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Case Report

Prefabricated Free Fibula Flap for Reconstruction of a Maxillary Defect: A Case Report

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Abstract

The present article describes a case of prosthetic rehabilitation with the new technique of prefabricated osteo-cutaneous free fibula flap for reconstructing a maxillary defect which had resulted from ameloblastoma. The fibula and a cuff of 6-8 mm were prepared with its pedicle intact. The bone flap was left in place with its pedicle intact for 2 to 3 months; the skin graft and the flap were free of inflammation. The fibula flap was then transferred to the maxilla. Implant placement was performed 4 to 6 months after transfer of the flap to the oral cavity. Three titanium implants, with a width of 4 mm and a length of 13 mm, were placed using a conventional two-stage protocol. A cement-retained 5-unit metal-ceramic fixed partial denture was fabricated.

Key words: **Free fibula flap, implant, maxillary defect.**

Introduction

Prosthetic reconstruction of maxillary defects is challenging. The basic goal is to maximize aesthetic and function while minimizing the complexity and risks involved.[1] A low maxillectomy defect may result in the loss of the alveolus and inferior antrum. The ideal construction should provide support for cheek, close the antronasal fistula and provide the basis for a dental prosthesis. The implant-supported prosthesis, if the patient is unable to retain the maxillary prosthesis, is an advantage and should always be considered.[3,4]

Numerous flaps have been described for reconstructing maxillectomy defects, including local and pedicle flaps as well as microvascular free tissue transfer. The free vascularized fibula graft was first reported in 1975 by Taylor et al for construction of tibia defects; however, it was not used in the oral and maxillofacial reconstruction until 1980.[5] After their introduction these flaps gradually came into wide use and recently have become popular with a wide range of indications.[6]

The main problem with the fibula graft in reconstructed defects is the difference in height of the reconstructed segment and intact maxilla, which makes the prosthodontic rehabilitation of these patients more challenging. The low height of reconstructed segment creates a large distance from the occlusal plane and a large vertical dimension for the prosthesis. This evokes a high leverage force, which can be detrimental to the implants as well as to the supporting teeth in free-end hybrid situations, especially if the crown-fixture ratio is greater than 1:1.[6,7]

We describe a case of prosthetic rehabilitation with a new technique to prefabricate the osteo-cutaneous free

fibula flap to reconstruct a maxillary defect lost as a result of ameloblastoma.

Case Report

A 36-year-old woman was referred to the prosthodontic clinic for maxillofacial prosthodontic reconstruction. The patient had a maxillary ameloblastoma, which had been removed surgically. She had a radical hemi-maxillectomy with a resection margin at the distal end of the right lateral incisor. A panoramic radiograph and computerized tomography (CT) scan showed a large right maxillary defect. The patient had also undergone post-surgical radiotherapy (up to 72 Gy). Radiation therapy had been delivered in fractions of 2 Gy given daily for 5 days each week. She had been wearing an interim removable partial denture for 4 years to replace missing maxillary teeth and definitive prosthetic obturation of the maxillary defect.

The patient's chief complaint was that she did not like maxillofacial prosthesis and had a problem with its poor retention and function.

The patient was treated with prefabricated free fibula graft. The fibula bone and a cuff of 6-8 mm were prepared with its pedicle intact. The flap was transferred to the surface of the wound and the tissues beneath the flap were closed. For ease of future dissections, a silicone sheet was used to wrap around the pedicle to completely cover the pedicle; then the fibula flap was covered with a split-thickness skin graft, almost circumferentially (Figure 1).

The dorsal side of the flap was sutured to subcutaneous tissues, the role of which was to anchor the flap in the days to come. After 9 weeks the flap was ready for transfer and during this second stage the flap was dissected from the leg (Figure 2). The flap was transferred to the oral cavity (Figures 3 and 4). Vascular anastomoses were established using the facial artery and vein. Conformity was confirmed via pre- and post-operative computed tomography scans. After fixation of the graft and suturing the soft tissues of the flap in the mouth, the vascular anastomoses were established from the facial vessels. No remarkable vessel mismatch was observed. Because of the maturity of the flap, intraoral bleeding from the flap was minimal. The

Figure 1. The fibula bone with the intact pedicle. Arrow shows a thin silicone sheet wrapped around the pedicle.

Figure 2. The graft is nearly complete.

Figure 3. The flap was transferred to the oral cavity (3D CT-scan, Lateral view).

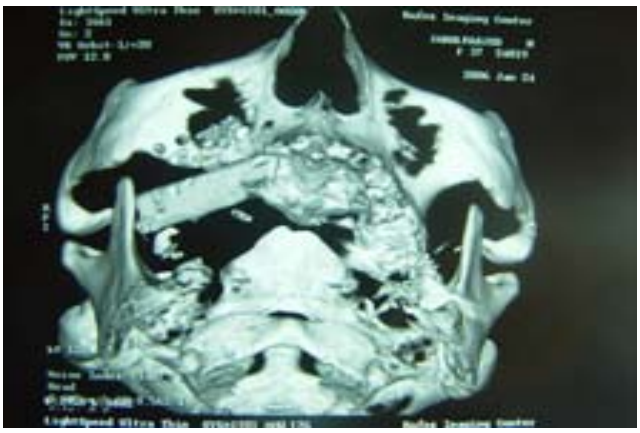

Figure 4. Another view of the transferred flap (3D CT-scan).

Figure 5. Three titanium implants were placed.

anticoagulation regimen we used was single-dose intra-operative heparin injection with oral aspirin and dipyridamole the day after surgery. There was no infection or other complications. Edema of the flap subsided with time, leading to shrinkage.

Three titanium implants (Biomet 3i, West Palm Beach, Fla), 4 mm wide and 13 mm long, were placed with a conventional two-stage protocol (Figure 5). The patient was given an antibiotic regimen using 500-mg amoxicillin capsules 3 times daily, 1 day preoperatively and 5 days post-operatively; chlorhexidine mouthwash was also given. The implants were allowed to osseointegrate for 6 months to minimize the risk of osteoradionecrosis. Two weeks after the second-stage surgery, the final impression was made. Three transfer-type impression copings were joined together using autopolymerizing acrylic resin (Duraly; GC Inc., Japan) using an open-impression tray technique with a polyether impression material (Impregum; 3M ESPE, Seefeld, Germany).

Implant analogues (Biomet 3i, West Palm Beach, Fla) were attached to the completed impression and the impression was immediately poured in type IV dental stone (Die-Keen; Heraeus Kulzer, South Bend, Ind) to form a final cast. Implant level abutments (Abutment; Biomet 3i, West Palm Beach, Fla) were attached onto the implant analog of the cast.

A cement-retained 5-unit metal-ceramic fixed partial denture was made (Figures 6 and 7). The patient was clinically evaluated every 6 months using a standard protocol that included visual and digital inspection of the prosthetic restoration and/or modified bleeding index and modified plaque index. Mechanical and biological complications were monitored. These criteria include the absence of persistent complaints, such as pain or dysesthesia and the absence of repeated peri-implant infection, fistula, or abscess. Furthermore, the mobility and radiolucency around the implant were assessed.

Figure 6. A cement-retained 5-unit metal-ceramic fixed partial denture.

Figure 7. Occlusal view.

Discussion

Deformity of jaws after tumor resection can be amended by the use of microsurgical techniques.[1,2] Among the different flaps used for defect reconstruction, the fibula flap has many advantages, but the most important consideration is supplying an excellent foundation for the insertion of implants.[5,6] The use of osseointegrated implants can minimize masticatory disability, with the augmentation of facial forms. Microvascular bony rehabilitation with osseointegrated implants can improve the patient's quality of life and almost restore the patient's health. Our results with the fibula free flap and osseointegrated implants support this statement.

In addition, dental rehabilitation in maxillectomy patients (without osseointegrated implants and free flap grafts) has been extensively reported in the dental literature with a wide range of success rates. The use of osseointegrated implants in microvascular free fibula flap-reconstructed maxilla has produced highly superior results to those achieved with removable appli-

ances.[6,7] The properly positioned fibula free flap allows insertion of implant fixtures to provide mastication, in addition to post-operative cosmetic improvements.[1,2]

Conclusion

The prefabricated fibula technique with a "banking time" on the leg for flap maturation seems to be a better choice compared with other methods of using the fibula for reconstruction and has passed the test of time. We described a case of implant-supported fixed prosthetic rehabilitation with this new technique.

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