Reconstruction of Full-Thickness Alar Defect by the Turnover Nasolabial Flap: Improving the Outcome by Primary Flap-Thinning and Unilateral Alar Base Suturing

KARIM S. MASSOUD, M.D.

The Department of Plastic Surgery, Faculty of Medicine, Ain Shams University.

ABSTRACT

The medially-based nasolabial turnover flap offers an important tool to reconstruct full-thickness alar defects. It is however accompanied by lateral shift and bulkiness of the reconstructed ala in certain cases. A modified technique was introduced in the current work which included primary thinning of the flap and stabilization of the lateral alar side wall by suturing it to the anterior nasal spine. A comparison was conducted between traditional turnover flaps (5 cases) and the modified technique (6 cases). The results demonstrated improvements in the lateral shift of the ala (from 25.2% to 10.9%) and in the increase thickness of the alar rim (from 53.4% to 20%).

INTRODUCTION

Full-thickness defects of the nasal ala present a great challenge to the plastic surgeon. The need to provide adequate skin cover with similar colour-match is compounded by the additional tasks of reconstructing the nasal lining and the support of the reconstructed alar margin. This often requires staged procedures with donor sites morbidities. Several options exists in the armamentarium of the plastic surgical field, however the main choices remain one of three: The forehead, the superior-based nasolabial and the medial-based nasolabial flaps. Distant flaps from the forehead often lead to a bulky repair of the ala. They are also accompanied by visible donor site scarring. Superior-based nasolabial flaps are commonly used to reconstruct the external surface of the ala while another stage is needed to reconstruct the nasal lining with or without a cartilaginous frame. Medial-based nasolabial flaps are usually turned to reconstruct the nasal lining while another local flap or a full-thickness graft is used to provide the cover. The colour-match problem, the multi-staged procedures and the scarring at the alar rim are among the side effects of the previous nasolabial techniques [1-3].

Single-stage procedures using nasolabial skin are also possible. A superior-based flap can be elevated with sufficient length the cover the external surface and then it is folded inside the nasal cavity to provide lining. The resultant repair is commonly associated with a bulky alar side wall and a visible donor site scarring. Single-stage medial nasolabial flaps are better suited for that purpose. The flap is raised as an island, based of the subcutaneous tissue and folded to repair both layer of the alar side wall. Two variants of the medial-based island nasolabial flap were published. In the first type, the proximal part of the flap provides the external surface reconstruction while the distal part in internally folded to provide lining. The resultant reconstruction is commonly associated with a bulky and unnatural ala. The second variant provides a better contour to the reconstructed ala. By raising the flap and turning it like the page of the book, the proximal part is used to reconstruct the nasal lining first. The distal part is then folded to cover the first layer and reconstruct the external surface. During suturing the first layer, the flap make a natural 90 degree turn to orient its distal part for the final stage of the repair (Fig. 1). As the distal part is folded to reconstruct the outer surface, the free margin of the ala is formed and is structurally strong enough to eliminate the need of a cartilaginous frame work of alar support [3].

This technique of turnover medial-based nasolabial flap was used by several authors to reconstruct full-thickness alar defects with excellent results [4-6]. They however reported a high rate of revisional surgery to reduce the bulk of the

reconstructed ala and to seat the ala in a more medial location. In the current study, a modification of the medial nasolabial turnover flap is introduced in an attempt to reduce the bulk of the flap and to stabilize the lateral shift of the ala. Primary thinning of the flap-preserving the subdermal plexus- was suggested by several authors [5-7] and was performed in the current study to reduce the bulk of the lateral alar sidewall. To prevent the lateral shift of the alar groove, sutures were used anchoring the dermis of the base of the flap to the soft tissue cover of the anterior nasal spine. These sutures were similar to the alar base sutures used in rhinoplasties to reduce the alar-base width [8].

PATIENTS AND METHODS

The study was conducted on 11 cases in the period between August 2003 and November 2006. They were 4 males and 7 females with age ranging from 47 to 92 years (mean 63.2 years). All cases suffered from nodulo-ulcerative basal cell carcinoma (confirmed by an incisional biopsy) of the nasal ala. In all cases, the lesion was excised with a 2-3mm. safety margin. The first 5 cases (Group I) were reconstructed by the nasolabial turnover flap as described by Spears el al., in 1987 [6]. In the remaining 6 cases (cases 6-11, Group II) two modifications of the original nasolabial turnover flap were applied. They included the primary thinning of the flap and the stabilization of the reconstructed lateral alar side wall by suturing it to the anterior nasal spine.

All cases were done under general anaesthesia. The defect and the flap were outlined with a flap-base larger than the defect and a flap length that allowed primary closure of the nasolabial defect (Fig. 1A). The flap was raised as an island on a subcutaneous pedicle (Fig. 1B). Its proximal part was sutured to the nasal lining using 4/0 Vicryl sutures. As the suturing proceeded, the flap made a 90 degree twist (Fig. 1C). The distal part of the flap was then turned to cover the lining. Excess length was excised and the outer layer was sutured using 5/0 Prolene sutures. The lateral cheek skin was undermined and the donor site was closed using 4/0 Vicryl subcutaneous and 5/0 Prolene intradermal sutures (Fig. 1D).

A modification of the preceding technique was used on cases of group II (cases 6-11). First the flap was thinned to 2-3mm. in thickness, preserving the subdermal vascular plexus prior to turning the distal part. The second modification included su-

turing the reconstructed alar side wall to the anterior nasal spine. A subcutaneous tunnel was created connecting the base of the flap to the base of the columella. A 4mm. incision was made in the membranous septum over the anterior nasal spine. A 2/0 Prolene suture was used to anchor the dermal part of the reconstructed ala (flap) to the soft tissue covering the anterior nasal spine (Fig. 2). The suture was tightened incrementally just to stabilize the distance between the alar-facial groove and the centre of the columella. The contralateral distance (of the normal side) was used as a reference.

In order to evaluate the effects of these modifications on the outcome of the reconstructed alae, two measurements were taken at 3-6 months postoperative in all cases. The first measurement was taken to reflect the position of the reconstructed ala. The distance between the alar-facial groove and the centre of the columella (at the same horizontal plane) of both the reconstructed and the contralateral normal side were recorded. The second measurement was the thickness of the reconstructed and the normal contralateral ala.

RESULTS

All flaps survived completely. Only temporary congestion was seen in certain cases but resolved in 2 weeks. There were also no recurrences of the excised malignancies. The mean alar-base width of the reconstructed alae of group I cases was 26.8mm.; while the contralateral measurement had a mean of 21.4 mm. This represents a 5.4mm. (or a 25.2%) lateral shift of the position of the reconstructed ala when the traditional turnover nasolabial flap was used (Figs. 3,4). In group II cases the mean distance of the reconstructed side was 23.3mm. while that of the normal side was 21mm. This represents a lateral shift of only 2.3mm. (or a 10.9%) when the modified nasolabial flap was used (Table 1) (Figs. 5,6).

The alar rim thickness of the flaps of group I cases had a mean of 11.2mm. Their normal sides had a mean thickness of 7.3mm. This indicates that a mean of 3.9mm. increase in the thickness of the alar rim (53.4%) occurred when a traditional nasolabial turnover flap was used (Figs. 3,4). However, in the modified flap-presented in the current work a mean of only 1.5mm. increase in thickness was noted. This represents a 20% augmentation of the thickness of the reconstructed ala (normal side 7.5mm., reconstructed side 9mm.) (Figs. 5,6).
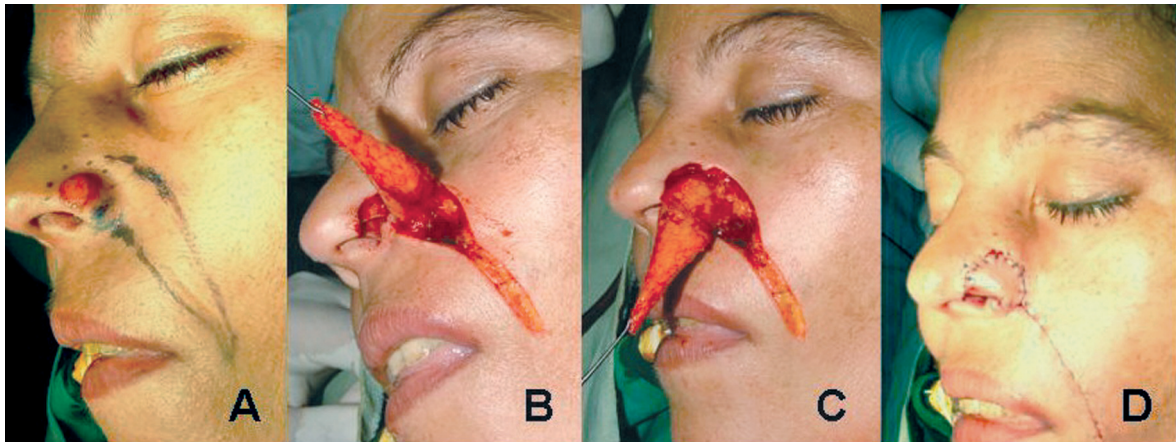
Fig. (1): The nasolabial turnover flap: (A) Design of the excision and the flap outline. (B) Raising the flap as an island on a subcutaneous pedicle. (C) Suturing the proximal part of the flap to reconstruct the nasal lining. (D) The distal part of the flap turned on the proximal part to reconstruct the external surface.

Fig. (2): The modified nasolabial turnover flap: After thinning of the flap, a subcutaneous tunnel is created between the base of the flap and a 4mm. incision over the anterior nasal spine. A 2/0 Prolene suture is placed between the dermis of the reconstructed ala and the soft tissue covering of the anterior nasal spine.
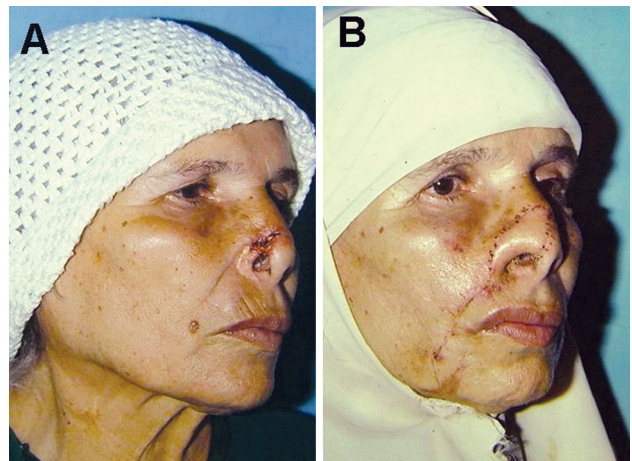

Fig. (3): Case number 2 (56 years female, Group I): (A) Preoperative and (B) postoperative result of the reconstructed right ala by the traditional nasolabial turnover flap with an alar-base measurement of 28mm. (normal side 20mm.) and an alar thickness of 11mm. (normal side 8mm.).

Fig. (4): Case number 4 (59 years female, Group I): (A) Preoperative and (B) postoperative result of the reconstructed right ala by the traditional nasolabial turnover flap with an alar-base measurement of 26mm. (normal side 22mm.) and an alar thickness of 11mm. (normal side 6mm.).

Fig. (5): Case number 7 (47 years female, Group II): (A) Preoperative and (B) postoperative result of the reconstructed left ala by the modified nasolabial turnover flap with an alar-base measurement of 22mm. (normal side 20mm.) and an alar thickness of 8mm. (normal side 6mm.).

Fig. (6): Case number 10 (92 years female, Group II): (A) Preoperative and (B) postoperative result of the reconstructed right ala by the modified nasolabial turnover flap with an alar-base measurement of 26mm. (normal side 24mm.) and an alar thickness of 9mm. (normal side 8mm.).

Table (1): Results of the measurements of the alar-base width and the alar-rim thickness in all cases: Group I (cases 1-5) and Group II (cases 6-11).

Case Number	Age (years)/ Sex	Alar-Base Width		Alar-Rim Thickness	
		Normal	Flap	Normal	Flap
1	67 F	21 mm.	26 mm.	7 mm.	10 mm.
2	56 F	20 mm.	28 mm.	8 mm.	11 mm.
3	71 M	24 mm.	29 mm.	9 mm.	12 mm.
4	59 F	22 mm.	26 mm.	6 mm.	11 mm.
5	86 F	20 mm.	25 mm.	7 mm.	12 mm.
6	53 M	23 mm.	26 mm.	9 mm.	10 mm.
7	47 F	20 mm.	22 mm.	6 mm.	8 mm.
8	64 M	22 mm.	25 mm.	7 mm.	9 mm.
9	49 M	19 mm.	21 mm.	9 mm.	10 mm.
10	92 F	24 mm.	26 mm.	8 mm.	9 mm.
11	51 F	18 mm.	20 mm.	6 mm.	8 mm.

DISCUSSION

The turnover medial-based nasolabial flap was first described by Pers in 1967 [4] and later by Herbert in 1976 [5]. Their flap was based on the superior labial artery and was used to reconstruct full-thickness defects of the nasal alae. In these original techniques, the authors used an additional cheek flap to close the donor defect of the raised nasolabial flap. This resulted in additional scarring in the cheek region. Spears et al., in 1987 [6] modified the technique by raising a long island flap based on the subcutaneous tissue containing the connections of various vascular systems. The rich anastomoses, between the facial artery, the infraorbital artery (external carotid) and the dorsal branch of the ophthalmic artery (internal carotid), is believed to be the cause of the extraordinary viability of the flap. These long flaps allowed primary closure without the need of an additional cheek flap. The authors also reported that the alar margin was well supported by the two-layer fold of the flap and that the need of a structural support (cartilage) was eliminated. This fact is in accordance with the work of Iwao in 2005 [9] where he noted that a cartilage graft produced less support to the alar rim than a folded nasolabial flap. Spears et al. [6] however reported a 50% rate of revisional surgery to reduce the bulk of the ala and to seat the alar side wall in a more medial location. This fact was also noted in the current study. Cases of group I (traditional flaps) had thick alae and wide distances between the alar-facial groove and the midline, compared to the normal contralateral part.

A modification of the previous technique was published by Hauben and Sagi in 1987 [7]. They added a small flap from the remaining lateral ala to support the nasolabial flap-base and prevent its lateral shift. Although a natural alar groove with no revisions was reported, yet this modification required the presence of a sizable portion of the lateral ala unaffected by the excisional surgery. In the current study, the lateral shift of the alar was reduced by applying sutures to the anterior nasal spine. Remnant of the lateral ala was not needed to perform this task. In addition, comparison of the degree of lateral shift was done objectively between the traditional and the modified technique. The lateral shift was reduced from 5.4mm. to 2.3mm., when the sutures were used. In addition, the flap circulation was not affected by these sutures.

Based on the robust blood supply of this flap, several authors have suggested primary thinning of the flap to reduce the thickness of the reconstructed ala [5-7]. However, this was not published nor evaluated by numerical values. In the current work, flap thinning was performed primary and led to a reduction, in the increased thickness of the reconstructed ala, from 3.9 to 1.5mm. In addition, no interference with flap circulation was noted with the thinning.

In conclusion, the two modifications presented in the current work offered improvements in the results of the turnover medially-based nasolabial flap with no affection of the flap circulation.

REFERENCES

1- Barlow R.J. and Swanson N.A.: The nasolabial interpolated flap in reconstruction of the nasal ala. J. Am. Acad. Dermatol., 36: 965, 1997.

2- Millman B. and Klingensmith M.: The island rotation flap: A better alternative for nasal tip repair. Plast. Reconstr. Surg., 98: 1293, 1996.

3- Barron J.N. and Saad M.N.: Subcutaneous Pedicle Skin Flaps. In B. Strauch, L.O. Vasconez and E.J. Hall-Findlay (Eds.), Grabb's Encyclopedia of Flaps 2nd. edition. Philadelphia: Lippincott-Raven, pp 167-173, 1998.

4- Pers M.: Cheek flaps in partial rhinoplasty. Scand. J. Plast. Surg., 1: 37, 1967.

5- Herbert D.C.: A subcutaneous pedicled cheek flap for reconstruction of alar defects. Br. J. Plast. Surg., 31: 79, 1978.

6- Spears S.L., Kroll S.S. and Romm S.: A new twist to the nasolabial flap for reconstruction of lateral alar defects. Plast. Recontr. Surg., 79: 915, 1987.

7- Hauben D.J. and Sagi A.: A simple method for alar rim reconstruction. Plast. Reconstr. Surg., 80: 839, 1987.

8- Gruber R.P., Wall S.H. and Kaufman D.: Open Rhinoplasty: Concepts and Techniques. In S.J. Mathes (Ed.), Plastic Surgery 2nd edition. Philadelphia: Saunders-Elsevier, Vol. 2 pp 473-516, 2006.

9- Iwao F.: Alar reconstruction with subcutaneous pedicled nasolabial flap: Difficulties, considerations and conclusions for this procedure. Dermatol. Surg., 31: 1351, 2005.