

Forehead Flap in Nasal Tip Reconstruction

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ABSTRACT

The forehead flap is a long-standing surgical technique used for nasal restoration. The forehead flap is considered the most reliable method for reconstructing nasal soft tissue. It offers a reconstructive surgeon a strong pedicle and a significant volume of tissue, making it suitable for repairing nearly any lesion. The modifications made by experts such as Burget and Menick have significantly enhanced the functionality of this outstanding flap. The guiding principles for reconstructing the nose with a forehead flap involve maintaining a straight line along the axis, using the pedicle on the same side as the defect, expanding the flap at a right angle when additional length is required, employing a small pedicle, and performing early subperiosteal dissection. Furthermore, the issue of lining abnormalities can be effectively and dependably resolved through the utilization of a folded forehead flap.

KEYWORDS: Forehead, reconstruction, nasal tip reconstructive surgery

ARTICLE DETAILS

Published On:
02 April 2024

Available on:
<https://ijmscr.org/>

INTRODUCTION

Rhinoplasty is considered the most intricate cosmetic surgery, whereas nasal restoration is regarded as the most intricate facial reconstruction procedure. The nose is an intricate three-dimensional formation that, together with the eyes, serves as a prominent aesthetic feature of the face. While much attention is given to the cosmetic aspect of nasal reconstruction, it is as important to consider the functional outcome for the surgery to be considered successful. The process of nasal reconstruction can be divided into three primary elements: lining, support, and covering. Among the three possibilities, the failure of the lining is the most probable cause of a complete reconstructive failure. Various techniques can be used to restore the nasal lining, such as mucosal flaps, skin grafting, local flaps, prefabricated

forehead flap, three-stage forehead flap, forehead flap turnover, and free tissue transfer. Typically, when lining is needed, there is usually a specific area with a complete loss of tissue that can be fixed by using a flattened forehead flap. If the lining region is not next to the principal defect or beyond its boundaries, one of the aforementioned alternatives may be necessary. The nasal structure plays a crucial role in maintaining open airways and ensuring long-lasting aesthetic appearance. With the exception of entire nose reconstruction, which was previously discussed, the majority of instances that require support have a specific defect that necessitates the replacement of a section of cartilage. The conchal cartilage is an excellent option because to its advantageous position, dimensions, and configuration. Conchal cartilage is well-suited for providing structural support due to its inherent

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curvature and thickness, particularly in cases where nonanatomic grafts such as alar rim grafts are required. The donor site is advantageous because it does not result in any noticeable cosmetic deformity and problems are infrequent¹⁻⁴.

The method of covering the nose can be further classified based on the nasal subunits and the principle of rebuilding within each subunit. In simple terms, there are nine divisions of the nose based on changes in shading between natural curves and indentations where scars are least noticeable. Moreover, in cases when a substantial proportion of a certain component is absent (e.g., more than 50%), performing a complete removal and subsequent reconstruction of the entire component tends to result in better aesthetic outcomes. These core notions encompass various distinct flaws with specific requirements, requiring the expertise of an experienced surgeon to achieve the best outcome. In plastic surgery, it is common for there to be no universally applicable rules that are absolute in all circumstances⁵. Nasal coverage can be achieved through many methods, such as secondary intention, skin grafting, local flaps, and interpolated flaps. This range of choices enables further customization to suit individual patient features. For instance, while a staged forehead flap may result in the most aesthetically pleasing outcome, a skin transplant may be a better choice for a patient who does not prioritize appearance, has other medical conditions, or prefers a one-step procedure. Nevertheless, disregarding these peculiarities, when confronted with a significant and/or distant imperfection, the decision is frequently quite obvious: the paramedian forehead flap. The utilization of the forehead for nose reconstruction, known as the Paramedian Forehead Flap, has its origins in ancient India. Nasal tip amputation was a prevalent form of punishment for various offenses during the year 700 BC. The treatment was documented in a medical book called the Sushruta Samita. The technique was introduced to Europe in the 1500s and subsequently to the United States in the 1830s by J.M⁶⁻⁸.

In the 1930s, Kazanjian identified the main blood supply of the flap as the supratrochlear and supraorbital arteries, which led to substantial advancements in its design. Millard, Gillies, and Converse made significant contributions to this innovation, but Labat was credited with designing the median forehead flap based on a unilateral supratrochlear artery. Millard developed the paramedian position, excluding the central glabellar skin, which reduced complications and maintained viability. Menick further improved Millard's design by narrowing the pedicle, allowing for greater flexibility in movement and length. Shumrick and Smith's anatomical studies demonstrated the position and path of the supratrochlear artery, which runs 1.7 to 2.2 cm to the side of the midline in a vertical direction. The supratrochlear artery initially follows a deep path beneath the muscles and then transitions to a more superficial position just above the forehead, starting 1 cm above it. Understanding the exact

route of this artery's anatomy enables more accurate planning of flaps, enhanced flexibility, and longer pedicle length. An expertly performed forehead flap procedure can lead to a nose reconstruction that is highly natural-looking, long-lasting, and difficult to detect, if not completely imperceptible. When it comes to color and texture, no other flap is as suitable for matching with the skin⁹.



Figure 1. nasal tip tumor resection



Figure 2. nasal flap lift



Figure 3. frontal flap transposition

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Figure 4. Lateral flap view



Figure 5. Post surgery frontal view



Figure 6. 3/4 post surgery view

The flap's primary limitations are around the time commitment required and the morbidity associated with the staging of the surgery. Throughout its existence, the forehead flap has experienced significant advancements and modifications, establishing itself as the most advantageous option for treating extensive nasal abnormalities. The paramedian forehead flap is typically used for nasal defects that cannot be repaired using other local flaps or full-thickness or composite grafts, particularly when the defect is wider than 2 cm in the horizontal plane or involves exposed bone and/or cartilage. Nevertheless, it should be regarded as the benchmark for all nasal reconstructive procedures¹⁰. The administration of clopidogrel may result in an increased risk of bleeding, so compromising the overall safety and outcome of the procedure. Based on our expertise, we have found that it is possible to create flaps that can be safely reconstructed in individuals who are actively smoking. The surgical procedure can be carried out with sedation or, preferably, under general anesthesia, either as an inpatient or outpatient. Before creating the forehead flap, it is necessary to assess the main problem. When dealing with a combined defect affecting both the nose and the cheek, it is advisable to prioritize the evaluation and correction of the cheek. This is because addressing the cheek first will result in reshaping the nasal defect and establishing clear boundaries. The subsequent course of action involves choosing between executing a basic defect reconstruction or opting for a completion-excision and subunit reconstruction. Each situation requires a subjective decision made by the surgeon, relying on their expertise. When recreating a subunit, the contralateral "normal" subunit is utilized as a template. Flap design and elevation are guided by certain principles, including: Striving to maintain an axial pattern whenever feasible. Using the pedicle on the same side as the defect. Exercise caution and only extend the flap at a right angle across the forehead when more length is required¹¹.

When properly designed, the distal portion of a forehead flap can provide a larger extent of lining for heminasal reconstruction compared to previous methods. In the case of a folded forehead flap, the lining is designed using a full-pattern template with sufficient looseness to allow for folding of the distal flap in order to recreate the nasal lining. A 1-mm incision is created at the level of the alar rim to facilitate or accelerate the rotation of the lining of the flap. This incision permits a calm and comfortable insertion. The lining section is significantly reduced to the subcutaneous fat and secured with 5-0 chromic gut suture. This has demonstrated significant success and dependability. We can use an alar rim incision to reduce the thickness of the nasal vestibule to the desired level. In cases where there is a need for bigger lining, such as in the columella or septum, a rib is taken from the patient to offer support, as explained by Gunter. However, when dealing with defects that are larger than heminasal, which involve both the ala and tip, a folded forehead flap is not employed for lining. Alternatively, the lining is

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reconstructed using a two-stage microvascular free radial forearm flap, following the method reported by Burgett and Menick¹².

CONCLUSION

The forehead flap is an optimal option for reconstruction in several patients and can be performed safely and consistently either as an outpatient or inpatient procedure. The principles stated by renowned experts, such as Burgett and Menick, have provided valuable guidance for the advancement of this reconstruction. Other principles that have enhanced results include preserving an axial pattern whenever feasible, employing the pedicle on the same side as the defect, extending the flap perpendicularly across the forehead when additional length is required, utilizing a relatively narrow pedicle, performing early subperiosteal dissection, and employing the folded forehead flap for lining.

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