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Reconstructive surgery

Three-layer reconstruction of lower third nasal defects using forehead flap, reversed nasolabial flap, and auricular cartilage

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Abstract. The reconstruction of a full-thickness defect of the distal third of the nose requires the restoration of all three anatomical layers. A practical method for three-layer reconstruction of the lower third of the nose and the long-term results of this technique are presented herein. A combined reconstruction technique was utilized, including a reverse subcutaneous pedicled nasolabial flap to restore the nasal mucosa, an auricular cartilage graft for structural support, and a forehead flap for cutaneous coverage of the defect. This technique was applied in 21 patients following the full-thickness excision of basal cell carcinoma of the lower part of the nose. All patients (12 male and nine female; mean age 59.8 years) were treated successfully and were satisfied with the aesthetic and functional outcomes. The wound had to be further revised in three cases for the correction of contour or residual deformities; however, no further complications were experienced. One patient had a wound infection and the cartilage had to be removed. The grafting procedure was repeated successfully after resolution of the infection. Donor site morbidity was unremarkable. Combined flaps from the forehead and nasolabial regions with an incorporated auricular cartilage graft can be used to reconstruct full-thickness defects of the lower third of the nose.

Key words: three-layer nasal reconstruction; reversed nasolabial flap; auricular cartilage; forehead flap.

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The nasal ala is a common site for malignancies, especially for basal cell carcinoma (BCC).[1,2] The local excision of a nasal tumour with the necessary safety margin may result in a full-thickness defect of the lower third of the nose.[3] The reconstruction of a lower nasal third defect, including the nasal tip, presents a major challenge, as all three layers need to be reconstructed to restore form and function.[4] Forehead and nasolabial flaps have been used in the reconstruction of the lower nasal third,

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especially of the nasal ala.[4–7] Other reconstructive options include the muco-perichondrial flap from septum, free skin graft and oral mucosa for the inner lining, combined with a forehead flap as skin coverage.[5–9] To restore a defect of the lower third of the nose properly, it is critical to focus on both function and aesthetics.[10–12] All of the three missing anatomical layers should be replaced optimally: the thin nasal vestibule, the supportive cartilage, and the nasal skin.[7] The provision of a reliable and sufficient nasal lining is considered the most challenging aspect of nasal reconstruction. Inadequate reconstruction of the nasal lining is complicated by contracture of the skin cover and does not allow the simultaneous placement of a cartilage graft for skeletal framework support.

The present authors have developed a method for the reconstruction of full-thickness defects of the distal third of the nose, using a combined forehead flap as skin cover, a subcutaneously pedicled reverse nasolabial flap as the nasal lining, and an auricular cartilage graft as the cartilaginous skeletal support. The technical feasibility and technical performance of this alternative approach, as well as its aesthetic and functional outcomes, are discussed herein.

Methods

This study was approved by the necessary institutional review board and all patients signed an informed consent agreement to participate in the study. Twenty-one patients have been treated for BCC of the lower third of the nose at the study institution since March 2010 (Table 1). The surgical excision of the nasal ala included all three layers: the overlying skin coverage, the inner mucosal lining, and the interpositioning lateral crural cartilage. The patients were asked about the aesthetic outcome and any airway obstruction. Two surgeons evaluated the outcomes after more than 1 year.

Table 1. Patient characteristics.

Sex	Age range, years	Defect location		Total
		Right ala	Left ala	
Female	53–76	6	3	9
Male	43–84	7	5	12
Total		13	8	21

Surgical procedure

The surgical method utilized to accomplish the full-thickness reconstruction of the lower third nasal defects is illustrated in Fig. 1.

The BCC was resected and a tumour-free margin was achieved in the first stage (Fig. 2a). Resection of the safety margin and reconstruction of the lost part was performed in a second stage. A nasolabial flap was incised and dissected as a subcutaneously pedicled flap, up to the ala base, as close as possible to the defect (Fig. 1 and 2b). Subcutaneous remnants of muscle are included in the flap in order to preserve a safe blood supply. The flap was reversed and its cranial border sutured to the caudal border of the remaining nasal mucosa, up to the base of the columella (Fig. 2b and c). The cutaneous coverage of the nasolabial flap was turned downward and replaced the lost nasal mucosa. After marking the size and shape of the lost skin according to the healthy side, a forehead flap was dissected as skin coverage (Fig. 2c and d). The distal end of the flap was carefully thinned out for easy fitting by considering the vascularization. Taking into account the shrinkage of flaps during the healing phase, a flap larger than the defect size was elevated. This should prevent pin-cushioning or alar displacement. Tension-free closure of the donor site was achieved in all cases.

Vaseline-soaked gauze was inserted into the nasal hole to support the reconstructed ala. Antibiotics were prescribed for 5 days. After 7–10 days, the forehead flap was elevated and both flaps thinned out as far as possible. A crescent-shaped auricular cartilage graft was inserted for stabilization of the nasal ala. A mattress 4–0 Prolene suture, one laterally in the base of the ala and one into the tip region, secured the lateral and medial edges of the cartilage graft (Fig. 2d). After 2 weeks, the pedicle of the forehead flap was transected and carefully adapted. The final adaptation and debulking of the flaps, as required, was performed after 3–5 weeks (Fig. 2e).

Figure 3 shows the outcome of the reconstruction after 18 months.

Results

The technique described was applied in 21 patients (12 men and nine women); their mean age was 59.8 years (range 43–84

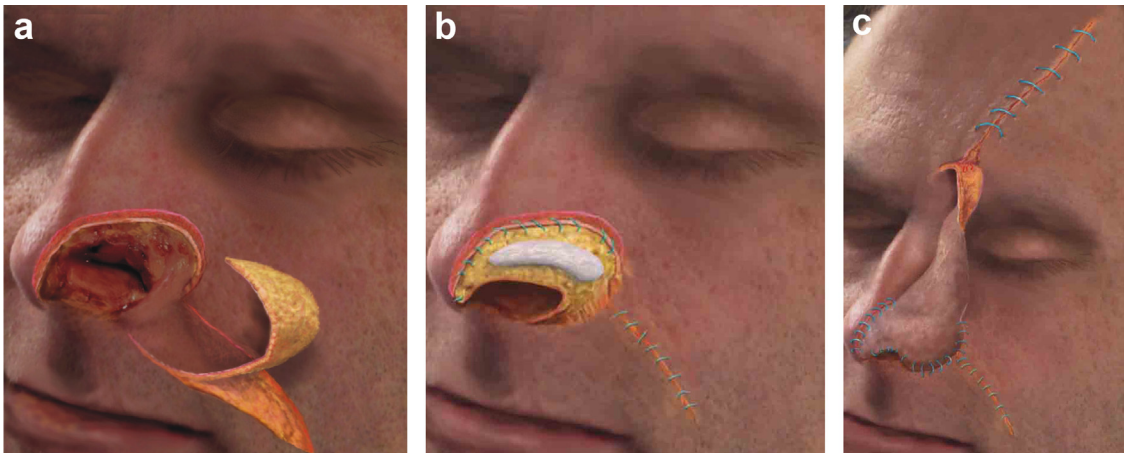

Fig. 1. Artistic illustration of the technique used. (a) Incision of the cranially pedicled nasolabial flap. (b) The cranial edge of the reversed nasolabial flap is sutured with the caudal edge of the preserved nasal mucosa. An auricular cartilage graft is placed on the subcutaneous surface of the nasolabial flap in the second step. (c) Dissection and adaptation of a paramedian forehead flap as skin coverage.

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