Midfacial Degloving Technique for Free Flap Reconstruction of Nasal and Anterior Skull Base Defects

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Summary: Traditionally, surgical access for extirpation and reconstruction of midfacial tumors requires external incisions that can cause a myriad of complications, especially in irradiated patients. The modern midfacial degloving approach involves hidden, sublabial and intranasal incisions that provide reliable access for free flap reconstruction of nasal and maxillofacial tumors. Seven patients with a history of radiation therapy underwent free flap reconstruction of the midface. Five patients underwent the technique in a delayed manner, and the remaining two underwent reconstruction immediately at the time of resection. Five patients underwent free radial forearm fasciocutaneous free flaps and two underwent reconstruction with anterolateral thigh perforator flaps. Bone and/or rib cartilage grafting was used in all patients. All patients underwent successful free flap reconstruction of the midface without external incisions. The most common complication was postoperative infection requiring oral or intravenous antibiotics. No patients sustained loss of their grafts or hardware in the postoperative period. The midfacial degloving technique provides satisfactory exposure to the nasal cavity, midface, orbits, and skull base for free flap reconstruction, without disrupting the external soft tissue. The authors describe a novel use of the midfacial degloving technique to provide safe and reliable results with improved cosmetic outcome. (*Plast. Reconstr. Surg.* 147: 990e, 2021.)

Traditionally, surgical access for extirpation of midfacial tumors, and subsequent reconstruction, involves external facial incisions such as the Weber-Fergusson or lateral rhinotomy.[1] These open methods allow for excellent visualization of facial structures at the expense of a visible aesthetic deformity and potential complications such as scar contracture, skin necrosis, and nasocutaneous fistula.[2] Such postoperative difficulties are especially prevalent in irradiated patients. Techniques to minimize these complications by means of hidden incisions were first suggested in the 1920s with sublabial approaches, and later by incorporating the use of rhinoplasty techniques.[3–5] In the 1970s, Casson et al.[6] and Conley and Price[7] described the modern "midfacial degloving" approach using sublabial and intercartilaginous incisions to elevate the soft tissue of the midface during excision of neoplasms. Additional uses of this technique include treatment of facial fractures, skull base lesions, and facial reconstruction.[1,8–13] In this article, we describe a novel use of the midfacial degloving technique to provide access for free flap reconstruction of nasal and maxillofacial tumors.

SURGICAL TECHNIQUE

Midfacial degloving is performed under general anesthesia with the patient orally intubated. The procedure uses four incisions: (1) transoral sublabial incision along the buccal sulcus of the maxilla between the first two premolars, (2) transnasal complete transfixion incision between the bony septum and columella, (3) bilateral intranasal intercartilaginous incisions between the upper and

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Table 1. Patient Population

Patient	Age (yr)	Sex	Diagnosis	Treatment	Surgery	Anastomoses	Complications	Revisions
1	57	F	Septal SCC, saddle nose deformity	Extirpation by means of lateral rhinotomy, March of 2013; radiation therapy completed, June of 2013	RFF free flap with rib cartilage, May of 2014	Superior thyroid artery and facial vein	Infection requiring IV antibiotics; temporary lip hypesthesia	Scar release, January of 2019
2	16	F	Nasomaxillary olfactory neuroblastoma, saddle nose deformity, unilateral midfacial collapse	Extirpation by means of endoscopic approach, November of 2012; radiation therapy completed, March of 2013	RFF free flap with rib cartilage to nose and maxilla, July of 2014	Facial artery and vein	Ectropion and excessive tearing	Dacryocystorhinostomy, medial canthopexy, flap revision, December of 2014
3	39	F	Recurrent sinonasal melanoma, saddle nose deformity, unilateral midfacial collapse	Extirpation by means of lateral rhinotomy with maxillectomy, March of 2011 and September of 2014; radiation therapy completed, June of 2011	Chimeric ALT plus vastus lateralis free flap with iliac crest to orbit and rib cartilage to nose and maxilla, September of 2014	Facial artery and vein	Oronasal fistula requiring operative repair	Recurrence, October of 2015, requiring rectus abdominis myocutaneous free flap and reirradiation
4	55	M	Septal SCC, saddle nose deformity	Extirpation by means of lateral rhinotomy, January of 2008; radiation therapy completed, May of 2008	RFF free flap with rib cartilage grafting, December of 2014	Facial artery and vein	Infection requiring oral antibiotics	Flap revision and fat grafting, March of 2015; fat grafting, November of 2015
5	72	M	Septal SCC, saddle nose deformity	Extirpation by means of lateral rhinotomy, October of 2014; radiation therapy completed, December of 2014	RFF free flap with rib cartilage grafting, February of 2016	Facial artery and vein	None	None
6	44	F	Nasal mucosal melanoma, unilateral middle and lower vault collapse	Extirpation by means of endoscopic approach, June of 2017; radiation therapy completed, August of 2017	RFF free flap with rib cartilage grafting, September of 2018	Facial artery and vein	Infection requiring oral antibiotics; temporary lip hypesthesia	Flap revision, cartilage grafting, August of 2019
7	49	M	Sinonasal SCC with bilateral orbital, skull base, and dural involvement	Induction chemoradiation therapy, November of 2019; extirpation by means of bifrontal craniotomy with coronal incision, endoscopic endonasal resection, January of 2020	Chimeric ALT plus vastus lateralis muscle free flap with custom titanium orbital implants, January of 2020	Facial artery and vein, by means of maxillary antrostomy	Bilateral maxillary fluid collections treated with operative I+D and IV antibiotics	None

F, female; M, male; SCC, squamous cell carcinoma; ALT, anterolateral thigh; RFF, radial forearm fasciocutaneous; I+D, incision and drainage; IV, intravenous.

lower lateral cartilages, and (4) transnasal bilateral vestibule-piriform aperture incisions. The nasal incisions are connected by curved scissors and the nasal dorsum is elevated from the upper cartilages and nasal bones. On the bony midface, the periosteum is elevated with preservation of the infraorbital nerves. Once complete, this approach allows for elevation of the soft tissue of the lower nose and bilateral midface from the nasofrontal angle to the level of the glabella. Direct access to the nasal cavity and maxilla is provided, and the nasofrontal duct and skull base are exposed with additional osteotomies. If needed, structural grafts and alloplasts are fixated before flap transfer.

Soft-tissue free flaps are inset through this exposure. Absorbable sutures are used to secure endonasal portions of the flap, starting from deep to superficial. The free flap pedicle is passed through a subcutaneous cheek tunnel to reach cervical recipient vessels, usually the facial artery and vein, which are dissected through an additional submandibular incision. In orbital and skull base reconstructions, a maxillary antrostomy allows egress of the pedicle. The floor of the subcutaneous tunnel should be the superficial musculoaponeurotic system layer.

After the reconstruction is completed, the nasofacial soft tissues are redraped and the incisions closed with absorbable sutures. Special care is taken to place a septocolumellar stitch to anchor the medial crural plates to the caudal septum and prevent malrotation of the nasal tip. Septomucosal borders are carefully realigned to prevent vestibular stenosis. Tube feeding is performed for 5 to 7 days postoperatively; then, a liquid diet is prescribed until the sublabial incision is healed.

PATIENTS AND METHODS

From 2014 to 2020, seven patients underwent free flap reconstruction by means of the midfacial degloving approach (Table 1). Five patients underwent reconstruction in a delayed manner, whereas two underwent reconstruction immediately. All patients had a history of radiation therapy. Five patients underwent radial forearm fasciocutaneous free flaps and two underwent reconstruction with anterolateral thigh perforator flaps. Bone and/or rib cartilage grafting was used in all patients.

CASE REPORT

Patient 4

A 55-year-old man with a history of septal squamous cell carcinoma who had undergone resection and radiation therapy 6 years previously presented with saddle nose deformity, tip deviation, and vestibular stenosis with airway obstruction (Fig. 1). The patient's nasal lining defect was recreated, and a radial forearm fasciocutaneous flap was folded and inset with the cutaneous surface facing the airway (Fig. 2). A dorsal cartilage graft was secured to the nasal bones with a miniplate in between the external soft tissue and

Fig. 1. Patient 4 presented with saddle nose deformity, tip deviation, and severe vestibular stenosis causing airway obstruction.

Fig. 2. Using the midfacial degloving technique, the nasal lining defect of patient 4 was recreated and the radial forearm fasciocutaneous flap was folded and inset with the cutaneous surface facing the airway.

flap. Quilting sutures and nasal trumpets were used to conform the flap to the bilateral vestibular openings and columella. The patient had no complications postoperatively and demonstrated correction of both aesthetic and functional deformities (Fig. 3).

DISCUSSION

The aesthetic benefits of the midfacial degloving technique are notable when compared to other conventional surgical approaches. Traditional open incisions cause facial scars and possibly ectropion, medial canthal deformity, deviation of the nose, and notching of the lip. Despite the extent of undermining required in midfacial degloving, patients show excellent aesthetic results without creating deformities of the face.

With regard to cancer reconstruction in irradiated patients, a major advantage of midfacial degloving is that the procedure requires septomucosal incisions only, rather than cutaneous incisions that often heal poorly. Adequate visualization of the sinonasal cavities and anterior skull base is achieved while avoiding disruption of the subdermal plexus vasculature. In our series, no patients experienced postoperative soft-tissue necrosis, wound dehiscence, or cutaneous fistula.

Previous studies regarding microsurgical reconstruction of the midface have described the challenges of performing reconstructive flap surgery in a cavity with intricate topography and physical constraint.[14–19] However, without sufficient soft-tissue and nasal lining, reconstructions inevitably undergo scar contracture and airway constriction.[16,17,20,21] Microvascular free flaps are advantageous because of their ability to reconstruct complicated three-dimensional structures with well-vascularized tissue when local flaps are insufficient or unreliable. The midfacial degloving technique provides good exposure and minimizes disruption of the external architecture of the nose and vascularity of the surrounding soft tissues.

Possible complications related specifically to the midfacial degloving technique include

Fig. 3. Patient 4 with correction of both aesthetic and functional deformities.

the following: (1) paresthesia of the infraorbital nerve, which is usually self-limited; (2) scar-related nostril stenosis; and (3) oronasal fistulas. In our series, two patients experienced temporary hypesthesia of the lip, caused by retraction of previously irradiated infraorbital nerves. One patient developed a small oronasal fistula, which was treated successfully with débridement and reclosure.

SUMMARY

Endonasal and skull base microvascular free flap reconstruction using the midfacial degloving approach represents a step forward in minimally invasive head and neck surgery. Despite some added technical difficulty, the midfacial degloving technique provides safe and reliable results with improved cosmetic outcome.

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PATIENT CONSENT

The patient provided written consent for the use of his images.

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