

Island Pedicle and Bilobed Flaps in Ala and Back Nose Reconstruction: A Prospective Comparative Analysis

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Abstract

Background Reconstruction of face deformities resulting from skin cancer includes reconstructing the area with similar tissue. This prospective study aimed to compare the functional and aesthetic outcomes between two types of local flaps (the island pedicle flap vs the bilobed flap) used in reconstruction of the ala and back nose.

Methods In this study, 120 patients with skin cancer of the nose underwent ala and back reconstruction: 60 patients using the island flap (IF group) and 60 patients using the bilobed flap (BF group). The two groups were homogeneous for sex, age, and anatomic area. Complications, scarring according to the scale of Vancouver, cosmetic appearance, and disorders of sensations were analyzed, and statistical analysis was performed using Chi-square and analysis of variance (ANOVA).

Results Early complications were more common in the BF group than in the IF group ($p < 0.005$). The Vancouver Scar Scale scores were significantly better for the IF patients ($p < 0.005$), who also showed better results in the analysis of cosmetic outcomes ($p < 0.005$).

Conclusion The study showed that the island flap used for ala and back nose reconstruction provides better functional and cosmetic results than the bilobed flap, from both functional and aesthetic points of view.

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Keywords Bilobed flap · Island flap · Nose reconstruction · Skin tumors

The nose is the most common anatomic site of facial skin cancer due to its cumulative exposure to sunlight [4, 7]. Many aesthetic and functional reconstruction options for full-thickness soft tissue nasal defects after tumor excision are available. Skin grafts are not considered the ideal replacement for the thick sebaceous skin of the nasal tip, ala, lower sidewalls, or dorsum [6, 18]. Instead, regional flaps are very useful and versatile.

In this study, we evaluated ala and back of nose reconstruction by analysis comparing the island pedicle flap and the bilobed flap, highlighting the ease of performing the surgical techniques, the complication rate, and the results, both functional and aesthetic.

Materials and Methods

The study recruited 120 patients eligible for ala and back of nose reconstruction from January 2007 to January 2011, selecting two homogeneous groups by a random method from a sample of 200 patients scheduled for excision of ala and back of nose carcinoma who consented to participate in the study.

The patients were randomized for treatment allocation at a 1:1 ratio, with 60 patients placed in the IF group

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Table 1 Clinical data of study cases

Group	Nasal dorsum	Nasal ala		Sex		Surgery		Histology	
		Right	Left	M	F	Bilobed flap	Island flap	BCC	SCC
IF	16	26	18	30	30	0	60	42	18
BF	14	24	22	30	30	60	0	46	14
<i>p</i> Value	>0.005							0.68	

BCC basal cell carcinoma, *SCC* squamous cell carcinoma, *IF* island flap, *BF* bilobed flap

(reconstruction by island pedicle flap) and 60 patients placed in the BF group (reconstruction by bilobed flap). The two groups were homogeneous for sex, age, and characteristics (Table 1). There were 60 men and 60 women. The age of the youngest patient was 54 years, and the age of the oldest was 77 years (average age, 64.96 years). The lesions were similar between the two groups in terms of size (diameter, 0.5–1.5 cm) and anatomic area.

The study protocol conformed to the ethical guidelines of the Declaration of Helsinki. This research was approved by our local institutional review board. An informed consent for participation in the study was obtained from each patient.

Patients met the inclusion criteria if they had suspected skin cancer of the ala or the back of the nose, if they had a previously untreated removable tumor with 3–5 mm of healthy skin, if they were Caucasian, and if they were not younger than 50 years or older than 80 years. All the patients underwent excision of the lesion using frozen section histology and reconstructive surgery under local anesthesia with adrenaline (1:200,000).

Island Flap Operative Technique (IF Group) (Fig. 1)

The flap design was oriented with the axis parallel to the relaxed skin lines. The flap width was 50 % greater than the defect diameter.

Flap dissection started with the submuscular and suprapariosteal/perichondrial plane of dissection. The flap raising continued in this plane beyond the flap skin markings, rostral, and across the midline. The flap borders then were incised through the full thickness of the skin. The surrounding skin was undermined until sufficient rotation in the flap was gained with respect to the defect. The proximal and distal margins were cut to allow proper mobility, and the skin surrounding the nose was released. The flap then was rotated into the defect.

After the dissection was complete, a balancing stitch was used to orient and position the flap. A caudal view allowed an appropriate vision of nasal symmetry. Balancing the motion of the rotational and translation flap through

an accurate submuscular and subcutaneous dissection allowed a satisfactory outcome to be achieved [12]. After flap creation, the resulting island of skin and subcutaneous tissue was advanced into the defect and sutured in place. The secondary defect was closed in a V–Y configuration.

Bilobed Flap Operative Technique (BF Group) (Fig. 2)

A distance equal to the radius of the defect was measured from the lateral border of the defect to the point marked in the alar groove. Two arcs were drawn with centers at the point. The first arc passed through the center, and the second passed tangential to the defect. The bases to both lobes of the flap arose from the smaller arc. The height of the first lobe extended to the second arc. The width of the first lobe equaled the width of the defect. The width of the second lobe was the same or slightly less than that of the first lobe. The height of the second lobe was twice the

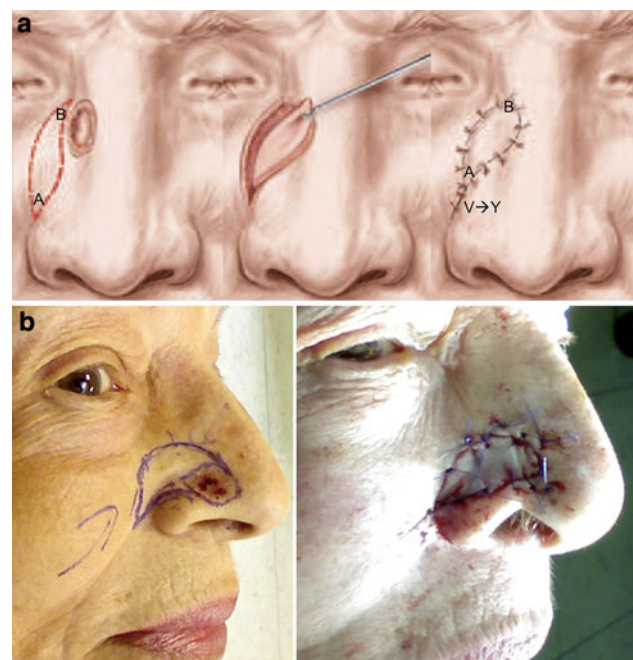
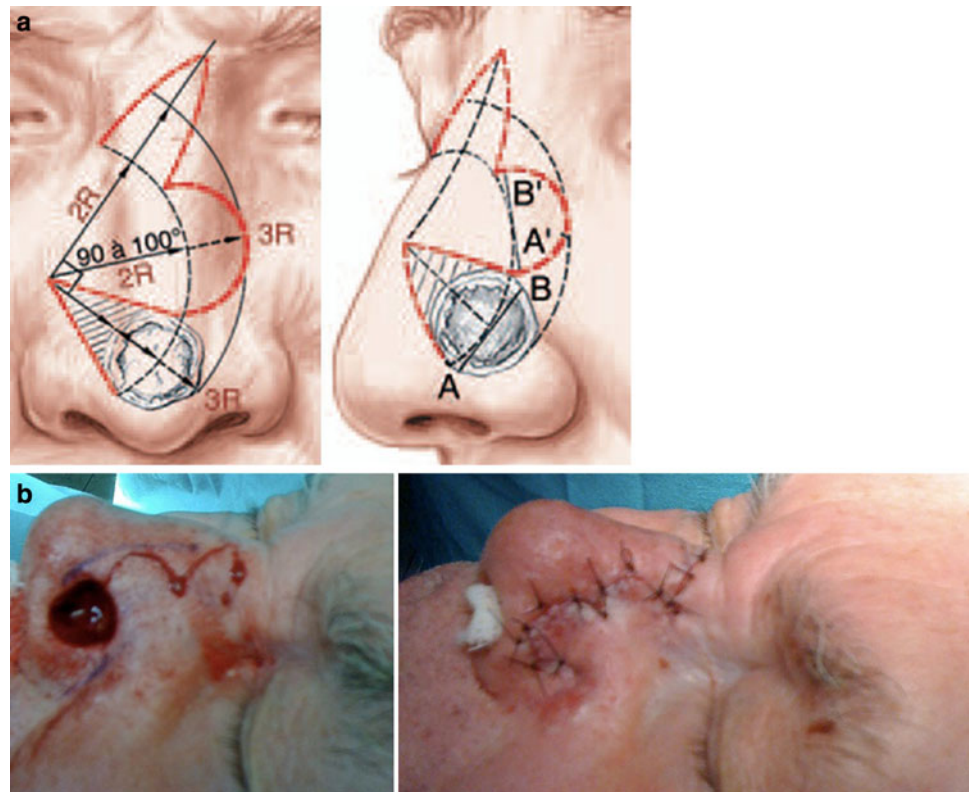


Fig. 1 Island flap. Operative technique. **a** Operative design. **b** Operative figures

Fig. 2 Bilobed flap. Operative technique. **a** Operative design. **b** Operative figures



height of the first lobe. The axis of the defect and the two lobes were approximately 45° apart.

The donor site of the first lobe was closed first. The first lobe was transposed, and the standing cutaneous deformity was removed. The second lobe was transposed and trimmed [3].

Postoperative follow-up evaluation was at 7 days, then at 1, 3, 6, and 12 months. We analyzed early and late complications. In particular, to evaluate the results of treatment 12 months after the surgery, the formed scar was evaluated in terms of its pigmentation, color, height, and elasticity. The pigmentation of the scar, its height, and its color were evaluated on a scale of 0–3. Elasticity was evaluated on a scale of 0–5 according to the Vancouver scale. The cosmetic appearance of nose was evaluated subjectively by the patients themselves based on a scale of 1 (cosmetic appearance close to normal) to 4 (unsatisfactory cosmetic appearance).

Objectively, the long-term aesthetic results were evaluated by a blinded third-party observer from the Institute of Health. Moreover, to examine disorders of sensation, the discrimination of two points was evaluated using needles fixed by standard distances (two-point test). At the beginning of the examination, the distance between the needles was 2 mm. Later, it was increased by 1 mm up to 15 mm until the patient started feeling the touch of both needles (not only one). This examination was repeated three times, and the best result was recorded.

Statistical Analysis

The Chi-square test was performed to compare discrete variables of the early and late complications as well as the cosmetic outcomes for the two groups. Analysis of variance (ANOVA) was used to compare the cosmetic outcomes for the two groups. A p value lower than 0.005 was considered significant. The software program used was Apache Open-Office™ 3.4 Calc <http://www.openoffice.org/it/>.

Results

During the short-term follow-up period (7 days, Fig. 3; Table 2), the viability of the flap, the functions of the

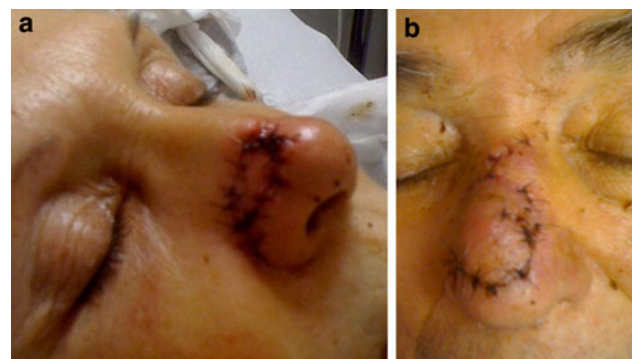


Fig. 3 Immediate results of surgery. **a** Island flap. **b** Bilobed flap

Table 2 Evaluation of complications at the 7-day follow-up assessment

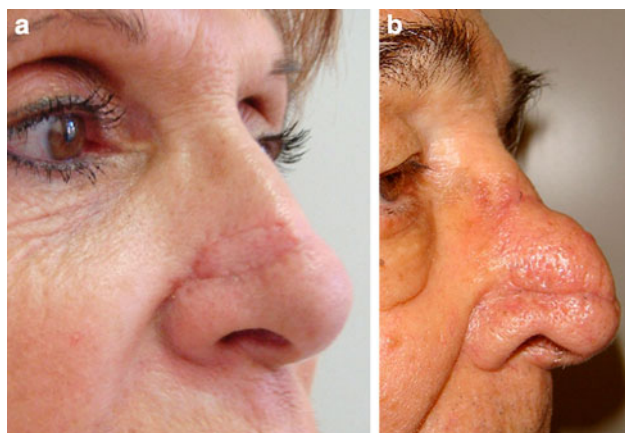
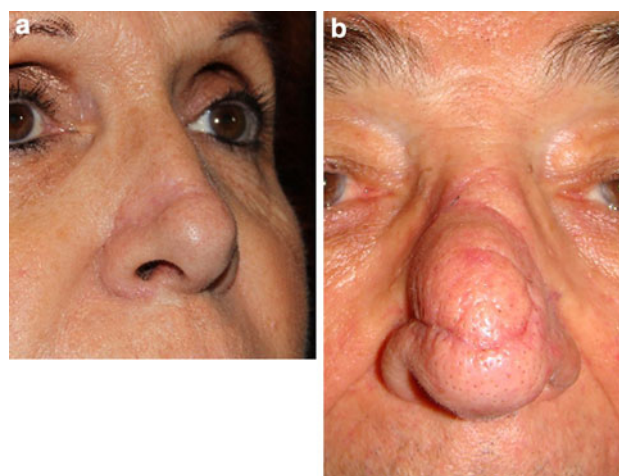
Group	Early complication					Total
	Edema	Congestion	Hematoma	Ischemia	Apex necrosis	
IF	0	0	6	0	0	6
BF	7	10	5	0	5	27
<i>p</i> Value	<0.005					

IF island flap, BF bilobed flap

reconstructed nose, and the early complications were analyzed. Group IF had six cases of hematoma (10 %), which resolved spontaneously with patients receiving antiplatelet therapy. No complication related to alteration of the vascularization occurred such as ischemia, congestion, or necrosis of the flap, and no cases of nasal asymmetry occurred.

In the BF group, the complications recorded were 10 cases involving congestion of the flap (16.6 %), which resolved spontaneously; 5 cases involving necrosis of the apex flap (8.3 %), 2 of which required surgical revision; 7 cases of persistent edema (11.6 %); and 6 cases of hematoma in patients receiving antiplatelet therapy (10 %), which resolved spontaneously. This difference in early complications between the groups was significant ($p < 0.005$).

During the long-term follow-up period (12 months, Figs. 4, 5; Tables 3, 4, 5), we evaluated both the functional and aesthetic results of the surgical procedures, the late complications, and tumor recurrence. In the IF group, we observed high preservation of the patient's facial characteristics and normal function of the nose and facial tissues. In the BF group 16 cases of nose distortion (26.6 %) were recorded, namely, 11 cases of trap door deformity (6 cases requiring contouring of the flap and 5 cases improving with time) and 5 cases of skin defect of the nasal tip (3 requiring surgical revision).

**Fig. 4** Status at the 6-month follow-up evaluation. **a** Island flap. **b** Bilobed flap**Fig. 5** Status at the 12-month follow-up evaluation. **a** Island flap. **b** Bilobed flap**Table 3** Evaluation of the complications at the 12-month follow-up assessment

Group	Late complication				Total
	Trap door deformity	Tip defect	Ala collapse	Recurrence	
IF	0	0	0	0	0
BF	11	5	0	0	16
<i>p</i> Value	<0.005				

IF island flap, BF bilobed flap

Table 4 Scar evaluation according to the Vancouver scale at the 12-month follow-up assessment

Score	Pigmentation		Flexibility		Height		Color	
	Group		Group		Group		Group	
	IF	BF	IF	BF	IF	BF	IF	BF
0	28	10	20	16	28	22	22	34
1	18	10	20	36	30	32	28	22
2	10	16	12	4	2	6	10	4
3	4	24	4	2	0	0	0	0
4	–	–	2	2	–	–	–	–
5	–	–	2	0	–	–	–	–
<i>p</i> Value	<0.005				2.78		5.86	

IF island flap, BF bilobed flap

Table 5 Evaluation of cosmetic appearance at the 12-month follow-up assessment

Scale	Subjectively		Blinded third-party observer	
	Group		Group	
	IF	BF	IF	BF
1 Close to normal/very good	18	6	20	6
2 Good	36	22	31	15
3 Satisfactory	4	16	8	24
4 Unsatisfactory	2	16	1	15
<i>p</i> Value	<0.005		<0.005	

IF island flap, BF bilobed flap

Evaluating the late complications, we analyzed the state of formed scars according to the Vancouver scale (Table 4). The mean scores between the groups differed significantly. We noted that in the IF group, the color, pigmentation, height, and elasticity of the scars closely resembled those of undamaged skin. The scars that formed in the BF patients were thicker and less elastic, with greater changes in pigmentation. In particular, the differences in pigmentation and flexibility were significant ($p < 0.005$).

In the cosmetic assessment, 18 IF patients evaluated the appearance of their nose as very good, with 36 evaluating it as good, 4 as satisfactory, and 2 as unsatisfactory. In the BF group, the subjective scoring showed that 6 patients evaluated the appearance of their nose as very good, 22 as good, 16 as satisfactory, and 16 as unsatisfactory. The difference in cosmetic evaluation between the two groups was significant ($p < 0.005$). In the same way, the blinded third-party observer gave a favorable assessment for the IF group that was significant to the statistical analysis ($p < 0.005$) (Table 5).

Finally, the analysis for discrimination of two points to evaluate disorders of sensation showed that the discrimination of two points was comparable between the two groups and that the difference was not statistically significant. Neither group had recurrence of disease.

Discussion

Given the vital function of the nose in everyday life, it is extremely important that the reconstruction of facial defects preserve the integrity of complex facial functions and expressions as well as facial symmetry and a pleasing aesthetic outcome. Nasal reconstruction has always been a challenge for plastic surgeons. The goals for reconstructing deformities of the face acquired secondary to skin tumors include optimizing donor-site aesthetics and reconstructing the area with similar types of tissue when possible [12].

Nasal reconstruction has reached a point in its evolution such that its goals no longer include simply filling the defect. Numerous methods for reconstructing nose defects have been described, including local-regional flaps [1, 11, 13, 17, 19].

Traditionally, ala reconstruction has involved a nasolabial flap [6, 13, 14] that provides a large volume of tissue, but controversial results are reported. Some reports show that it is difficult to reconstruct the complex configuration of the ala eminence precisely, whereas others show that reconstruction restores a very natural appearance.

Another useful choice for nasal reconstruction is the bilobed flap [15, 20–22]. This is the repair of choice for defects located 0.5–1.5 cm of the nose, particularly defects involving the lateral tip, supratip, or tissue near the tip. It is a simple double rotation-transposition flap designed to move more skin over a larger distance than would be possible with a single transposition flap in the same location.

The bilobed flap is best suited for reconstruction of circular defects on the caudal one-third of the nose. In this location, reconstruction with other types of nasal cutaneous flaps is difficult. The bilobed nasal flap enables the surgeon to repair defects with an aesthetic result that surpasses that resulting from use of full-thickness skin grafts. This is especially true for deep nasal cutaneous defects. As a consequence, the bilobed flap is the preferred flap for reconstruction of the nose in the area of the tip and caudal dorsum.

The disadvantage of the bilobed flap is that most of the incisions necessary to create the flap produce scars that do not parallel relaxed skin tension lines. On the nose, the incisions for the flap do not lie within boundary lines separating nasal aesthetic units [3].

In recent years, several authors have reported reconstruction with the island flap as an alternative [2, 5, 9, 10]. An island flap is incised on all borders so that no cutaneous attachments exist between the skin of the flap and the adjacent skin of the donor site. This creates an island of the skin, which constitutes the flap.

The island flap may be designed with any configuration depending on the requirements of the defect it is used to repair. The island flap may be of a circular, rectangular, or triangular configuration [3]. This flap is technically straightforward. It enables the surgeon to achieve symmetry and stable healing in a one-stage reconstruction without sacrificing nasal tip position. If correctly designed and performed, the island flap avoids nostril notching or asymmetry for defects extending to the alar rim. Nasal symmetry is maintained although the defect and donor flap are on the same side of the nose, which allows tension-free closure of larger defects.

The random blood supply of the nasal island flap is reliable and robust. The flap is freely mobile on its pedicle,

and because the surrounding nasal skin is also loose, the flap can be advanced or rotated easily. The island advancement or rotation flap is a versatile and reliable reconstructive option for many different defects on the nose. It is well tolerated and accepted by patients [16]. With these views of different authors, this flap is becoming increasingly popular.

We performed an analysis comparing the island pedicle flap and the bilobed flap for nose reconstruction in homogeneous groups of patients. The island pedicle flap showed greater success, with reports of lower morbidity, shorter operating room time, reduced complications, and improved morphofunctional outcome. The advantages of this flap include great ease of harvest, a long pedicle obtained, and a large volume. The island pedicle flap preserves the nasolabial folds. On the lower third of the nose, where the skin is least mobile, it allows the surgical site to be filled with nearby skin and matched for color and texture. It then allows for repair of the secondary defect with another well-matched flap from a nearby donor site. The procedure is less technically complex and has lower morbidity.

Of primary importance, we have experienced no complications related to alterations of vascularization using the island flap. The island flap receives its blood supply from perforating arteries, which guarantee a rich vascular plexus. It therefore is safer than the dermal/subdermal plexus of the bilobed flap. We also found that the mobility of the island pedicle flap ensured the reconstruction of skin loss of substance with good aesthetic and functional results. We believe that the use of the island pedicle flap can lead to an improved outcome compared with the bilobed flap, and especially with a more natural recovery (Figs. 4, 5).

We believe the island pedicle flap is more advantageous, with less risk for distortion of the nasal tip and better recovery of the alar groove (Figs. 4, 5). It avoids the risk of edema that often can create the pivot of rotation of the bilobed flap. The island flap also is advisable because it avoids contracture of the reconstructed area and prevents the risk of trap door deformity. No cases of trap door deformity were registered in the IF group, whereas 11 cases were recorded in the BF group, with necessary contouring of the flap in 6 cases.

Trap door deformity may result from persistent edema and poor lymphatic drainage of flaps with incisions on three borders. Flaps with curvilinear borders are particularly prone to develop trap door deformity. The scar around the border of the flap contracts in a concentric fashion. This concentric contraction combines with contraction of the scar sheet beneath the flap to push the skin upward in a mushroom effect [8].

Bilobed flaps of the nasal skin are particularly susceptible to trap door deformity because of the two circular lobes used for reconstruction of the flap. The deformity is

even more likely to occur when a bilobed flap is used to repair a nasal defect in which the nasal skin is thick and has excessive sebaceous glandularity [3]. In these patients, an island flap reconstruction may be the first choice, in which the drainage is axial and reliable.

Conclusion

Our prospective study findings show that reconstruction with an island flap provides better functional and cosmetic results than reconstruction with a bilobed flap.

Conflict of interest The authors declare that they have no conflicts of interest to disclose.

Ethical approval The ethical approval was given for our study. The Helsinki Declaration guidelines were followed in this investigation.

References

1. Antia NH, Daver BM (1981) Reconstructive surgery for nasal defects. *Clin Plast Surg* 8:535–563
2. Asgari M, Odland P (2005) Nasalis island pedicle flap in nasal ala reconstruction. *Dermatol Surg* 31:448–452
3. Baker SR (2007) Local flap in facial reconstruction, 2nd edn, chap 6, pp 83–84; chap 10, pp 189–211; chap 26, p 703
4. Boyd AS, Shyr Y, King LE Jr (2002) Basal cell carcinoma in young women: an evaluation of the association of tanning bed use and smoking. *J Am Acad Dermatol* 46:706–709
5. Campbell LB, Ramsey ML (2008) Transposition island pedicle flaps in the reconstruction of nasal and perinasal defects. *J Am Acad Dermatol* 58:434–436
6. El-Marakby HH (2005) The versatile nasolabial flaps in facial reconstruction. *J Egypt Natl Cancer Inst* 17:245–250
7. Ge NN, McGuire JF, Dyson S, Chark D (2009) Nonmelanoma skin cancer of the head and neck II: surgical treatment and reconstruction. *Am J Otolaryngol* 30:181–192
8. Kaufman AJ, Kiene KL, Moy RL (1985) Role of tissue undermining in the trapdoor effect of transposition flaps. *J Dermatol Surg Oncol* 19:128
9. Krathen RA, Behroozan D, Goldberg LH (2007) Island pedicle flaps for the repair of a nose, cheek, and lip defect. *Dermatol Surg* 33:351–354
10. Krathen RA, Meunnich E, Donnelly HB (2010) Dermatol island pedicle flap for alar defects. *Dermatol Surg* 36:386–391
11. Mavili ME, Pence M, Gursu KG (1994) Upper lip flap for reconstruction of full-thickness ala nasi defect. *Plast Reconstr Surg* 94:1064–1068
12. Monarca C, Rizzo MI, Palmieri A, Chiummariello S, Fino P, Scuderi N (2012) Comparative analysis between nasolabial and island pedicle flaps in the ala nose reconstruction: prospective study. *In Vivo (Athens, Greece)* 26:93–98
13. Mureau MA, Moolenburgh SE, Levendag PC, Hofer SO (2007) Aesthetic and functional outcome following nasal reconstruction. *Plast Reconstr Surg* 120:1217–1230
14. Rohrich RJ, Conrad MH (2001) The superiorly based nasolabial flap for simultaneous alar and cheek reconstruction. *Plast Reconstr Surg* 108:1727–1730

15. Salgarelli AC, Cangiano A, Sartorelli F, Bellini P, Collini M (2010) The bilobed flap in skin cancer of the face: our experience on 285 cases. *J Craniomaxillofac Surg* 38:460–464
16. Siddiqui A, Ditmars DM (2005) Island rotation flap for nasal reconstruction. *Plast Reconstr Surg* 116:1604–1609
17. Vandeput JJ (1997) The retroangular flap for nasal reconstructions. *Plast Reconstr Surg* 100:276–277
18. Weber SM, Baker SR (2009) Management of cutaneous nasal defects. *Facial Plast Surg Clin North Am* 17:395–417
19. Wilkinson TS (1978) Alar hinge flap in heminasal reconstruction. *Ann Plast Surg* 1:481–484
20. Zitelli JA (1989) The bilobed flap for nasal reconstruction. *Arch Dermatol* 125:957–959
21. Zitelli JA (2008) Design aspect of the bilobed flap. *Arch Facial Plast Surg* 10:106
22. Zoumalan RA, Hazan C, Levine VJ, Shah AR, Zitelli JA (2008) Analysis of vector alignment with the Zitelli bilobed flap for nasal defect repair: a comparison of flap dynamics in human cadavers. *Arch Facial Plast Surg* 10:181–185