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Surgical Videos

Paramedian Forehead Flap With Intraoperative Frontal Expansion

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Introduction

The paramedian forehead flap (PFF) is a reconstructive option of choice for repairing large defects of the nasal pyramid, as it provides sufficient tissue of appropriate thickness to fully restore nasal anatomy and function.[1] However, one of the challenges of this flap lies in reconstruction of the frontal donor site. This video illustrates the reconstruction of a nasal dorsum defect following Mohs micrographic surgery for basal cell carcinoma, using intraoperative expansion to reconstruct the frontal donor site.

Technique description

The PFF is initiated by identifying the supratrochlear artery, the axis of the pedicle, using Doppler ultrasound. Under general anesthesia and guided by this vascular course, the flap is designed with the help of a template corresponding to the defect to be repaired.[2] The flap is incised and dissected in the subfascial plane using a Colorado-tip electrocautery until the supraorbital rim is reached. At this point, dissection proceeds deeper into the subperiosteal plane using a periosteal elevator, and the pedicle is progressively released caudally until it can be mobilized and rotated without tension to reach the defect.[2]

For reconstruction of the donor site, intraoperative expansion is performed by inserting a size 14 Foley catheter subcutaneously into each margin of the frontal wound, followed by 3 cycles of balloon inflation lasting 3 min, with relaxation periods of 2–3 min across cycles. After completing expansion cycles, the frontal defect is directly approximated without the need for additional flaps or grafts.[3]

After 20 days, under local anesthesia, the pedicle is divided and the anatomy of the glabellar region restored.[1,2] A recent study, however, has shown that Doppler ultrasound evaluation of the pedicle may allow shortening of this interval before pedicle division.[4]

Indications

The PFF is indicated for reconstruction of large defects (>1.5–2.0 cm), of partial or full thickness, located on the lower two-thirds of the nasal dorsum, nasal tip, alae, and even the columella. In full-thickness defects with mucosal exposure, it is commonly combined with cartilage grafts for structural support or with transposition flaps to provide mucosal coverage.[1,2] Intraoperative tissue expansion may be used for any large defect at the limit of direct closure, particularly when located over solid deep planes (cranium, back, etc.), as it facilitates direct closure with reduced tension.[5]

Contraindications

The PFF is highly versatile and feasible in nearly all clinical scenarios. However, its use may be contraindicated in the following circumstances: frontal region morbidity (previous surgery or radiotherapy, presence of carcinomas, etc.), active infection, patients who cannot undergo general anesthesia, or those who decline two surgical procedures. Additionally, beyond these formal contraindications, active smoking may be considered a partial contraindication due to the increased risk of flap necrosis in smokers.[1,6]

Complications

The main complication of the PFF is the creation of a donor-site defect that may require a skin graft, thereby creating a third surgical wound. Intraoperative tissue expansion is a technique that allows, in a single surgical session, distension of donor-site margins through insertion and inflation of a Foley catheter in 3-min cycles with 2–3 min of deflation. This technique can provide additional millimeters of tissue that permit primary closure without the need for grafting.[3,5]

A different complication that should be taken into consideration is flap infection, especially when reconstruction is delayed or when nasal mucosa is exposed. The exposed raw surface of the pedicle can serve as a source of infection. Administration of prophylactic antibiotics before Mohs tumor resection and before reconstruction may reduce this risk. Hemorrhage from the raw edges of the pedicle is another potential complication.[6]

Flap necrosis, although a rare finding, can be prevented by accurately calculating the distance to the defect and anticipating length loss due to pedicle rotation, ensuring – via Doppler – that the supratrochlear artery is centered within the pedicle, and carefully thinning the flap without damaging its vascular axis.[6]

In the medium-to-long term, persistent edema of the flap, hypoesthesia of the frontal region, and visible scarring may occur, though these tend to improve over time.

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Conclusions

The PFF represents an optimal option for reconstruction of large nasal pyramid defects, preserving function while achieving an acceptable cosmetic result. Although the existing literature shows variable outcomes, intraoperative tissue expansion is a technique that does not increase the complexity or risk of the surgical procedure and requires no additional instrumentation beyond a widely available urinary catheter. This expansion technique can provide additional tissue that enables approximation of large defects without the need for grafts or additional flaps.

Conflict of interest

The authors declare no conflict of interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found in the online version available at https://doi.org/10.1016/j.ad.2025.104578.

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