Cancer Network guidelines, the standard treatment of resectable carcinomas of the minor salivary glands is the surgical excision aimed at achieving complete clearance with 1-cm margin (mucoepidermoid and adenocarcinoma) or more (2–3 cm for adenoid cystic carcinoma); in case of N0, a

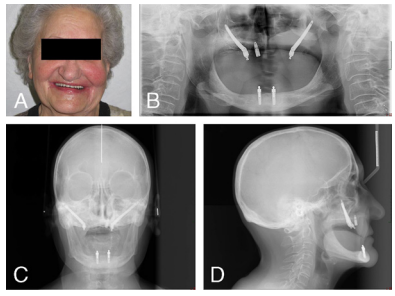

FIGURE 4. Postoperative clinical (A) and radiologic (B–D) conditions.

routine prophylactic neck dissection is not recommended. Neck dissection is usually performed in the presence of clinically or radiographically positive lymphadenopathy. Postoperative radiotherapy is recommended in patients with advanced disease, positive or closed resection margins, histologically high-grade tumors, and evidence of perineural, intravascular, or intralymphatic spreading.[3,15,16]

Reconstruction after surgery is required for most patients—mostly for patients who underwent a wide demolition of the oral cavity because local and systemic recurrences occur late and the long-term survival outcome is determined mainly by T stage, resection margins status, N stage (which are the most powerful predictors of survival) and by the systemic spread of disease.[4]

According to the scientific literature, many reconstructive options are described such as (1) prosthetic obturator; (2) locoregional flaps, (3) nonvascularized grafts, and (4) microvascular free flaps.[7,8]

In some motivated patients without recurrences of the primary tumor (in this report, the interval of the absence of disease is almost 7 y), it is possible to complete the surgical reconstruction with implantology surgery, obviously only to improve the patient's quality of life: physical well-being, familiar relationship, emotional status, and functional activities.

The 2 major indications for the zygomatic implant placement are defects after maxillectomy and edentulous atrophic maxilla. The zygomatic implants are usually placed at 30° to 60° in relation to the occlusal plane. Preoperative planning using computer-assisted software package is mandatory because of the anatomic complexity of the zygomatic bone and the limited intraoperative visibility.[17,18]

For patient who underwent maxillectomy, it is frequently difficult to obtain an "all-on-four" protocol because of the frequent lack of the residual maxillary bone. Afterward, it is necessary to adapt the protocol to the case, as demonstrated by our operative choice.[19–21]

It was clear that it was not technically possible to insert 2 conventional implants in the anterior maxilla because of the lack of residual bone, thus rehabilitating the patient with 2 zygomatic implants and only 1 implant in the right anterior hemimaxilla.

The maxillectomy condition is characterized by the absence of bone for implant therapy; the loss of bone leads to less volume available to accept the placement of implants with a high rate of surgical failure. Simultaneously, the oral environment become unsuitable for an adequate denture retention.[7–11]

With the previous statements in mind and having considered the published technical strategies of experienced surgeons, we have managed this case by performing an intraoral transposition of a pedicled temporalis muscle flap without any bone grafts, followed by a delayed zygomatic implant placement; despite the complexity of this procedure, this approach enabled us to solve a double problem: the maxillary defect with bucconasal communication and the atrophic/edentulous maxilla.

Our clinical report demonstrates a successful 2-step treatment for a patient who underwent hemimaxillectomy. Although there are scarce data on the long-term survival of the zygomatic implants, this method permits us to solve this case, avoiding the morbidity of a fibula free flap or the inconvenience of a removable prosthetic obturator.

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