

Medial Femoral Condyle Free Flap for Nasal Reconstruction: New Technique for Full-Thickness Nasal Defects

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Summary: The nose is a functionally complex organ implicated in breathing, olfaction, and phonation, with a critical role also in the aesthetic appearance of a person. This latter aspect should be carefully considered whenever a total or subtotal rhinectomy is performed for resection of locally advanced nasal cancer. To reconstruct large nasal defects, several techniques were described, including the use of cartilaginous grafts, bony grafts, local flaps, and free flaps. In cases of extensive full-thickness resections, free flaps probably represent the most adequate option. The aim of this report is to present the functional and aesthetical outcomes of a reconstruction of the nose after rhinectomy, using the medial femoral condyle free flap associated with the forehead flap. (*Plast Reconstr Surg Glob Open* 2016;4:e855; doi: 10.1097/GOX.0000000000000858; Published online 7 September 2016.)

The nose is a functionally complex organ, implicated in breathing, olfaction, and phonation, with a critical role also in the aesthetic appearance of a person. This latter aspect should be carefully considered whenever a total or subtotal rhinectomy is performed for resection of locally advanced nasal cancer.

Two methods are available to repair extended nasal defects: prosthesis and reconstruction. Although prostheses may result in an acceptable aesthetic outcome, several patients complain about problems with nasal airflow and psychological troubles with removable devices. Therefore, at present, reconstruction is considered the best strategy and requires a complex and individualized approach. To reconstruct large nasal defects, several techniques were described, including the use of cartilaginous grafts, bony grafts, local flaps, and free flaps. In case of extensive full-thickness resections, free flaps probably represent the most adequate option. The most widely used is the radial forearm free flap (RFFF), which, however, requires several operative stages to achieve an acceptable aesthetic result.

The aim of this report is to present the functional and aesthetical outcomes of a two-stage reconstruction

of the nose after subtotal rhinectomy, using the medial femoral condyle free flap (MFCFF) associated with the forehead flap.

CASE REPORT

A 50-year-old man presented with a large skin cancer of the nasal dorsum, which had been previously subjected to multiple surgical removal with the diagnosis of nasal skin keratoacanthoma. Preoperative computed tomographic scan and contrast-enhanced MRI showed an extensive lesion infiltrating the anterior aspect of the nasal septum, the triangular and alar cartilages bilaterally, and the nasal bones. The biopsy of the lesion indicated the diagnosis of squamous cell carcinoma moderately differentiated (Fig. 1). Neck ultrasound and total body computed tomographic scan excluded a systemic dissemination of the disease. After a tumor board evaluation and patient's consent, a subtotal resection of the nose with concomitant reconstruction was planned. To recreate the bony scaffold of the nasal pyramid and to provide an internal lining, a corticoperiosteal MFCFF was scheduled; to restore the external skin coverage, a forehead flap was proposed.

Two teams performed the operation simultaneously under general anesthesia. A subtotal rhinectomy with preservation of the caudal portion of the alar cartilages and columella was performed (Fig. 2). Free margins of at least 1 cm were obtained and confirmed by intraoperative frozen sections. Because of the advanced stage of disease at presentation, the patient underwent also a selective neck dissection (levels from 1 to 3, bilaterally).¹ At

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Fig. 1. Squamous cell carcinoma of the nasal skin. Preoperative marking of the defect.

the same time, the reconstructive team raised the MFCFF from the left leg according to a previously described technique.² No anomalies in vascular anatomy were encountered during flap harvesting. The vascular pedicle was the descending genicular artery and the comitant veins rising from the superficial femoral artery. It was cautiously dissected, and the saphenous artery branch was ligated to lengthen the pedicle. The final length of the pedicle was 6.3 cm (Fig. 3). A template tailored to the nasal defect was made, and a flap of the proper size was harvested. The cortical bony aspect of the flap was trimmed using bone pliers, and the flap was shaped into an obtuse-angle vault to reproduce the nasal dorsum profile using a drill. The periosteal surface of the flap was used to reconstruct the inner layer and sutured to the nasal mucosa. The bone was stabilized with modified titanium plates for orbital floor synthesis (Matrix MIDFACE System, Synthes, Zuchwil, Switzerland). The vascular pedicle was anastomosed with the infraorbital artery and the facial vein. An Indian forehead flap, based on the right supratrochlear artery, was harvested and rotated to cover the MFCFF, leaving a skin tunnel for the pedicle. The patient was transferred to the ICU for 3 days. Rehabilitation of the leg started on the fourth postoperative day. No intra- or postoperative complications were encountered. The patient was discharged on the 15th day without major complaints but with a mild right nasal obstruction because of swelling of the free flap with bulky tissue vegetating intranasally. At the definitive



Fig. 2. The aspect of the surgical defect in lateral view. The full-thickness defect requires a 3-layer reconstruction to restore the nasal profile.



Fig. 3. The medial femoral condyle free flap in its free state with its vascular pedicle. The descending genicular artery was branching from the superficial femoral artery. The flap was placed to restore 2 of the inner layers of the nose. The arrow shows the periosteum before the suture to the remaining nasal mucosa.

histological examination, no nodal metastases were found, and the final stage was pT3pN0 according to the Wang system.³ A second-stage surgery was planned 3 weeks later to free the local pedicle of the Indian flap and to remove the endonasal vegetating portion of the free flap. No complications occurred, and the patient was discharged on the fifth postoperative day.

After a 1-year follow-up, no local or distant recurrences and no bone displacement or resorption were observed. Moreover, the patient was satisfied in terms of nasal breathing and aesthetic outcomes, and he did not refer any discomfort or morbidity at the donor site (Fig. 4).

DISCUSSION

Given the anatomical complexity and aesthetic function of the nose, nasal malignancies are particularly



Fig. 4. Final aesthetic result. The nose has a good projection, and the scar of the forehead flap is barely visible.

challenging whenever they require a total or subtotal rhinectomy. Even though prostheses are feasible options, microvascular free flaps have recently emerged as a better alternative.⁴ Different free flaps have been proposed, with the most common choice being the RFFF,⁵ because of its favorable characteristics, such as the robust vascular supply, the long pedicle, the good calibre of its vessels, and the possibility of harvesting it as a composite flap. However, when the entire nasal scaffold has to be recreated, the RFFF may not be adequate because of the lack of substantial bony tissue. To overcome this problem, a bony or cartilaginous graft might be introduced into the flap, but the risk of graft resorption or displacement and the need of several surgical stages represent 2 critical issues.⁶

In our experience, the corticoperiosteal MFCFF can represent an effective alternative for the reconstruction of both the inner and bony layers of the nose. Because of its significant vascular supply, bone reabsorption and other modifications are unlikely events. The MFCFF was previously described and used mostly in orthopedic reconstructions.^{7–10} Its peculiarity is that the corticoperiosteal flap can be harvested as a thin and pliable lamina, which is easily adaptable to reconstruct small bone defects. The pedicle is based on the descending genicular artery (a medial branch of the superficial femoral artery) and its comitant veins, with an average vascular diameter of 1.5 to 3.5 mm. The length of the pedicle depends on the vascular anatomy of the knee, being between 4 to 12 cm,¹¹ and

usually, it does not represent a problem because compatible receiving vessels are available in the midface.

To cover the external surface of the corticoperiosteal flap and to obtain an aesthetically pleasing result, a forehead flap is advisable because it is easy to harvest, pliable, and consistent with nasal skin color and texture. The autonomization of the local pedicle can safely be performed after 3 weeks, according with the usual timing, because the transferred skin lies on a vascularized bone flap. A drawback of this local flap when used as 1 single reconstructive option is the lack of cartilaginous or bony supports that are mandatory in case of extensive full-thickness nasal defects.

The combined use of the MFCFF and the Indian flap allows for the overcoming of the limitations of both the RFFF and forehead flap, offering a suitable solution to recreate the entire nasal pyramid. Considering the case herein reported, the main disadvantage of this type of reconstruction is the double-staged surgery, necessary to free the local pedicle and restore the nasal patency. However, given the brief operative time required for the second stage, we think that this aspect is overbalanced by the good outcomes achieved.

CONCLUSIONS

Reconstruction of the nasal lining in subtotal rhinectomy defects is not a straightforward procedure, and no technique has been standardized. This case demonstrates a possible method of microvascular nasal lining and framework reconstruction using the MFCFF. This flap has consistent anatomy, is easy to harvest, has a long vascular pedicle, and possesses the necessary pliability and thinness to be easily folded without creating excessive bulk. When combined with the forehead flap, it can result in a good functional and aesthetic outcome. Although further refinements of the technique are necessary, we regard the MFCFF as a new viable reconstructive option for full-thickness defects of the nasal pyramid.

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PATIENT CONSENT

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

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