



Case Series

Broadening the scope and utility of the triple advancement flap in Mohs surgery

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ABSTRACT

The triple advancement flap has traditionally been used on the trunk, but gained popularity for facial defects of the neck and temple. Advantages of this closure technique include evenly dispersed tension vectors, less need for extensive subcutaneous undermining and mobilization compared to standard facial reconstruction techniques. The nasal sidewall, root, and bridge often pose reconstructive challenges, with convergence of competing tension lines and surrounding anatomic landmarks. Our purpose is to introduce, describe, and illustrate application of the triple advancement flap for reconstruction of the nasal sidewall, bridge, and root. A triple advancement flap employs aspects of a purse-string closure and an advancement flap. Burow's triangles are excised from three equidistant points of a round defect. Tissue undermining is encouraged. A purse-string suture is used to approximate flap edges together along three tension lines. The central defect is subsequently allowed to heal either by secondary intention or with application of a Burow's graft. When applied appropriately, the triple advancement flap can provide pleasing cosmetic and functional results in areas that have traditionally posed a reconstructive challenge. This new application broadens the scope of the triple advancement flap and provides reconstructive surgeons with an additional tool when approaching nasal root, bridge, or sidewall defects.

Keywords: Mercedes flap, Mohs, Nasal bridge, Nasal root, Reconstruction, Triple advancement, Tripolar flap

INTRODUCTION

Surgical defects located near prominent facial landmarks restrict repair options, as minor tension can lead to distortion of anatomy. Reconstruction involving the nasal bridge, nasal root, and nasal sidewall is notoriously challenging. We highlight a novel use of the triple advancement flap (TAF) within these regions, which has not been previously reported.

Surgical defects within the nasal root and sidewall often pose reconstructive conundrums, given convergence of tension lines and nearby cosmetic units prone to distortion under excessive tension.¹ Borders of these regions are defined superiorly by the medial and inferior edge of the brow and glabella, inferiorly by the alar crease, laterally by the canthus and cheek, and medially by the nasal bridge.²

Linear closures and flaps involving manipulation of tissue orientation can lead to ectropion or flaring of the nasal ala.²

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First described by *Tamir et al* for closure of round defects of the temple and neck, the TAF, a combination of an advancement flap and a purse string closure, distributes tension along three vectors, thereby minimizing distortion to surrounding anatomical units.³ Its use in dermatologic surgery has expanded to high tension regions, including the heel, malleolar and shoulder regions, and facial defects on the temple and intercanthal region^{1,4,5} We report three cases demonstrating successful nasal bridge, root, and sidewall defect reconstruction via the TAF following Mohs Micrographic Surgery (MMS).

CASE SERIES

A 49-year-old female with a basal cell carcinoma (BCC) on the left nasal bridge underwent MMS resulting in a 2.0 cm defect. A TAF was used for repair and three Burow's triangles were oriented to minimize tension on adjacent structures. Approximation of tissue occurred via absorbable subcutaneous 5-0 polyglactin and cutaneous 6-0 gut sutures. At her one-week follow up, she was healing well with no distortion of all adjacent facial structures (left eyebrow, left ala, left medial canthus).

A 61-year-old female with a squamous cell carcinoma (SCC) on the right nasal root and a squamous cell carcinoma *in situ* (SCCis) on the right upper eyelid, underwent MMS of both



Figure 1: (a) Right nasal root and upper eyelid defects resulting from Squamous Cell Carcinoma (SCC) and Squamous Cell Carcinoma *In Situ* (SCCis), respectively. Black lines represent Burow's triangles; white dotted lines demonstrate approximate locations of initial key suture placement. (b) Immediate postoperative with small residual defect left to heal by secondary intention; no ectropion or medial eyebrow pull. (c) Three years' postoperative, well-camouflaged scar with no anatomic distortion of surrounding structures.

lesions, resulting in a 2.9 cm combined defect [Figure 1a]. In order to prevent ectropion and medial eyebrow pull, a TAF helped evenly distribute tension and repair the broad defect. A small portion centrally was allowed to heal by second intention to avoid further tension on the lid and canthus [Figure 1b]. At her 1-week follow-up, she was healing well. At a routine dermatology appointment 3 years after surgery, she was noted to have no anatomic distortion of the lid, canthus, or nose and well camouflaged scar [Figure 1c]. The TAF proved to be an excellent yet simple repair choice for regions involving multiple defects near surrounding anatomic structures.

A 79-year-old male, with an SCCis on the right nasal sidewall, underwent treatment with MMS, resulting in a 1.6 cm defect. Despite undermining wound edges in all directions, apposition with a linear closure could not be obtained without significant tension and distortion of adjacent tissue and anatomic structures, including the ala. The TAF reoriented and spread tension across 3 flap arms, thus avoiding anatomic distortion and other complications occasionally seen with transposition flaps, (e.g. pincushioning).

A 90-year-old male, with a BCC on the right nasal sidewall, underwent MMS, leading to a 2.0 x 2.5 cm defect [Figure 2a]. With the defect's long axis lying near the right medial canthus, a TAF was elected, as a linear repair would cause tension and distortion of adjacent tissue and anatomic structures (lower eyelid and right ala). Three Burow's triangles were oriented to avoid ectropion or elevation of the ala [Figure 2b]. Subcutaneous and epidermal tissues were approximated and Steri-strips were used for further tension



Figure 2: (a) Right nasal sidewall defect, resulting from treatment of Basal Cell Carcinoma (BCC). Black lines represent Burow's triangles; white dotted lines demonstrate approximate locations of initial key suture placement. (b) Immediate postoperative, no ectropion noted. (c) Eleven-month postoperative photo for 90-year-old man.

and edge approximation. At the patient's 1 week follow-up, he was pleased with the aesthetic results and his original anatomic landmarks were preserved. He was later seen for an ophthalmology visit 11 months after his MMS, and expressed satisfaction with the faint scar and intact surrounding structures [Figure 2c].

DISCUSSION

The TAF, also known as the tripolar advancement flap, three-point advancement flap, or Mercedes flap, is an excellent reconstruction technique for facial defects that may result in distortion of facial anatomic structures via other common repair methods. Although limited, the current literature suggests use of the TAF for large defects on the body, extremities, and scalp, with select reports on the temple and forehead.^{4,5} We believe this flap to be an underutilized, easy-to-perform closure that disperses tension vectors in different directions, requiring less extensive subcutaneous mobilization than most alternative closures.⁴

We feature a novel use of the TAF for defects located within the nasal root, bridge, or sidewall. When working close to the orbit and ala, poorly executed reconstruction can cause ectropion or inappropriate elevation of the alar rim.² Rhombic transposition flaps, island pedicle flaps, rotation flaps, and full thickness skin grafts are other commonly used repairs in this location. These reconstruction methods often involve displacement of tissue, extensive undermining, prolonged postoperative swelling and numbness, and can approximate skin with different texture and sebaceous density, and lead to undesirable aesthetic outcomes.² Despite claims that the TAF's "star-shaped" appearance may not be suitable for cosmetically sensitive areas,⁴ our series emphasizes the contrary, with excellent healing and potential for minimal scarring. As an advancement flap, the TAF relies on local tissues' vascular plexus and superficial vessels, thus not requiring assessment of a named blood supply. These qualities make it an ideal closure for dermatologic surgeons to consider for surgical defects on the nasal root and sidewall.

The TAF is a relatively simple, versatile flap with scope well beyond that currently described in the literature. We recommend broadening the utility of this flap, considering it for nasal sidewall and nasal root defects among other reconstructive options. Additionally, we believe this repair method has utility in many other facial regions and hope these cases prompt broader adaptation and additional novel locations.

CONCLUSION

The triple advancement flap is a versatile, underutilized reconstructive method on the face, which can be useful and

gives excellent cosmetic results for defects involving the nasal root, bridge, and sidewall.

Authors' Contributions

All the authors contributed to the research study. Karina M. Paci: Concepts, Design, Definition of intellectual content, Literature search, Manuscript preparation, Manuscript Editing, and Manuscript review. Lindsey J. Gaghan: Concepts, Design, Definition of intellectual content, Literature search, Manuscript preparation, Manuscript Editing, and Manuscript review. Rajat Varma: Concepts, Design, Definition of intellectual content, Literature search, Manuscript preparation, Manuscript Editing, and Manuscript review.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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