
The AIRNS flap: An alternative to the bilobed flap for the repair of defects of the distal nose

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Background: Defects of the distal nose and nasal tip are inherently challenging to reconstruct. Although the bilobed flap has a pivotal role for the closure of such defects to achieve a satisfactory outcome, it demands meticulous planning and execution.

Objective: We sought to present our experience of the advancement and inferior rotation of the nasal sidewall (AIRNS) flap as a possible alternative to the bilobed flap for reconstruction of the distal nose.

Methods: All patients who underwent AIRNS repair after Mohs tumor extirpation of the nose at 2 regional skin cancer units since April 2011 were reviewed.

Results: In all, 45 patients underwent the AIRNS flap repair. There were 25 men and 20 women, with a mean age of 70 years (range 41-88). The average defect size was 1.2 × 1.2 cm. The majority of cases involved the nasal tip. A single case of postoperative infection occurred in a smoker, which resolved without any long-term sequelae. No cases of flap necrosis or nasal airflow obstruction were seen. All cases produced good or excellent cosmetic results.

Limitations: Because of blunting of the superior alar crease, which may be avoided in a bilobed repair, the AIRNS flap is best avoided in laterally based defects of the nasal alar.

Conclusions: The AIRNS flap is a reliable, single-stage closure option that, in our opinion, is simpler in design and execution compared with the bilobed flap and thus adds to the reconstructive surgeon's armamentarium when faced with centrally located defects of the distal nose. (J Am Acad Dermatol 2012;67:712-6.)

Key words: advancement rotation flap; bilobed flap; distal nose repair; local nose flap; Mohs micrographic surgery; nasal reconstruction.

Skin cancer on the nasal tip and distal nose are common. Consequently, the repair of defects at this aesthetically important site is frequently encountered by the reconstructive surgeon. Numerous flaps have been reported for the repair of such defects, however, there is little doubt that the bilobed flap remains the workhorse flap for small to medium defects of the distal nose.

Originally proposed by Esser,¹ the modification in design by Zitelli² in his seminal work in the late 1980s

is arguably one of the most significant developments in nasal reconstructive techniques in recent decades. Despite this modification, the bilobed flap still demands meticulous planning and execution to achieve optimal functional and aesthetic outcomes. In this article, we report our experience of an advancement rotation flap that appears to have been overlooked in the modern surgical literature. We discuss the advancement and inferior rotation of the nasal sidewall (AIRNS) flap as a direct and

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perhaps simpler alternative to the bilobed flap for reconstruction of the distal nose.

METHODS

Fig 1, A, illustrates a 1.8- × 1.4-cm Mohs micrographic surgical defect after extirpation of a recurrent basal cell carcinoma. Given the site and orientation of the defect, a bilobed flap would perhaps be the repair option of choice for most reconstructive surgeons. An alternative we propose is the AIRNS flap.

The AIRNS flap is a random pattern, single-stage closure option, using the principles of advancement and rotation in its design, best suited for horizontally orientated defects of the distal nose. The primary arc of rotation in an AIRNS flap mirrors that seen in a Zitelli bilobed flap repair. The arc must be long enough to encompass the height of the surgical defect within its design. At the junction of the nasal sidewall and cheek, this arc is then linked to an advancement limb. Critical in the design of the AIRNS flap is that the width of the advancement limb (the base of the triangle) approximates the vertical height of the surgical defect.

The flap is incised as shown and elevated in a subnasalis plane. Undermining is performed as lateral on the cheek as is necessary to enable a tension-free closure, usually to the nasojugal fold. After meticulous hemostasis, the primary stitch—an absorbable buried vertical mattress suture, orientated parallel to the free margins of the ipsilateral lower cutaneous eyelid and alar—advances the flap from the cheek to the nasal sidewall as shown. The redundant Burrow triangle created during this movement may be excised at this point or later if preferred.

The aforementioned primary advancement of the flap offsets the secondary defect created during the subsequent inferior rotation that follows. Thus by ensuring the advancement limb approximates the height of the original surgical defect, it ensures the flap does not fall short, placing the free margin of the ipsilateral alar at risk of elevation. The remainder of the flap is sutured in a standard fashion and the distal standing cutaneous deformity produced during the flap's inferior rotation removed along the alar crease as shown. (In practice, however, we prefer to remove this tricorne earlier to facilitate flap movement.)

RESULTS

Since April 2011 the AIRNS flap has been performed on 45 patients at 2 regional Mohs referral centers (Leeds, United Kingdom [W. H.], and Tauranga, New Zealand [J. H. and P. S.]). There were 25 men and 20 women, with a mean age of 70 years (range 41-88). The average defect size was 1.2 × 1.2 cm. The overwhelming majority of cases involved the nasal tip or the lower nasal dorsum. A single case of postoperative infection occurred in a smoker, which settled without any adverse results after early initiation of oral antibiotics. No cases of flap necrosis or nasal airflow obstruction were seen. All cases without exception produced good or excellent cosmetic results.

DISCUSSION

The nose is the central focal point of the face and any irregularities after its repair are readily apparent to an observer. The aesthetic reconstruction of nasal tip defects thus remains a challenge for the reconstructive surgeon.

Over the years numerous techniques have been advocated to optimize the outcomes of surgical reconstruction at this site.³⁻⁹ Indeed, the role of the myocutaneous island pedicle flap for the aesthetic repair of distal nasal defects has certainly been advocated as an attractive option, providing the reconstructive surgeon with a highly efficient flap that, like the AIRNS and bilobed flaps, respects the principles of cosmetic subunit repair and enables all the principles of tissue match to occur.¹⁰

Although Zitelli's modification of the bilobed flap remains a robust and widely adopted closure technique for the distal nose, because of the potential consequences of individual suboptimal flap design and execution^{11,12} (eg, pincushioning, alar displacement, airflow obstruction), numerous adjustments ensuring its correct design have been proposed.¹³⁻¹⁷

The AIRNS flap is an attractive single-stage alternative to the bilobed flap for the repair of defects of the distal nose. Like the bilobed flap, the AIRNS flap transfers skin and soft tissue, in a rotational fashion, from the reservoir of the upper nasal sidewall/cheek to the inelastic region of the nasal tip where it is required. By virtue of its design, however (ie, a rotation limb linked to an advancement limb), we

CAPSULE SUMMARY

- Distal nose defects are challenging to reconstruct with the bilobed flap considered the workhorse flap for such defects.
- We present the advancement and inferior rotation of the nasal sidewall (AIRNS) flap as a direct alternative to the bilobed flap for centrally located defects of the distal nose.
- The simple design and execution makes the AIRNS flap a reliable and attractive option for the single-stage aesthetic repair of defects of the distal nose.

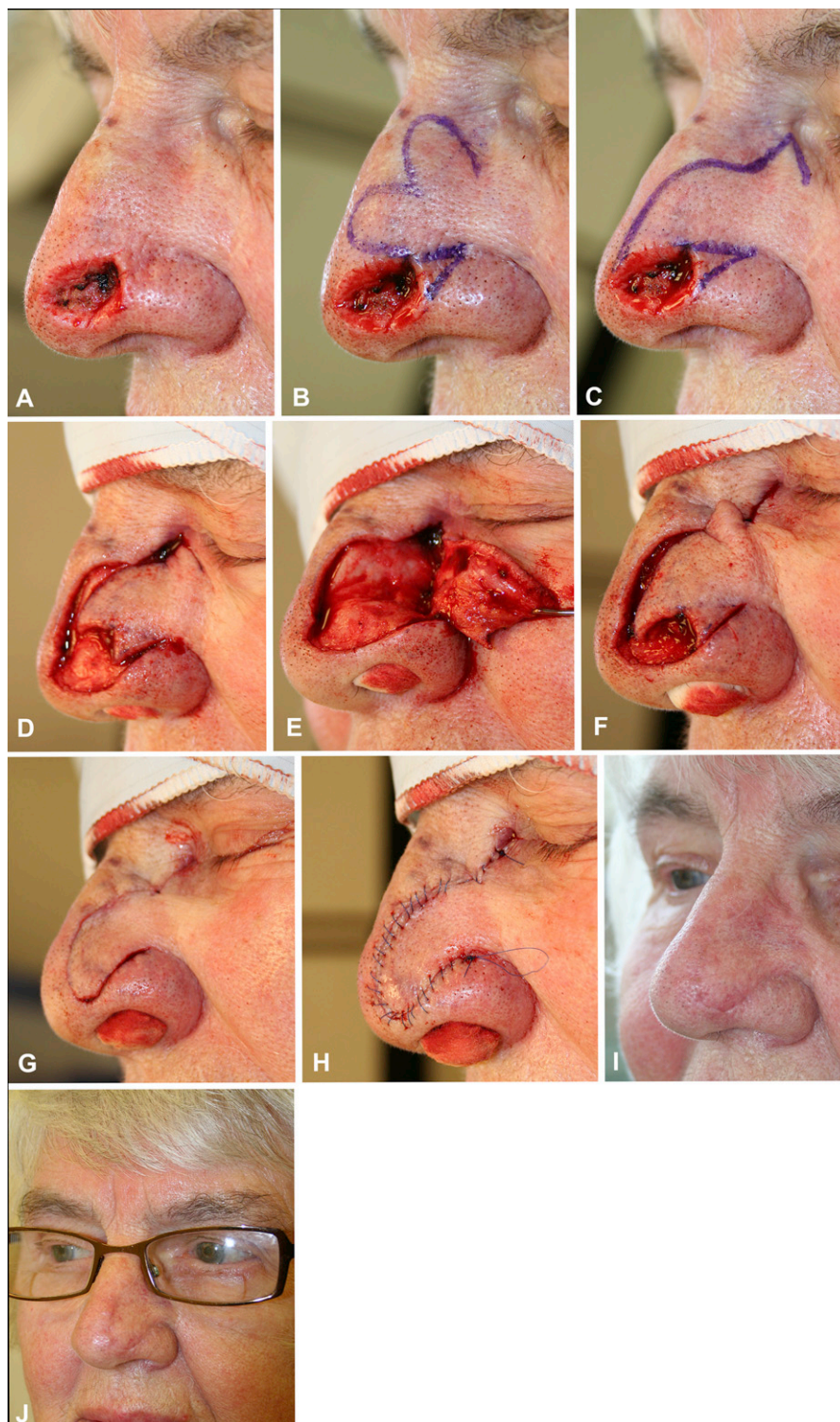


Fig 1. **A**, Defect (1.4 × 1.8 cm) of left nasal tip after Mohs tumor extirpation of a recurrent basal cell carcinoma. **B**, Design of a laterally based bilobed flap for defect repair. **C**, Design of the advancement and inferior rotation of nasal sidewall (AIRNS) flap for repair of same defect. Note how the flap's rotational arc encompasses the surgical defect size before its linkage to an advancement limb at the upper nasal sidewall/cheek junction. Importantly, the advancement limb width (ie, triangle base) approximates the surgical defect height as this offsets the secondary defect created during the flap's inferior rotation. **D**, The flap is incised. The freeing of the inferior aspect of the tricone along the alar crease at this stage facilitates flap movement.

believe the design and subsequent execution of the AIRNS flap is simpler than that of the bilobed.

By replacing the defect with neighboring skin, all the inherent benefits of tissue match that occur with a local flap are seen. In our experience there is also less of a tendency for the flap to pincushion (although we acknowledge that in a bilobed flap this is most likely a result of suboptimal execution and poor suturing technique as opposed to the flap's inherent design^{18,19}). Furthermore, in the AIRNS flap no delicate tip stitches are required thus contributing to its simplicity.

Although the AIRNS flap was developed independently by the author (W. H.) as an alternative to the bilobed flap, a review of the surgical literature revealed that the flap had actually been advocated more than 50 years ago. The first report of an "advancement-rotation" flap being used for defects of the distal nose came from Erich²⁰ in 1949 and subsequently Figi and Foss²¹ a decade later. In 1974, Hagerty and Rambo²² highlighted the flap's use in a large series of patients. Since then however, it appears to have been overlooked in the reconstructive literature. The principle of linking 2 different flaps (as seen in the AIRNS repair), in the form of a combined nasal transposition and melolabial flap, has however been previously reported for nasal reconstruction.²³

Snow²⁴ produced an excellent article on the use of rotation flaps for distal nose defects. The advantage of the AIRNS flap over a single-limb rotation is that as the rotational arc is much shorter in length (because it is linked to an advancement limb at the nose/cheek junction), the incision line may be offset from the central nose much sooner than in a single-limb rotation, enabling better concealment of the final scar.

Although a laterally based AIRNS flap has become our closure option of choice for appropriate defects of the distal nose there are circumstances where a bilobed flap remains a better reconstructive option. For example, in lateral defects involving the ala, a medially based AIRNS flap will efface the aesthetically important alar-cheek sulcus and thus a medially based bilobed flap that "skips" this vitally important cosmetic sulcus is preferable. In addition, the alternating scar line of a bilobed flap may on occasions be better

concealed than the single curvilinear scar associated with an AIRNS flap.

CONCLUSION

Aesthetic reconstruction of the nasal tip remains a challenge for the reconstructive surgeon. Numerous options exist for repairing such defects and it is up to the surgeon to decide which of these will provide the best results for their individual patient. The AIRNS flap is a reliable, single-stage closure option that may be used and thus adds to the reconstructive surgeon's armamentarium when faced with defects of the distal nose.

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E, The flap is dissected in a subnasalis plane, usually as far as the nose/cheek junction. **F**, First stitch (buried vertical mattress suture) advances the flap as shown. The Burow triangle is subsequently removed. **G**, A second buried stitch encourages the flap's inferior rotation and approximates the flap along the alar crease. The standing cutaneous deformity along the alar sulcus is excised and the flap tip is trimmed to conform to size. The remainder of the flap is sutured according to the rule of halves. Results immediately at: closure (**H**), 4-week follow-up (**I**), and 4 months (**J**).

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