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IDEAS AND INNOVATIONS

Craniofacial/Pediatric

The Expanded Forehead Flap for Resurfacing of Multi-unit Congenital Nevi of the Face

Meagan Wu, MA
Matthew E. Pontell, MD
Benjamin B. Massenburg, MD
Jinggang J. Ng, MA
Dominic J. Romeo, MA
Jordan W. Swanson, MD, MSc
Jesse A. Taylor, MD
Scott P. Bartlett, MD

Summary: The forehead flap is a timeless and robust reconstructive option for complex facial defects. In accordance with aesthetic subunit principles, it has traditionally been used to resurface defects affecting a single cervicofacial region, most commonly the nose or periorbital unit. In this article, we present three cases of congenital nevi treated with expanded forehead flap reconstruction of the nasal, periorbital, and cheek units in early childhood. This series demonstrates an approach that, while violating facial units, limits total scar burden and optimizes aesthetic and functional results. With precise staging and execution, this reconstructive technique allows for a single flap to resurface multi-unit defects in the pediatric population with excellent long-term results. *(Plast Reconstr Surg Glob Open 2024; 12:e5867; doi: 10.1097/GOX.0000000000005867; Published online 5 June 2024.)*

SURGICAL TECHNIQUE AND DESIGN CONSIDERATIONS

Congenital melanocytic nevi are challenging to manage, especially when located on the face. In addition to an increased risk of malignancy, the appearance of the deformity can cause significant psychosocial distress and therefore should be managed early in life.[1,2] Reconstructive options include skin grafts, tissue expansion, and local or free flaps.[3–5] However, each technique has potential complications, ranging from poor scarring and contracture to color mismatch and distortion.[6] Undue tension on critical structures in the periorbital region, for instance, can cause brow asymmetry, ptosis, or ectropion.[7,8] Facial aesthetic subunits are thus carefully considered when planning resection.[8–10]

Bauer and Vicari,[3] and later Gur and Zucker,[4] established that complex facial nevi covering multiple units require the coordinated use of skin grafts, tissue expansion, and flap coverage. With its reliable blood supply and substantial tissue volume, the forehead is a particularly suitable donor site for midfacial defects. Wang et al[11] reported on the use of the paramedian forehead flap to resurface multi-subunit areas of the nose, lower eyelid and medial canthi, and medial cheek and zygomatic regions in adults. However, the authors do not present any long-term results for congenital lesions. Overall, most of the forehead flap literature involves nonexpanded flaps, acquired nasal defects, and adult patients.[12–15]

Below we present three cases of expanded forehead flap nasal, cheek, and periorbital reconstruction for congenital nevi in the pediatric population with up to 12 years of postoperative follow-up. While the alternative approach of a cheek flap with full-thickness skin graft (FTSG) to the nasal component respects facial units, the forehead flap provides superior aesthetic and functional results with maximal flap tissue usage. This technique minimizes donor site scarring, reduces the risk of vertical lower lid contracture, and takes advantage of the forehead's well-matched color and texture.

Three patients presented to a single surgeon with congenital nevi of the left cheek, nasal, and periorbital units and underwent initial surgery at 2.3 years (Fig. 1), 2.6 years (Supplemental Digital Content 1), and 5.4 years of age (Fig. 2). Each lesion extended from the left medial upper cheek to the nasal dorsum and sidewall as well as the eyelid region, appearing as an irregular brown macule with a hemi-butterfly shape and increased hair growth. One patient had more extensive lower lid and zygomatic subunit involvement. [**See figure, Supplemental Digital Content 1**, which shows a female patient with a congenital nevus of the left cheek, nasal, and periorbital units who underwent forehead flap reconstruction at age 2.6 years and is shown preoperatively (left) and intraoperatively during flap division and inset in the third stage of reconstruction (right). **http://links.lww.com/PRSGO/D259**.] All three patients were treated with the staged

From the Division of Plastic, Reconstructive, and Oral Surgery, Children's Hospital of Philadelphia, Philadelphia, Pa.

Received for publication March 11, 2024; accepted April 12, 2024.

DOI: 10.1097/GOX.0000000000005867

Disclosure statements are at the end of this article, following the correspondence information.

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.

technique described herein: (1) placement of the forehead expander with eyelid nevus excision and FTSG, if necessary; (2) design and elevation of the expanded flap with excision of the cheek nevus; and (3) flap division and inset with excision of the residual nasal nevus.

The first stage involved tissue expander insertion to ensure adequate soft tissue for coverage of the anticipated cheek defect as well as forehead closure. Tissue expansion has the added benefit of thinning out the forehead tissue to better match the thickness of the cheek defect. In the same procedure, any lower eyelid nevus was excised to the lid-cheek junction and resurfaced with a retroauricular FTSG to reduce the risk of secondary ectropion. A forehead incision was made just behind the hairline to create a subgaleal, subperiosteal pocket for a round expander with a remote port. Expansion proceeded with 7–10 mL of saline weekly.

The second stage took place 6–8 weeks after expander placement. The forehead flap was designed upon the contralateral supratrochlear vessels to reduce the likelihood of pedicle compression[16] and to drape across the nose for use in nasal nevus excision at the time of flap division and inset. The flap was elevated in a subgaleal plane, thinned to match the involved aesthetic subunits, and inset precisely under slight tension to maintain the expanded surface area **(Supplemental Digital Content 1, http://links.lww.com/PRSGO/D25)**.

The third stage took place three weeks later, beginning with excision of the residual nasal nevus. Following flap division, the pedicle was thinned and re-draped to close the nasal defect. Care was taken to restore the medial eyebrow with the base of the flap as able **(Supplemental Digital Content 1, http://links.lww.com/PRSGO/D25)**.[16] Any final adjustments included serial excision of residual pigmentation. All three patients healed well without complications. Here, we present the long-term results of our 2.3-year-old patient at 11 years postoperatively (Fig. 1) and 5.4-year-old patient at 12 years postoperatively (Fig. 2). Both flaps blended nicely into the surrounding tissue with minimal webbing and no eyelid dysfunction. Long-term scarring was minimal.

Takeaways

Question: What are the long-term results of the expanded forehead flap for multi-unit congenital nevi of the face in pediatric patients?

Findings: This case series demonstrates successful utilization of the expanded forehead flap, which is traditionally used for nasal defects, and for the resurfacing of multi-unit congenital nevi of the cheek, nasal, and periorbital regions in pediatric patients. This staged reconstructive approach, while violating facial units, limits total scar burden and optimizes aesthetic outcomes.

Meaning: The expanded forehead flap is a reliable tool for the resurfacing of complex soft tissue defects of the face in children with excellent long-term results.

DISCUSSION

This staged technique, while combining fundamental reconstructive procedures, allows for the innovative use of a single donor site to resurface complex multi-unit facial defects. Alternative flap patterns may be proposed, such as V-Y advancement flaps[17–19] or cervicofacial rotation-advancement flaps[20,21] from the cheek and mandibular regions. However, any tissue borrowed from surfaces inferior or lateral to the defect creates undesired tension vectors, leading to lid malposition or ectropion.[22] The forehead flap, rotated downward from above, avoids lower

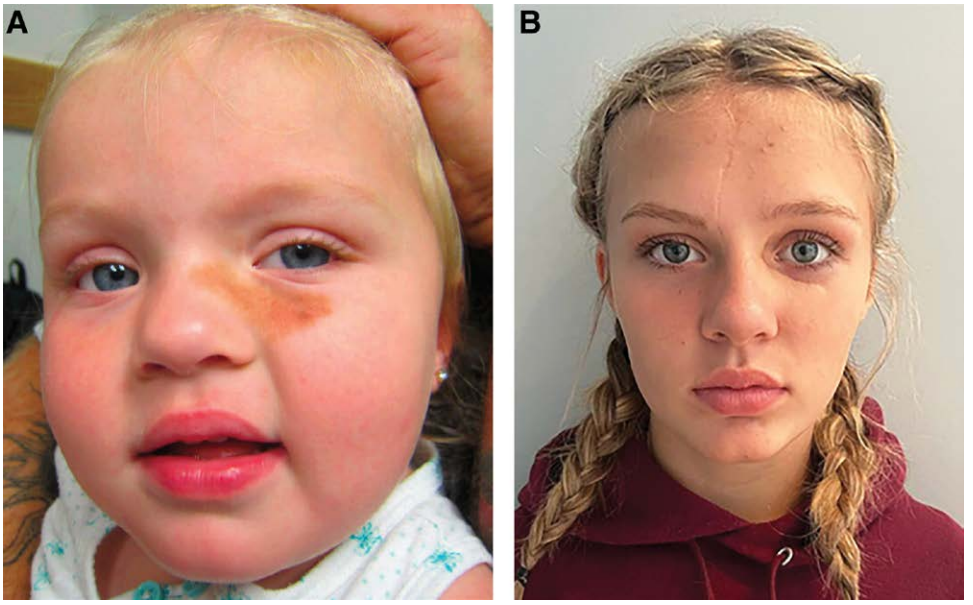

Fig. 1. A female patient with a congenital nevus of the left cheek, nasal, and periorbital units underwent forehead flap reconstruction at age 2.3 years. She is shown preoperatively (A) and at 11 years postoperatively from the third stage of reconstruction (B). The flap was inconspicuous over her cheek and nose with minimal donor site scarring.

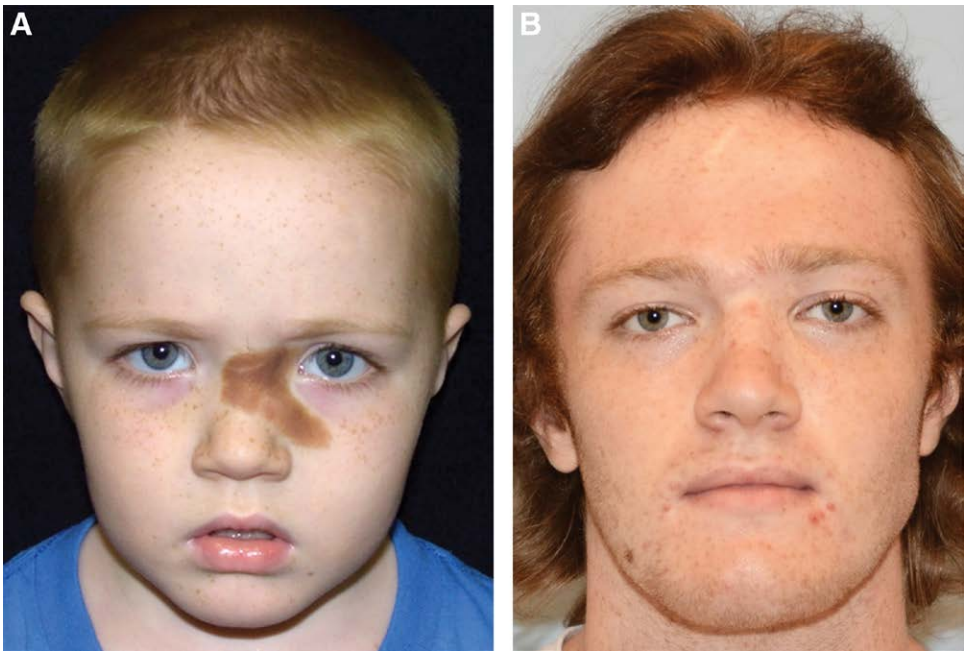

Fig. 2. A male patient with a congenital nevus of the left cheek, nasal, and periorbital units underwent forehead flap reconstruction at age 5.4 years. He is shown preoperatively (A) and at 12 years postoperatively from the third stage of reconstruction (B). The flap was inconspicuous over his cheek and nose with minimal donor site scarring.

lid tension to reduce the risk of ectropion, an important consideration at the lid-cheek junction.[19,22] Furthermore, traction from donor site scarring is minimized, and the forehead can be concealed by hair. Overall, the staged nature of this operation[23] is outweighed by the reduced donor site morbidity and scar burden.

Although this reliable axial flap has traditionally been used for nasal defects,[23] we demonstrate its successful utilization for the resurfacing of multi-unit congenital nevi of the cheek, nasal, and periorbital regions. Early surgical intervention, recommended to commence as early as 18 months of age, allows for completion of the reconstructive process before school age and improved self-esteem in childhood and adolescence.[3,6] Additionally, the nonsebaceous forehead skin in children enables good donor site healing, though some scars may ultimately require revision.[24] Since its inception, the forehead flap has undergone continuous innovation in its design and usage, reflecting its versatility and durability.[25] We demonstrate that the expanded forehead flap is an optimal tool for the resurfacing of complex soft tissue defects of the pediatric face.

Scott P. Bartlett, MD
Mary Downs Endowed Chair in Pediatric Craniofacial Treatment and Research
Division of Plastic, Reconstructive, and Oral Surgery
Children's Hospital of Philadelphia
Philadelphia, PA
E-mail: bartletts@chop.edu

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

PATIENT CONSENT

The patients provided written consent for the use of their images.

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