Reconstruction of Midface and Orbital Wall Defects After Maxillectomy and Orbital Content Preservation With Titanium Mesh and Fascia Lata: 3-Year Follow-Up

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**Purpose:** To describe the authors’ experience in the reconstruction of patients after total maxillectomy with preservation of orbital contents for maxillary tumors using titanium mesh and autogenous fascia lata, where no setting for free flap reconstruction is available.

**Patients and Methods:** Twelve consecutive patients with paranasal sinus tumors underwent total maxillectomy without orbital exenterations and primary reconstruction. The defects were reconstructed by titanium mesh in combination with autogenous fascia lata in the orbital floor performed by 1 surgical team. Titanium mesh (0.2 mm thick) was contoured and fixed to reconstruct the orbital floor and obtain midface projection. Fascia lata was used to cover the titanium mesh along the orbital floor to prevent fat entrapment in the mesh holes.

**Results:** The most common pathology was squamous cell carcinoma (50%). Patients’ mean age was 45.66 years (33 to 74 yr). The mean follow-up period was 35.2 months (30 to 49 months). During follow-up, no infection or foreign body reaction was encountered. Extrusion of titanium mesh occurred in 4 patients who underwent postoperative radiotherapy. Two cases of mild diplopia at extreme gaze occurred early during the postoperative period that resolved after a few months.

**Conclusion:** Placing fascia lata between the titanium mesh surface of the orbital implant and the orbital contents was successful in preventing long-term diplopia or dystopia. Nevertheless, exposure of the titanium implant through the skin surface represented a complication of this technique in 25% of patients. Further studies are required with head-to-head comparisons of artificial materials and free flaps for reconstruction of maxillectomy defects.

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Maxillary and orbital reconstruction is a major challenge for head and neck reconstructive surgeons. Because maxillectomy is an uncommon operation, evidence is limited regarding the best reconstructive procedure.1 Although the selection of the method depends on the extent of the bony and soft tissue defect, there is no clear optimal method of obturation, reconstruction, and rehabilitation.2 Titanium mesh is a very suitable reconstructive material that allows precise anatomic reconstruction, but subsequent extrusion and complications have always been problematic. This report describes the...
authors’ experience in the reconstruction of 12 patients who underwent total maxillectomy with preservation of orbital contents for maxillary tumors by titanium mesh and autogenous fascia lata.

**Patients and Methods**

**PATIENTS**

From August 2009 to December 2010, at the Imam Khomeini Hospital, an affiliated hospital of the Tehran University of Medical Sciences (Tehran, Iran), 12 consecutive patients with paranasal sinus tumors underwent total maxillectomy without orbital exenterations (Class III) and primary reconstruction. The cases that required orbital exenteration were excluded. This study was approved by the Imam Khomeini Hospital institutional review board and all participants signed an informed consent agreement. The defects were reconstructed by titanium mesh in combination with autogenous fascia lata in the orbital floor performed by 1 surgical team. Eleven patients received postoperative radiotherapy (range, 30 to 66 Gy).

**SURGICAL TECHNIQUES**

All surgeries and reconstructions were performed by 1 team. A total maxillectomy (including orbital floor resection with preservation of the orbital contents) was carried out in all patients. A Weber-Ferguson incision with subciliary extension was made. An upper cheek flap was raised with the lower eyelid portion elevated off the orbicularis oculi muscle. The flap was raised 1 cm lateral to the lateral canthus. The orbicularis oculi and the orbit periosteum were dissected off the inferior orbital rim and elevation was carried back near the orbital apex. The cheek skin and the contralateral palate were preserved. After performing the maxillectomy, the cheek flap was covered with a split-thickness skin graft. Titanium mesh (0.2 mm thick) was contoured and fixed to the remaining structures (zygoma, hard palate, alveolar ridge, and nasal bone) to reconstruct the orbital floor and obtain midface projection (Figs 1, 2).

Fascia lata was harvested from the ipsilateral lower extremity through a longitudinal incision, approximately 3 to 5 cm long, along the lateral thigh, the center of which lies over the junction of the upper and middle thirds of the upper leg. The graft was used to cover the titanium mesh along the orbital floor to prevent fat entrapment in the mesh holes (Fig 3).

**FOLLOW-UP**

During follow-up, the cases were reviewed for the presence of complications (diplopia, epiphora, enophthalmos or proptosis, infection, or extrusion of titanium mesh).

Results

Twelve patients with stage T3 to T4 paranasal sinus tumors (mean age, 45.66 yr; range, 33 to 74 yr) were enrolled in this study. The most common pathology was squamous cell carcinoma (50%). The mean follow-up period was 35.2 months (30 to 49 months). During follow-up, no infection or foreign body reaction was encountered (Table 1). Extrusion of titanium mesh occurred in 4 patients who underwent postoperative radiotherapy (Fig 4). Tumor recurrence was detected in 2 extrusion cases. Two cases of mild diplopia at extreme gaze occurred early during the postoperative period that resolved after a few months. There were 3 cases of ectropion, 2 of which required surgical management. Good cosmetic results for midface reconstruction were obtained.

Discussion

In this study, titanium mesh and fascia lata were used for reconstruction of Class III defects of the maxilla and orbital walls. A vascularized osteocutaneous free flap is believed to be the ideal material for reconstructing defects of the maxilla or mandible after radical cancer surgery in many studies. However,
reconstruction using these flaps is more complicated than using artificial material, especially in orbital reconstruction, and morbidity at the donor site cannot be avoided. Furthermore, there are many surgical centers around the world that still do not have the expertise or adequate funding to establish the setting required for free flap reconstruction of head and neck defects.

Different materials for orbital support after total maxillectomy have been described since the 1960s. Artificial materials, especially titanium, have been used to support orbital contents after total maxillectomy.\textsuperscript{10-13} Although as a thin mesh it is considered an ideal implant for facial skeletal reconstruction, there is a potential risk of infection and exposure because it is a foreign body. Sun et al.\textsuperscript{14} used titanium mesh and a radial forearm flap for palatomaxillary reconstruction, but not the orbital walls, and obtained good cosmetic results. Extrusion of implants occurred in 3 of 19 patients. In the present study, titanium mesh implants were exposed after radiotherapy in 4 cases.

The rate of infection also is low in patients who undergo reconstruction with titanium mesh. Depprich et al.\textsuperscript{15} found fewer pathologic micro-organisms on titanium-based obturators compared with polymer-based obturators for oral rehabilitation of patients after maxillectomy. None of the present patients developed infection during the postoperative period. The titanium mesh was not removed; thus, the dehiscence was reconstructed using locoregional flaps. No extrusion was detected afterward.

This study showed that placing fascia lata between the superior aspect of the titanium mesh surface of the orbital implant and the orbital contents can be successful in preventing long-term diplopia or dystopia. Nevertheless, exposure of the titanium mesh through the anterior skin represented a complication of this technique in 25% of patients. The authors suggest that reconstruction of combined maxillectomy and

<table>
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<th>Case</th>
<th>Gender</th>
<th>Age (yr)</th>
<th>Pathology</th>
<th>Tumor Stage</th>
<th>Complications</th>
<th>Extrusion Occurrence (mo)</th>
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<td>T4</td>
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Abbreviations: BCC, basal cell carcinoma; DFP, dermatofibrosis protuberans; SCC, squamous cell carcinoma.

orbital floor defects with titanium mesh covered by fascia lata might be an option to consider. Further studies are required with head-to-head comparison of allografts, alloplasts, and free flaps for reconstruction of maxillectomy defects that also involve the orbital floor.

References