

Comprehensive Reconstruction of Facial Defects: A Case Study Utilizing Combined Skin Flap Techniques and Composite Graft Chondrocutaneous

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ABSTRACT

Aim: to present several case reports of nasal defect reconstruction after tumor removal utilizing the auricular chondrocutaneous composite graft method combined with a paramedian forehead flap. **Case:** In this article, we present 3 cases of the combined use of auricular chondrocutaneous composite graft and paramedian forehead flap in defect reconstruction full thickness nasal ala after tumor excision. Two cases were unilateral reconstruction and 1 other case was bilateral reconstruction. Previously, the patient had been educated about the choice of surgical technique, risks and benefits of the surgical technique to be used and the patient had agreed to it. The reconstruction results in all three cases showed excellent results both aesthetically and functionally. The shape and contour of the thin auricular cartilage are very suitable for forming the nasal ala without the need for surgical molding as in other cartilage graft donors. The thin skin attached to the cartilage not only forms lining which is perfect but also forms a wide nostril space. The weakness of the auricular chondrocutaneous composite graft in terms of vascularization supply can be overcome with paramedian forehead flap, which is also a large skin donor with contours and skin color that are most similar to the skin of the nasal. **Conclusion:** This procedure provides excellent results in terms of aesthetics and functionality, as well as minimal complications and donor mobility, so it can be the procedure of choice for reconstruction of large defects in the nasal after tumor removal.

Keywords: Maxillofacial skin flap, reconstruction, composite graft

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INTRODUCTION

Post-operative defects of skin tumor removal in the facial area, especially

the nasal area, are very common. Deformities in the head and neck area can have a huge effect on the appearance and function of the patient. The patient becomes embarrassed and isolates himself from his environment.¹ Malignant head and neck tumors account for 5% of all cancers worldwide, and their incidence is increasing annually. Currently, surgery is still an important method for the treatment of malignant head and neck tumors, but damage to the head and neck shape after surgery not

only leads to the loss of certain functions but also causes major psychological stress, seriously reducing the quality of life after surgery.²

One of the facial defects that is a challenge for surgeons is the nasal. especially the nasal ala where reconstruction of defects in the nasal presents a great challenge for surgeons. The presence of asymmetry, changes in skin color and texture will be easily seen and cause changes in facial shape. High precision and expertise are needed to obtain good results both aesthetically and functionally.¹

Technique skin graft and composite graft, specifically chondrocutaneous grafts, is an

integral component of reconstructive surgery, particularly in the context of ear and nasal defects. The complexity of nasal anatomy poses significant challenges when treating defects resulting from skin malignancies or trauma. A variety of reconstructive options are available depending on the size and nature of the defect. For example, small defects can be treated with primary closure, whereas larger defects often require a more complex approach such as the Antia-Buch flap. This technique has been modified to include a postauricular skin flap to improve outcomes in the management of larger helical edge defects (greater than 2 cm), thereby improving aesthetic outcomes and patient satisfaction.³

The nasal ala is one of the nasal subunits with complex reconstruction techniques. The nasal ala consists of 3 layers of tissue, namely skin, cartilage and nasal lining. Defect reconstruction full thickness nasal ala requires the return of the three layers of tissue by paying attention to the cartilage framework that is strong enough to support the skin that covers it so that a round and symmetrical nostril is formed. In addition to causing aesthetic problems, failure to form a strong and wide nostril framework will cause nasal ala stenosis, nasal ala collapse (nasal valve) so that airway obstruction occurs.^{1,3}

The nasal reconstruction method with auricular chondrocutaneous composite graft is a reconstruction method that has many advantages. This method can allow the reconstruction of the cartilage structure, along with the mucosa in the nasal (lining) and outer skin in one stage, without causing significant complications in the donor area.⁴ Auricular composite grafts are reliable with low complication rates, and patients usually tolerate ear donor sites well. However, composite graft viability in this region is unpredictable as this often requires placing the composite graft over framework grafts or next

to scarred lining.⁵ In large defects, the auricular chondrocutaneous composite graft is best reduced to 2 layers and combined with another well-vascularized flap such as the forehead.³ The following will present several case reports of nasal defect reconstruction after tumor removal utilizing the auricular chondrocutaneous composite graft method combined with a paramedian forehead flap.

CASE REPORT

Case 1

A 65-year-old male patient came to the Head and Neck Surgery Department with complaints of lumpy wounds on the nasal to the upper lip that had not healed for 2 years. The wound had been operated on 2 years previously, but the wound reappeared. From the examination results, a tumor measuring 4 cm x 4 cm was found on the left nasal ala, extending to 2/3 of the upper lip and columella. The tumor infiltrated the entire layer of the left nasal ala. The results of the fine needle biopsy examination showed the pathological type of basalioma.

The therapy performed on this patient was wide excision with general anaesthesia, accompanied by a frozen section examination intraoperatively to achieve free margin. The resulting defect is quite extensive covering 80% of the upper lip, 100% of the columella and 100% of the left nasal ala. To close the upper lip defect, using a combination of cheek advancement flap and cross lip flap (Abbe flap). Closure of the defect full thickness left nasal ala was performed with a combination of auricular chondrocutaneous composite graft and paramedian forehead flap. Paramedian forehead flap is used as a donor of the outer skin of the left nasal ala and columella, while the cartilage framework and lining. Left nasal ala was formed by auricular chondrocutaneous composite graft. The donor of the auricular chondrocutaneous composite graft was taken

from the left ear concha. The size of the graft taken was 1.5 cm x 1 cm. The cartilage graft was sutured to the nasal tip cartilage and to the maxillary periosteum with 4.0 nylon thread. The skin graft was sutured to the left nasal mucosa lining on the inside with 4.0 polyglactin thread and skin from the paramedian forehead flap on the outside with 4.0 nylon. The donor defect was sutured primarily. At 4 weeks after surgery, the Abbe flap and paramedian forehead flap were cut (Figure 1).

Postoperative evaluation found that the left nasal ala that was formed was quite sturdy. The formed nostrils looked round and symmetrical. Collapse of the nasal ala did not occur even during deep inspiration. The donor graft area on the left ear healed perfectly with unchanged anatomical shape. Functionally and aesthetically, the reconstruction results were very satisfactory.



Figure 1. First patient. A. Preoperative basalioma image. B. Post-tumor excision defect. C. Post-first stage reconstruction. D. Post-second stage reconstruction (cut flap). The nostrils are firm and symmetrical. The aesthetics and functionality are excellent.

Case 2

A 57-year-old male patient came to the Head and Neck Surgery Department with a complaint of a non-healing wound in the nasal

area since 1 year ago. The wound was blackish in color on the nasal dorsum, measuring 4 cm x 3.5 cm covering the nasal tip, columella and right and left nasal ala. The results of a fine needle biopsy showed a pathological type of basalioma. The choice of therapy taken for this patient was wide excision under general anesthesia, accompanied by an frozen section examination to ensure the radicality of tumor excision. The margin achieved is at least 0.5 cm from the edge of the tumor (Figure 2).



Figure 2. Second patient A. Preoperative view of basalioma. B. After first stage reconstruction, viewed from the front. C. After first stage reconstruction, viewed from the side. Nostril looks sturdy and symmetrical D. Auricle donor with excellent postoperative aesthetics.

The defect that occurred in this patient includes the nasal dorsum, nasal tip, columella and the entire layer of the right and left nasal ala. Closure of the outer skin defect on the dorsum, tip, columella and nasal ala can be done with a paramedian forehead flap. To replace the cartilage and lining nasal, bilateral auricular chondrocutaneous composite graft was performed. The graft procedure was performed in the same procedure as in the previous case. Closure of the donor area forehead paramedian was performed with skin graft, while the donor area of the auricular composite graft was closed primarily. The

final result of this patient's reconstruction was very satisfactory. The nostrils formed were quite sturdy and symmetrical. The patient had no problems breathing and the resulting nasal shape was quite good aesthetically. The donor area of the graft could heal perfectly and did not cause ear deformities (Figure 2).

Case 3

A 72-year-old male farmer presented to the Head and Neck Surgery Department with a facial lesion that had developed over a ten-year period. Initially, the lesion appeared as a pigmented macule that ulcerated after repeated trauma. On examination, the ulcerated lesion measured 8 cm x 6 cm with irregular borders that bled easily, was reddish in color and had a keratin pearly border with the lesion extending from the nasal tip and left nasal dorsum to the left medial canthus and in the orbital region to the left maxilla. The tumor had infiltrated all layers of the left nasal cavity. Pathological examination revealed basal cell carcinoma.

The therapy taken for this patient was wide excision with general anesthesia. The free margin that must be achieved is 0.5 cm from the edge of the tumor. This action resulted in extensive tissue loss on the left side of the face covering 80% of the dorsum nasi, buccal, and 100% of the left nasal ala. Closure of the defect fullthickness in the tip, dorsum and left nasal ala was performed with a combination of auricular chondrocutaneous composite graft and paramedian forehead flap. Paramedian forehead flap is used for external skin donors on the tip, nasal ala and left dorsum while the cartilage framework and lining left nasal ala was formed by auricular chondrocutaneous composite graft. Planned 4 weeks after surgery, flap cutting was performed. Donor defect paramedian forehead flap closure is performed with skin graft, while primary

closure is performed for auricular composite graft donors (Figure 3).

After post-operative evaluation, it was found that the reconstructed left nasal ala was quite sturdy with the nostril successfully formed giving round and symmetrical results. The nasal ala did not collapse during deep inspiration while the donor graft area on the left ear healed perfectly with an unchanged anatomical shape. The reconstruction results were very satisfying in terms of aesthetics and functionality.



Figure 3. Third Patient A. Preoperative basalioma image. B. Post-tumor excision defect. C. After first stage reconstruction, viewed from the front. D. After second stage reconstruction (flap cut), viewed from the side, nostrils are firm and symmetrical.

DISCUSSION

The concept of nasal reconstruction is not only centered on replacing lost tissue, but also paying attention to the similarity of color and texture aesthetically and restoring function. The nasal consists of 9 subunits divided based on differences in skin thickness, supporting structure and surface convexity, namely the tip, dorsum, a pair of sidewall, a pair of ala, a pair of facets and the columella. The ala

subunit is formed by thin non-sebaceous skin, cartilage and hairy skin as nasal lining.^{1,3}

The nasal cartilage can be reconstructed with a chondromucosal pedicle flap from the septum or with free graft. Chondromucosal pedicle flap from the septum or septal door flap with a hinge has a good vascular supply to its cartilage and provides nasal lining, but this technique can only be performed if the septum is intact and requires a technique molding which is good for getting a concave shape according to the contour of the ala.³

Auricular chondrocutaneous composite graft as a method free graft for the first nasal reconstruction was performed by Koenig in 1902.⁴ This graft consists of skin on both sides and cartilage taken randomly with procedure en bloc. Auricular composite grafts are ideal for nasal reconstruction because the auricular tissue is the autologous donor and has a natural contour that fits the convexity of the nasal ala, and can form a nasal support frame without the need for surgery molding. The elasticity, color and texture of the graft skin match the nasal ala very well.^{6,7}

The weakness of auricular chondrocutaneous composite graft is that the vascularization supply depends on the recipient's microcirculation. In the early stages, the composite graft receives nutrient supply by passive diffusion through the plasma imbibition process. Angiogenesis will form around the 5th day.⁷ In patients who are smokers or have a history of radiation in the recipient area, or have diseases that affect microcirculation such as diabetes mellitus and peripheral arterial disease, the success of this graft is lower. Some ways to improve graft success are the use of preoperative and postoperative steroids and the use of hyperbaric oxygen. Another way to prevent graft failure is to limit graft application to defects that are less than 1 cm in size.^{6,8}

In nasal ala defects measuring more than 1 cm, it is best to combine them with other flaps that have good vascularization.³ In 1943, Gillies described the use of a combination of flaps foreheadon auricular skin and cartilage composite graft.⁴ The Paramedian forehead flap receives its vascularization mainly from the supratrochlear artery. The vascularization source of this type of flap is very rich because there is also blood flow from the supraorbital artery, infraorbital artery and branches of the facial artery.⁹

In all reported cases, the size of the nasal defect was more than 1 cm. Reconstruction of the full thickness defect. The resulting nasal will be very good using an auricular composite graft with a combination of forehead flaps. In the second case, the external nasal skin defect is quite extensive, covering the nasal dorsum, nasal tip and both nasal ala. The paramedian forehead flap approach used provides another advantage, namely the availability of large donor skin to cover the large defect in this case.

Paramedian forehead flap is the best choice for covering large nasal defects. Nasal reconstruction with this flap produces a natural nasal appearance. The skin color and texture produced by this flap most closely resemble the recipient's skin compared to other techniques. The only drawback of this flap is that it requires at least two operations.^{9,10}

The long-term results of auricular chondrocutaneous composite grafts are quite satisfactory. The concave shape of the auricular cartilage will remain as before. The auricular cartilage in the graft does not experience or very minimal absorption, unlike what often occurs in costal cartilage grafts and bone grafts.⁴

CONCLUSION

From the three cases presented in this article, it can be concluded that the combination of auricular chondrocutaneous composite graft and paramedian forehead flap provides excellent results in terms of aesthetics and function. Complications and donor morbidity are minimal. This procedure can be the best choice for reconstruction of large nasal defects after tumor removal. absorption, unlike the frequent occurrence of costal cartilage grafts and bone grafts.

In the case presented in this article, reconstruction of the defect full thickness of ala nasal provides very satisfying results both aesthetically and functionally. Complications and morbidity caused to the donor area are very minimal. In the first 3 days after surgery, there is a change in color and edema in the auricle donor area, but with increasing time, the edema decreases, the skin color returns to normal and the resulting scar becomes fainter.

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DISCLOSURE

The authors declare no conflicts of interest.

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