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Surgery

The three-stage Forehead Flap: A Gold Standard in Nasal Reconstruction

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Abstract **Original Research Article**

The causes of nasal defects are dominated by skin tumors; surgical excision of these tumors sometimes leaves a large skin defect, which represents a challenge to the plastic surgeon for reconstruction. In this article, we will describe from a clinical case, the particularities of the three-stage forehead flap in nasal reconstruction as described by F. Menick, and we compare it with the classic technique in terms of aesthetic result.

Keywords: Nasal Reconstruction, Forehead Flap, Nose Defect.

INTRODUCTION

The forehead flap is the gold standard for nasal reconstruction because the texture and tone of the skin on the forehead is closest to the skin on the nose. It was first described in INDIA on 1793; and last improved by F. MENICK in 2002.

The Menick's technique is performed in three operating stages and it presents some technical peculiarities, which makes it different from the classic forehead flap.

Anatomy

It is important, before performing the forehead flap, to fully understand its vascularization. The para median forehead flap is based on axial vascularization from the supratrochlear artery, which emerges from the orbit 1.7-2.2 cm lateral to the midline at the level of the superior orbital rim.

It then penetrates the orbicularis and frontal muscles at the level of the eyebrow, and go superficially to the muscle towards a subcutaneous and subdermal plexus.

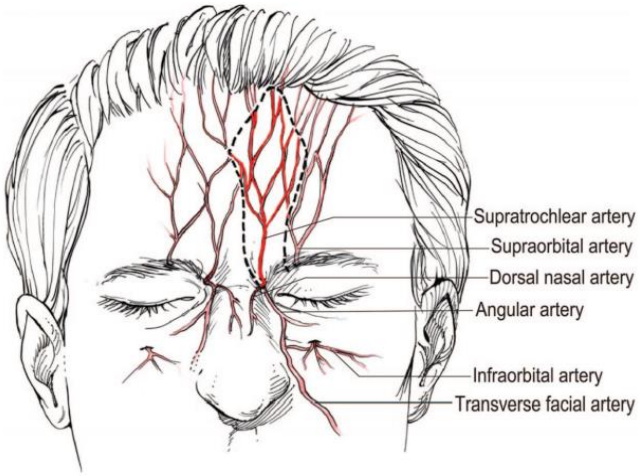

Figure 1: vascularization of the forehead flap [1]

Artistic Anatomy

From an artistic point of view, the nose is subdivided into several subunits [1]:

- The nasofrontal triangle
- The dorsum
- The tip: which can be subdivided into two sub-units; hemi tip right and left
- The columella

- Two nostril wings
- Two side parts

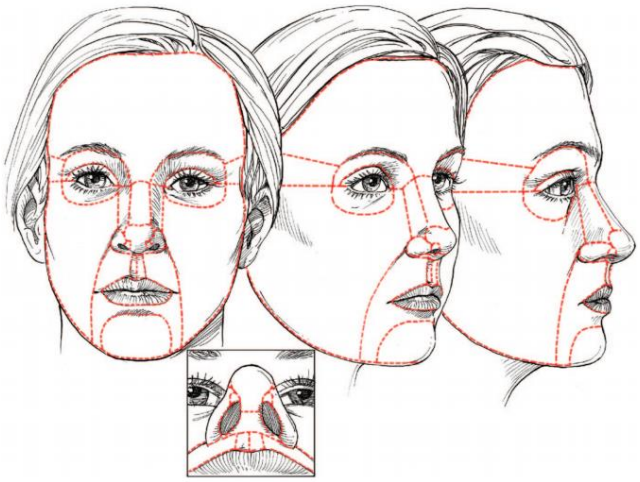

Figure 2: Aesthetic subunits of the nose [1]

Special features of the MENICK technique

Initially, the frontal flap was performed in two stages [6]:

- 1st step: lifting of the flap in 3 planes, subcutaneously in its distal part so that it is thinner, then under muscle in its middle part and then under periosteum at the point of emergence of the pedicle.
- 2nd step: weaning of the flap by section of the pedicle.

***MENICK offers a 3-stage technique with an interval of 3-4 weeks* [1-5]:**

- Lifting of the flap in full thickness in the 1st step, because the fact of resecting the muscle at the level of the distal part of the flap makes the skin tending to contract and become fibrous, thus resulting not aesthetic.
- It is during the 2nd step that the flap will be refined by resecting the muscle and degreasing until the desired thickness is obtained.
- If the loss of substance from the nose concerns only part of the subunits, all the subunits will have to be reconstructed and the remaining skin resected.
- The cartilage graft if it is considered, can be performed in the 2nd step.
- The flap is taken from the same side as the defect and the rotation is done on the side of the nose.
- Weaning will only take place in the 3rd step, generally 6 weeks after the initial surgery.

Flap Marking

On this supratrochlear artery, a forehead flap can be lifted as follows:

- Identify the pivot point which corresponds to the point of emergence of the supratrochlear artery.
- Draw 2 vertical lines 0.5cm on each side of this point which corresponds to 1cm: minimum width of the pedicle.
- A defect pattern to be covered is produced and transposed to the level of the front; after checking the arc of rotation of the flap using a thread or a compress.
- If the defect is unilateral, we can help the unaffected side to determine the exact dimensions of the pattern.

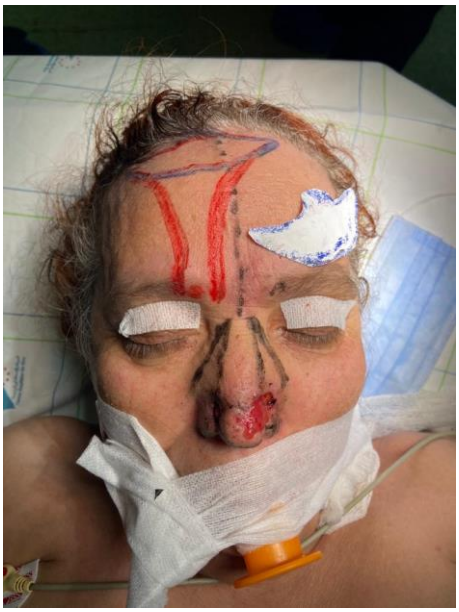

Figure 3: Preoperative marking of the forehead flap, to reconstruct the tip and the two nostril wings

To succeed the pattern of the flap, we:

- Draw the nasal subunits
- Take into account the complete excision of the subunit
- Dry the edges of the defect and go over them with a dermographic marker
- Use a paper or aluminum surface to press it against the defect in order to transfer the inked margins on it

- Cut the sheet along the inked line with scissors to create a pattern

Surgical Technique

1st step: lifting of the flap

- Skin incision according to the pre-established drawing
- Samples of the full thickness flap, flush with the periosteum removing the skin, the subcutaneous fat and the frontal muscle
- Detachment of the flap continues until the point of emergence of the supratrochlear artery
- As the flap is always taken from the same side as the PDS, its rotation is done on the side of the nose
- The placement of the flap begins with the reconstruction of the deep plane (distal extension of the flap which is folded back on itself, chondro mucous flap)
- The flap is then sutured on its recipient site with a non-absorbable monofilament
- The unsutured part of the flap can be grafted to limit bleeding and secretions thus improving patient comfort
- The donor area: the forehead, is sutured in 2 planes after detachment, and the unsutured PDS is left in directed healing.

Figure 4: Removal of the flap and complete excision of the subunits to be reconstructed (tip and the two nostril wings)

Figure 5: Placement of the flap after checking its rotation without tension

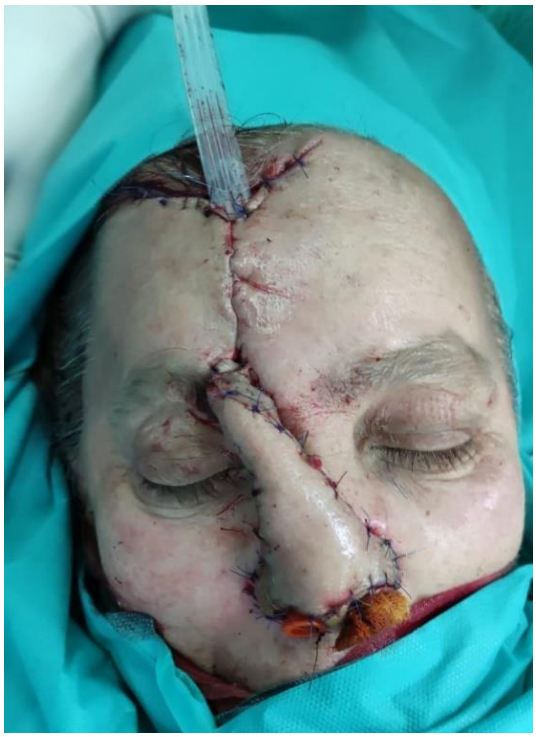

Figure 6: Suture of the flap in the recipient area, and the forehead defect is closed

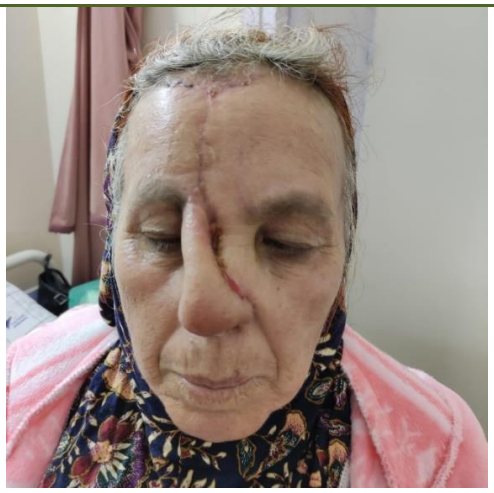

Figure 7: 3 weeks post-operative aspect

2nd step: refinement of the flap

- 3 weeks later, the forehead flap raised in full thickness has healed, but remains quite thick and lacks definition
- During the 2nd step: the flap will be refined and the aesthetic lines of the nose redefined
- The forehead flap will then be fully raised (with the exception of the columella or a distal extension covering the deep plane because a significant risk of necrosis) in a subcutaneous plane leaving the frontal muscle in place
- Resection of excess frontal muscle, fat and scar fibrosis is performed depending on the desired thickness
- A cartilage graft if it is indicated will be grafted during this 2nd step
- The nose wing, devoid of cartilage, can be reinforced by a conch cartilage graft, this cartilage graft prevents the flap from retracting and therefore collapsing together and giving relief to the nostril wing
- The flap will then be put back in place and the aesthetic lines of the nose will be redefined by Capiton-type points

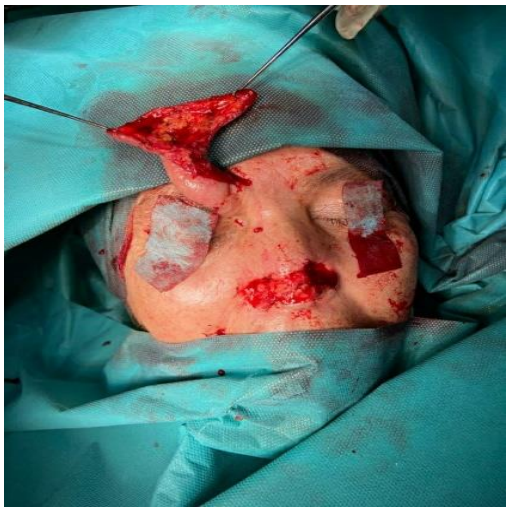

Figure 8: Refining the forehead flap

Figure 9: repositioning of the refined flap and placement of a Capiton-type point to redefine the aesthetic subunits

3rd step: Weaning of the flap

- The flap is weaned, cutting the pedicle
- The eyebrow is repositioned, cutting the lower part of the frontal scar and reinserting the proximal end of the flap in the shape of an inverted V
- The distal part of the flap, now autonomous, is sculpted so as to perfectly cover the subunit to be reconstructed
- Finally, Capiton-type points can be added for a better definition of the aesthetic lines of the nose

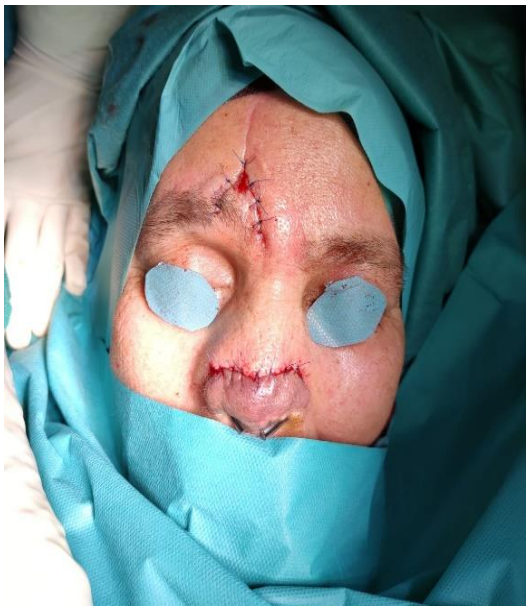

Figure 11: 6 weeks post-opérative aspect (front view)

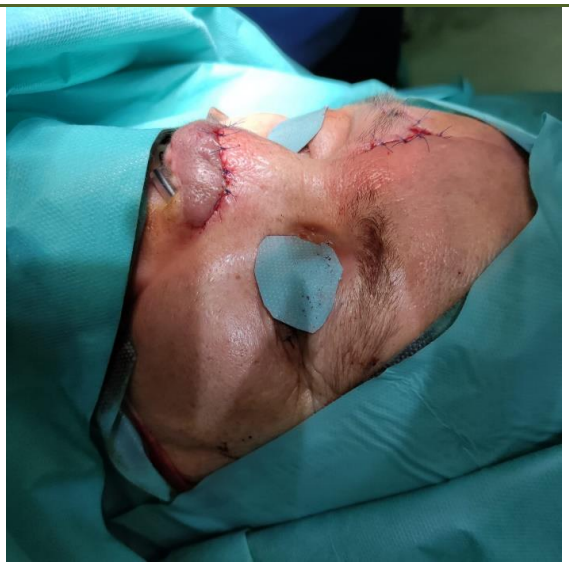

Figure 12: 6 weeks post-operative aspect (lateral view)

The 3-stage forehead flap far exceeds the classic technique in terms of aesthetic result, the fact of adding the 2nd step, allows to refine the flap to redefine the aesthetic lines of the nose for a more optimal aesthetic result.

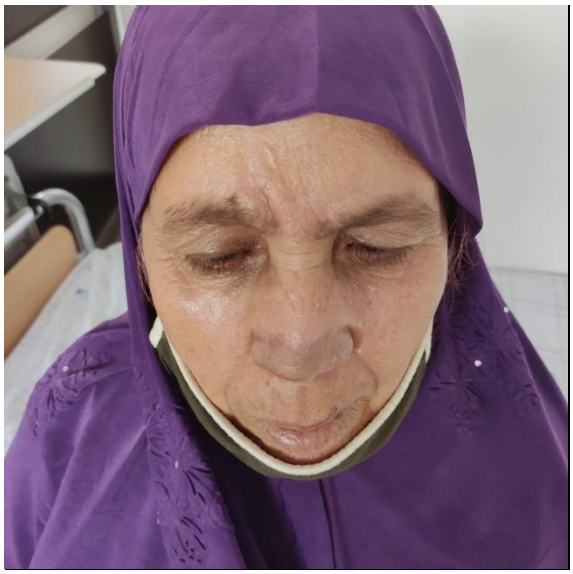

Figure 13: 6 months post-operative aspect (front view)

Figure 14: 6 months post-operative aspect (lateral view)

CONCLUSION

The 3-stage forehead flap is the reference technique for covering large nose defects. During the first step, the flap is lifted in full thickness carrying the frontal muscle, then refined and the aesthetic lines of the nose redesigned during the second step. The flap will only be weaned during the third step and the flap pedicle will be used to reposition the eyebrow.

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