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CASE REPORT

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Staged reconstruction of hemimaxillectomy defect: Application of buccal fat pad flap, iliac bone graft and implant-supported dental prostheses

Ali Hassani[1] | **Mahboube Hasheminasab**[2] | **Nariman Nikparto**[3] | **Lotfollah Kamali Hakim**[3]

[1]Implant Research Center, Oral and Maxillofacial Surgery Department, Islamic Azad University of Medical Sciences, Tehran, Iran

[2]Craniomaxillofacial Research Center, Oral and Maxillofacial Surgery Department, Tehran University of Medical Sciences, Tehran, Iran

[3]Oral and Maxillofacial Surgery Department, Tehran University of Medical Science, Tehran, Iran

Correspondence
Lotfollah Kamali Hakim, Oral and Maxillofacial Surgery Department, School of Dentistry, Tehran University of Medical Sciences, North Kargar St., Tehran, Iran.
Email: Arman_kamali.hakim@yahoo.com

Abstract

In order to achieve a fixed implant-supported prosthesis in a posthemimaxilectomy patient, ideal soft and hard tissue rehabilitation is necessary. Here, we present a staged approach for soft tissue reconstruction with local flaps followed by anterior iliac crest bone graft which resulted in a predictable and satisfactory outcome.

KEYWORDS

hemimaxillectomy, maxillary defect, palatal defect, oronasal fistula, oroantral fistula, buccal fat pad, free iliac graft, implant

1 | INTRODUCTION

The maxillary bone has a key role in midface by supporting the adjacent structures including orbit, nose, and palate. Thus, any defect in maxilla may result in functional and aesthetic impairments. Two main causes of maxillary defects include trauma and resection due to pathologic lesions.

Surgical and nonsurgical approaches have been proposed to reconstruct maxillary defects. Nonsurgical approaches, including conventional prosthetic obturators, have disadvantages including poor aesthetics, lack of retention, and limited ability to regain normal function.[1] Surgical treatment includes local flaps, including pedicled flaps from the buccal fat pad or temporalis muscle flaps, and free grafts with or without microvascular pedicle. Pedicled buccal fat pad flap (PBFPF) is widely used for soft tissue closure in maxillary defects or oroantral fistulas (OAF).[2] Re-epithelialization of this flap occurs with minimum complications.[3] Furthermore, the iliac bone graft is one of the best choice for hard tissue reconstruction in the maxillofacial region, providing a sufficient corticocancellous bone for large defects.[4]

This article presents a 21-year-old male patient with OAF and oronasal fistula due to right-side palatal pleomorphic adenoma (PA) and subsequent hemimaxillectomy. The defect was reconstructed secondarily with PBFPF and iliac bone graft followed by implant-supported prostheses.

FIGURE 1 Preoperation photography of the patient (profile of smile)

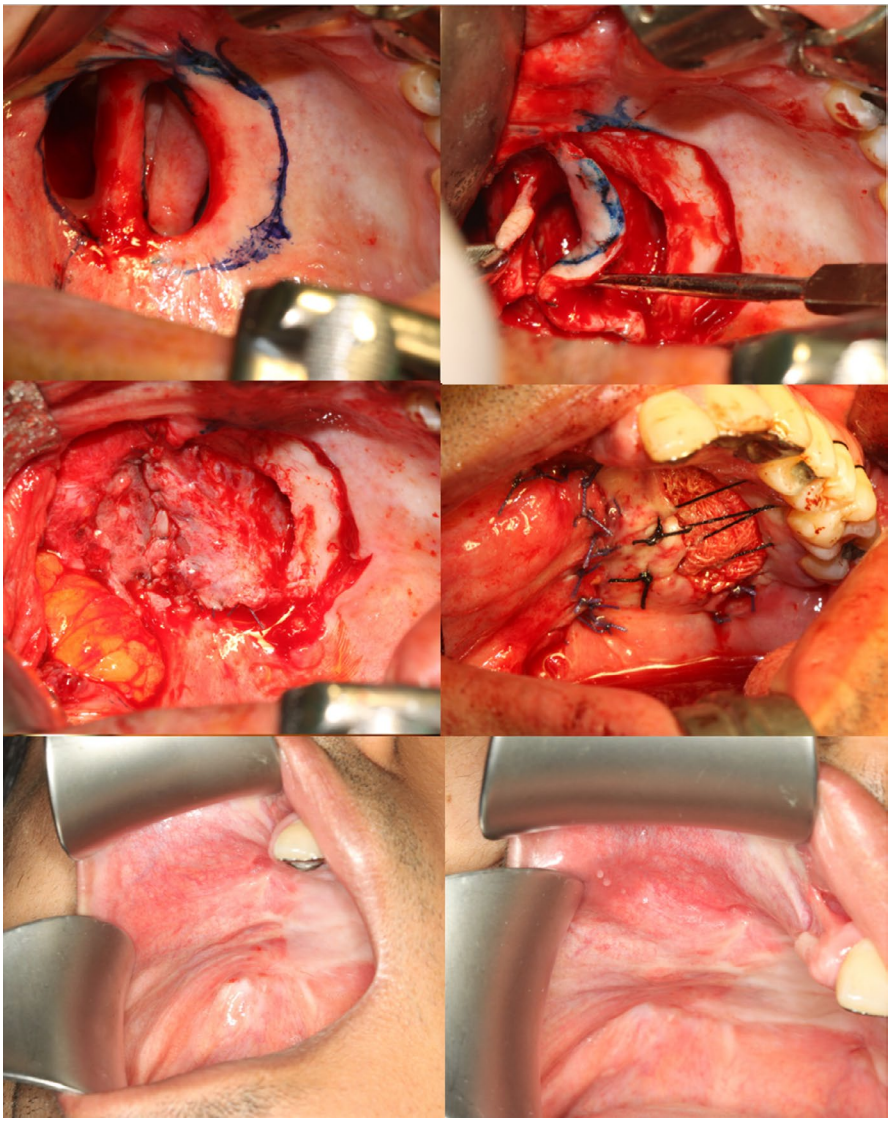

FIGURE 2 Soft tissue closure and 4 mo follow-up after hemimaxillectomy

2 | CASE PRESENTATION

The presented case is a 21-year-old male patient with a history of right-side palatal pleomorphic adenoma who had undergone subtotal maxillectomy in 2008, which resulted in a large communication between the oral and nasal cavities and maxillary sinus (Figure 1) along with subsequent aesthetic problems. He used a partial removable denture to seal the gap and replace the lost teeth for 6 years. However, lack of stability and retention as well as poor aesthetic were the drawbacks of the prosthetic treatment. He also complained about unstable occlusion, chronic soft tissue irritation, and inflammation, as well as the removable nature of the prosthesis.

In respect to his chief complaints, the treatment goal was to provide a fixed implant-supported prosthesis, for which soft and hard tissue reconstruction seemed necessary.

First, the soft tissue closure of the defect was obtained in two layers. The inner layer was nasal epithelium and a part of palatal mucosa, which was sutured to the sinus epithelium. For outer layer, a full-thickness palatal flap based on greater palatine artery was elevated from left side of palate and mobilized medially to the defect site and it was sutured to the buccal fat pad flap. A tetracycline-mixed gaze was placed on the pedicled palatal flap donor site as tie-over to cover the exposed bone for 1 week. (Figure 2).This donor site was healed with secondary intention.

Bone reconstruction was performed 7 months later. Prior to the surgery, a complete wax-up reconstruction of the defect was performed on stereolithographic model and a dental splint was made to replicate the final prosthesis (Figure 3). The recipient site was prepared by a dissection between the sinus lining mucosa and the palatal mucosa with Metzenbaum scissors through a palatal incision. Considering the defect size and the amount of corticocancellous bone needed, the anterior iliac crest was chosen as the donor site. A bone block of 40 × 30 × 13 millimeters (mm) was harvested and placed into the defect with dental splint as a guide. The graft was fixed with titanium mesh, mini-plate, and screws. Tension-free soft tissue closure was also obtained (Figure 4).

Five months later, the titanium mesh and screws were removed and 4 dental implants (Dentium Co.) were placed in the teeth position #8 (4.5 × 14 mm), #7 (4.5 × 14 mm), #3 (3.6*10 mm), and #2 (4 × 14 mm) (based on universal numbering system). Guided bone regeneration was also performed on buccal surfaces of implants #8 and #3 using allograft material and collagen membrane. Due to adequate primary stability, healing abutments were also placed (Figure 5). Four months later, the definite fixed implant-supported prosthesis was delivered to the patient.

At the 24th month follow-up, no signs of pain or implant mobility, discharge or irritation of peri-implant soft tissue were noticed. No bleeding was observed on probing at the depth of 2 to 4 mm. Radiographic examination showed 1 mm bone loss around implants in the position of teeth number 2 and 3. (Figure 6).

3 | DISCUSSION

Reconstruction of maxilla due to therapeutic maxillary resection is an ongoing clinical challenge. Palatal obturators are considered as the main nonsurgical treatment options for these palatal defects. However, the long-term use of

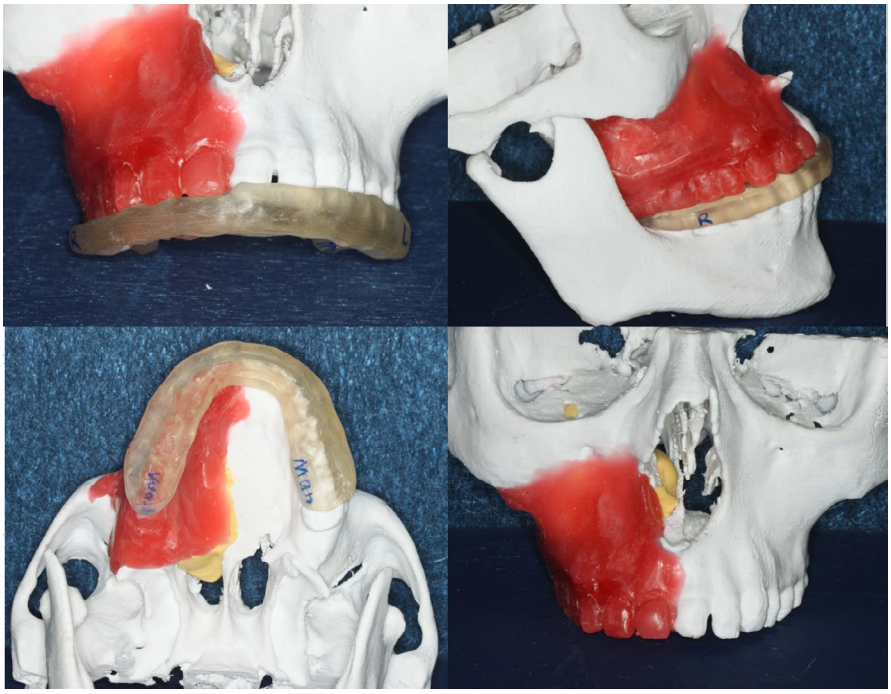

FIGURE 3 Wax op on stereolithographic model and interdental splint

FIGURE 4 Bone graft

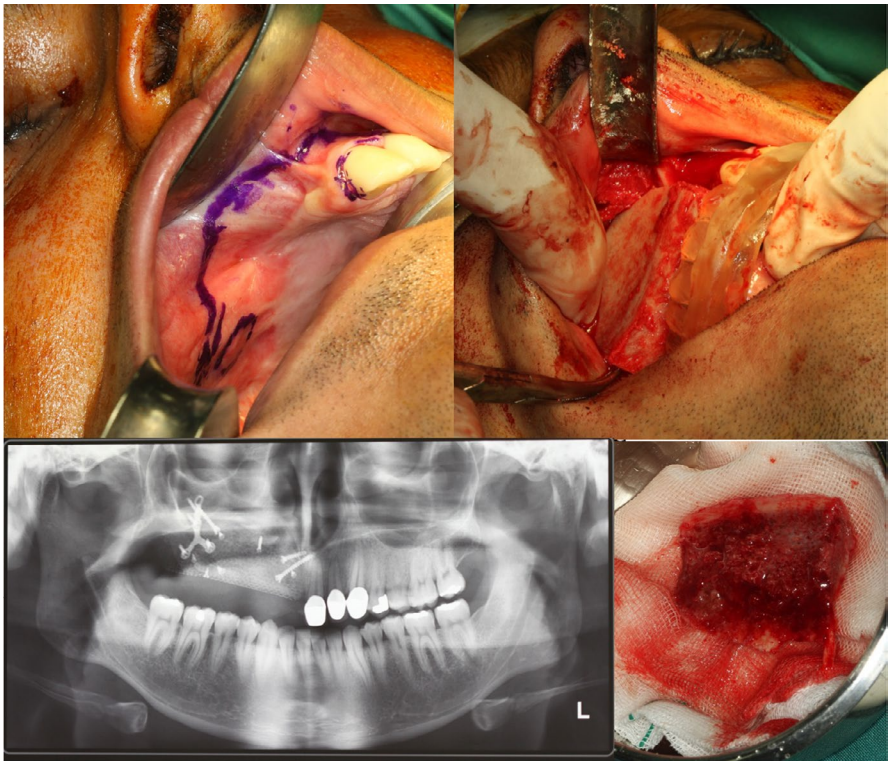

FIGURE 5 Implant insertion

these obturators is associated with food impaction, nasal speech, and mucosal irritation, while frequent prosthetic adjustments are also inevitable.[5,6] Instead, implant-supported prosthesis along with soft and hard tissue reconstruction using local or free flaps seems to be the promising options for these reconstructions.[6,7] This is especially true in young patients with an underlying systemic condition and no evidence of recurrence. However, these treatments are

FIGURE 6 Two year follow-up

time-consuming, require several surgeries, and are accompanied by variable failure rates.

Several flaps have been suggested to reconstruct soft tissue in the literature. The PBFPF is widely used for soft tissue reconstruction of palatal defects due to its rich blood supply and undifferentiated mesenchymal stem cell content.[8] Mesenchymal stem cells can act as an endothelial progenitor and promote tissue vascularization.[9,10] Furthermore, ease of access and manipulation are among other benefits of PBFPF. Moreover, in case of utilizing PBFPF, a proper soft tissue bed for a bone graft should also be obtained in order to eliminate the need for microvascular flaps.

Scapular flaps and fibula free grafts, other than iliac crest free grafts, are also proposed for hard tissue reconstruction. Since scapula provides a limited volume of bone for several dental implants in our case, this donor site was not chosen.[11]

Although microvascular-free grafts of fibula are considered the most successful treatment options for facial reconstructions,[12] the relatively more complicated surgical procedure compared to iliac crest grafts led us to use free iliac graft, since anterior iliac crest also provides sufficient amount of corticocancellous bone to bridge the defect and place dental implant.[13] Furthermore, the PBFPF, which was placed in the defect prior to bone reconstruction, provided a proper soft tissue bed for free iliac graft.[14]

4 | CONCLUSION

Implant-supported fixed prosthesis is reported to improve stability, retention and aesthetic outcomes. For this purpose, hard and soft tissue reconstruction of large defects is necessary. Proper reconstruction of the defects with various donor sites is encouraged to improve the quality of life of these patients.

CONFLICT OF INTEREST

Hereby, the authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

AH: involved in conceptualization, project administration, and resources supervision. MH: involved in conceptualization, project administration, resources supervision, software supervision, and writing-review and editing. NN: involved in writing-original draft; writing-review and editing. LKH: involved in corresponding, investigation, validation, and writing-original draft.

ORCID

Lotfollah Kamali Hakim https://orcid.org/0000-0001-6013-1174

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