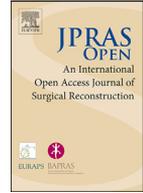




Contents lists available at ScienceDirect

JPRAS Open

journal homepage: www.elsevier.com/locate/jpra



Extended rotation flap for reconstruction of partial thickness defects of the tip and nasal ala region: in search of better aesthetic results

Annachiara Cavaliere*, Barbara Maisto, Tatiana Zaporozhan, Ludovica Giordano, Luigi Sorbino, Antonio Zaffiro, Amalia Vozza, Simone La Padula, Francesco D'Andrea, Fabrizio Schonauer

Department of Plastic and Reconstructive Surgery, Federico II University Hospital, Via Pansini 5, Napoli, Italy

ARTICLE INFO

Article history:

Received 15 January 2021

Accepted 7 May 2021

Available online 21 May 2021

Keywords:

Nose reconstruction

Basal cell carcinoma

Nose flap

Aesthetic reconstruction

ABSTRACT

Background: Basal cell carcinoma is the most common non-melanoma skin cancer of the nose. Defects of the nasal ala and tip region are among the most difficult to repair due to their intrinsic characteristics.

Objective: To present our experience with the extended rotation flap for reconstruction of nasal ala defects and evaluate the outcome using the Patient and Observer Scar Assessment Scale (POSAS).

Methods and Materials: Twenty-two patients with partial thickness nasal ala defects reconstructed using the extended rotation flap were assessed. Final cosmetic and functional outcomes were evaluated using the POSAS.

Results: Flaps survived in all the reported cases and no major complication was recorded. Histology showed complete excision of the tumour in all cases. Using the POSAS, the mean overall evaluation for patients was 1.8/10, while the mean overall evaluation for the evaluation panel was 2.2/ 10.

* Corresponding author.

E-mail address: annachiaracavaliere@yahoo.it (A. Cavaliere).

Conclusion: Although similar flaps have been previously described, the extended rotation flap for nasal ala and tip reconstruction represents a functionally and cosmetically appealing wound closure option, respecting and avoiding any distortion of the alar crease.

© 2021 The Authors. Published by Elsevier Ltd on behalf of British Association of Plastic, Reconstructive and Aesthetic Surgeons. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Defects of the nasal ala and tip region are among the most difficult to repair due to the reduced mobility and unique features of their thick and sebaceous skin.^{1,2} Key structures in this area are the lower lateral cartilage and the alar lobule. The alar lobule consists of three layers: external skin, muscle, and vestibular skin; dilator naris anterior and dilator naris posterior muscles provide the volume. The lower lateral cartilage is not part of the alar lobule and does not transverse the alar groove.³ This delicate structure is particularly susceptible to distortion during reconstructive surgery due to the lack of an intrinsic cartilaginous skeleton and the complete absence of support at its distal free margin. An intact nasal lining and a correct position of the ala after reconstruction guarantee proper function of the external nasal valve, a critical path for airflow during inhalation.³

Local nasal flaps represent a highly effective option for distal nose defect reconstruction, providing tissue with the same characteristics of the surrounding healthy tissue.⁴ Main objectives in nasal ala/tip reconstruction are local tissue match, respect of the alar groove and an indiscrete scar. With these targets in mind, we performed the extended rotation flap on 22 nasal alar and tip defects after basal cell carcinoma excision.

Patients and methods

Written informed consent for research publication of patient-related data was obtained from each patient. All the patients included in this study were referred to us with a dermoscopic diagnosis of basal cell carcinoma, mostly nodular. Patients were marked before local anaesthetic infiltration. Patient's surrounding skin laxity was assessed before outlining skin margins. Excision markings were incorporated within a triangle with the apex pointing towards the flap pivot point and its inferior side parallel to the alar rim. An ipsilateral rotation flap was drawn including the entire nasal ala, with the convex edge of the flap measuring three to four times the length of the base of the defect triangle. (Fig 1) The flap was incised and harvested dissecting it in a plane ending just above the perichondrium of the alar cartilage; accurate bipolar haemostasis was obtained. Lastly, the flap was rotated into place and secured with one or two 5/0 Vicryl subcutaneous sutures to distribute the tension; flap inset was completed with 6/0 Nylon cutaneous sutures. (Fig 2)

Standardized photographs were taken before the surgery, immediately after the surgery and during the follow-up to evaluate the clinical outcomes. (Fig 3)

Reconstructive and aesthetic outcomes were assessed by photographic examination of the patients using the Patient and Observer Scar Assessment Scale (POSAS Version 2.0).^{5,6,7} The POSAS evaluation scale consists of two separate questionnaires, one for the surgeon and one for the patient itself.⁷ To obtain a more objective evaluation we submitted the questionnaire to an evaluation panel, composed of three independent surgeons. POSAS evaluation questionnaires were subjected to the patients and to the evaluation panel one year after surgery. The two questionnaires evaluated different aspects of the scar: pain, itching, colour, stiffness, thickness, and irregularity were rated by patients, while vascularity, pigmentation, thickness, relief, pliability, and surface were rated by surgeons. The evaluation scale ranged from 1 (scar exactly like normal skin) to 10 (the worst scar imaginable).⁷ Mean values and standard deviations were calculated for each patient and evaluation panel variable. The SPSS sta-



Fig 1. Basal cell carcinoma of the right nasal ala. Planning of the extended rotation flap.



Fig 2. Flap has been rotated into the defect.

tistical program was used for data analysis. Differences between the scores assigned independently by each surgeon of the evaluation panel were evaluated using the F-Test.

Results

Between 2014 and 2018, a total of 22 patients (13F, 9M) were reconstructed with the extended rotation flap. The mean patient age was 67 (range 50-80). All the lesions excised were confirmed as nodular basal cell carcinoma with clear margins of resection at definitive histological examination. A 2-3 mm predetermined margin of clinically normal tissue was given for each lesion.^{8,9} Surgical defect diameter ranged from 1 to 1.9 cm; the defect location was the nasal ala in 15 patients and the tip area in 7. In 18 patients, the tumour involved only skin and subcutaneous tissue; in 4 patients, exci-



Fig 3. Nine-month follow-up of the reconstructed nasal ala, showing good healing.



Fig 4. Basal cell carcinoma of the right nasal ala. Planning of the expected defect and extended rotation flap.

Table 1

Patients' Scar Assessment Scale results.

	Range	Mean	Median	Standard Deviation
Pain	1 – 3	1.23	1.00	0.53
Itching	1 – 2	1.27	1.00	0.46
Colour	1 – 4	1.77	1.50	0.97
Stiffness	1 – 2	1.45	1.00	0.51
Thickness	1 – 5	2.18	2.00	1.01
Irregularity	1 – 5	1.68	1.00	1.21
Overall evaluation	1 – 4	1.82	2.00	0.96

sion included part of the underlying cartilage. Flaps survived in all reported cases. No major complications were recorded. The mean follow-up was 1.5 years, and no patient showed tumour recurrence at follow-up.

Good alar shape was maintained and aesthetic outcome was deemed to be satisfactory to optimum by all the patients with well-healed scars and maintained nasal alar groove. (Fig 4, 5, 6, 7) Mean overall evaluation by patients was $1.8/10 \pm 0.96$ (range 1-4) (Table 1), while mean overall evaluation by the surgeons' panel was $2.2/10 \pm 1.28$ (range 1-7) (Table 2).



Fig 5. One-year follow-up of the reconstructed nasal ala, showing satisfactory results.



Fig 6. Basal cell carcinoma of the nasal tip area. Planning of the surgical excision and extended rotation flap.



Fig 7. Fourteen-month follow-up of the reconstructed nasal ala, showing well-concealed scars.

Table 2
Observers' Scar Assessment Scale results.

	Range	Mean	Median	Standard Deviation
Vascularization	1 – 4	1.74	1.66	0.69
Pigmentation	1 – 5	1.92	1.66	0.93
Thickness	1 – 4	2.06	2.17	0.67
Relief	1 – 4	1.94	2.00	0.72
Pliability	1 – 4	1.84	1.66	0.53
Surface	1 – 4	2.84	1.83	0.83
Overall evaluation	1 – 7	2.20	1.66	1.28

Table 3
F-Test results.

	F	Significance Level	
Vascularization	1.000	p = .376	NS
Pigmentation	8.761	p = .001	**
Thickness	0.870	p = .426	NS
Relief	1.830	p = .173	NS
Pliability	3.367	p = .044	*
Surface	3.955	p < .027	*
Overall evaluation	4.955	p < .012	*

NS: Not Significant,

** : p < .05.

* : p < .01.

The F-Test showed concordance between the scores given by the three independent surgeons for pigmentation (F = 8.761; p = .001), pliability (F = 3.367; p < .05), surface (F = 3.955; p < .05) and overall evaluation (F = 4.955; p < .05). Also, concordance was found comparing the evaluation panel's overall evaluation score with the overall evaluation score given by the patients (F = 9.755; p < .001) (Tab. 3).

In one female patient, the basal cell carcinoma (BCC)-related defect involved the right alar rim; in this patient, minimal notching of the nasal ala was present after reconstruction; this complication settled with time and patient did not request surgical revision.

Discussion

Many rotation flaps have been described to reconstruct the nasal ala. Winton et al. described a rotation flap similar to our extended rotation flap, with the difference that their flap base was oriented superiorly on the nasal sidewall with a small range of mobility.¹⁰ Neltner et. al described a rotation flap involving the whole nasal ala suitable for small defects of the posterior third of the nasal ala. Nevertheless, with this flap, to avoid an unpleasant dog ear, a small section of the alar rim should be excised, thus leading to a noticeable narrowing of the nostril with mild breathing function impairment.²

Humphreys proposed a spiral flap for small defects (<1 cm) of the mid third of the nasal ala to minimize any alar distortion; flap scars' trap-door deformity may occur with the spiral flap.¹¹ Recently, also an island V-Y advancement flap, based on the "levator alae nasi" muscle, has been proposed for nasal alar and tip region reconstruction.¹²

Our extended rotation flap differs from other published flaps because it extends beyond the nasal ala boundaries, including part of the cheek skin: with an accurate flap planning, keeping in mind the nasal subunit principle¹³, this flap leaves intact the alar crease thus respecting the nasal ala subunit. It is suitable for defects with a diameter > 1 cm up to 2 cm, localized in the anterior two thirds of the nasal ala and tip. Because of its wide base, the flap skin is adequately distributed avoiding distortions of the nasal ala; trapdoor deformity is unlikely to occur.⁴ Dog ears, often a problem in transposition or rotation pedicled flaps, have not been experienced, and no narrowing of the nostril was observed.

However, this flap should be avoided for defects that involve the alar rim due to the consistent risk of alar notching.

Conclusion

Although similar flaps have been previously described, the extended rotation flap represents a functionally and cosmetically appealing option for tip and nasal ala reconstruction, respecting the nasal subunit principle.

Funding

The authors received no funding for this research.

Ethical approval

N/a

Written informed consent for research publication of patient-related data and photos was obtained from each patient.

Declaration of Competing Interest

The authors declare that they have no conflict of interest..

Acknowledgements

This paper has been English language edited by Juliet Ippolito, B.A., MPhil

This paper has been presented at SICPRE 2019 congress held in Palermo (IT), September 26-28, 2019.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.jpra.2021.05.004](https://doi.org/10.1016/j.jpra.2021.05.004).

References

1. Driscoll BP, Baker SR. Reconstruction of nasal alar defects. *Arch Facial Plast Surg*. 2001 Apr-Jun;3(2):91–99.
2. Neltner SA, Papa CA, Ramsey ML, Marks VJ. Alar rotation flap for small defects of the ala. *Dermatol Surg*. 2000 Jun;26(6):543–546.
3. Bloom JD, Ransom ER, Miller CJ. Reconstruction of alar defects. *Facial Plast Surg Clin North Am*. 2011 Feb;19(1):63–83.
4. Jacobs MA, Christenson LJ, Weaver AL, Appert DL, Phillips PK, Roenigk RK, Otley CC. Clinical outcome of cutaneous flaps versus full-thickness skin grafts after Mohs surgery on the nose. *Dermatol Surg*. 2010;36(1):23–30.
5. Van de Kar AL, Corion LU, Smeulders MJ, Draaijers LJ, van der Horst CM, van Zuijlen PP. Reliable and feasible evaluation of linear scars by the Patient and Observer Scar Assessment Scale. *Plast Reconstr Surg*. 2005 Aug;116(2):514–522.
6. Raklyar E, Zloty DM. Use of a patient and observer scar assessment scale to evaluate the V-Y advancement flap for reconstruction of medial cheek defects. *Dermatol Surg*. 2012 Dec;38(12):1968–1974.
7. Vercelli S, Ferriero G, Bravini E, Stissi V, Ciceri M, Rossetti S, Bianchi S, Sartorio F. Cross-cultural adaptation, reproducibility and validation of the Italian version of the Patient and Observer Scar Assessment Scale (POSAS). *Int Wound J*. 2017 Dec;14(6):1262–1268.
8. Peris K, Fagnoli MC, Garbe C. Diagnosis and treatment of basal cell carcinoma: European consensus-based interdisciplinary guidelines. *Eur J Cancer*. 2019 Sep; 118:10–34.
9. Gulleth Y, Goldberg N, Silverman RP, Gastman BR. What is the best surgical margin for a basal cell carcinoma: A meta-analysis of the literature. *Plastic and Reconstructive Surgery*. 2010;126(4):1222–1231.
10. Winton GB, Salasche SJ. Use of rotation flaps to repair small surgical defects on the ala nasi. *J Dermatol Surg Oncol*. 1986 Feb;12(2):154–158.
11. Humphreys TR. Use of the "spiral" flap for closure of small defects of the nasal ala. *Dermatol Surg*. 2001 Apr;27(4):409–410.
12. La Padula S, Abbate V, Di Monta G, Schonauer F. Levator alae nasi muscle V-Y island flap for nasal tip reconstruction. *J Cranio-Maxillofac Surg*. 2017 Mar;45(3):432–435.
13. Burget GC, Menick FJ. The Subunit Principle in Nasal Reconstruction. *Plast Reconstr Surg*. 1985 Aug;76(2):239–247.