

H-Plasty Reconstruction of a Traumatic Frontal Avulsion: A Case Report

José Isaac Macias Rodríguez¹, Cecilia Estefania Rocha Cabrera², Diego Eduardo Macias Muñoz³

^{1,2}Department of general Surgery, Hospital General de Zona No. 3, Instituto Mexicano del Seguro Social, Aguascalientes, México.

³Third-year general surgery resident, Hospital General de Zona No. 58, Instituto Mexicano del Seguro Social, León, México.

ABSTRACT

Traumatic forehead avulsion with calvarial exposure poses a reconstructive challenge in young children because the frontal skin is relatively inelastic and repair must preserve vascularity, facial symmetry, and future growth. We report a three-year-old girl who sustained a motorcycle-related craniofacial injury producing an approximately 8 × 4 cm left frontal soft-tissue defect, partial periosteal loss, exposed frontal bone, necrotic wound edges, gross contamination, and a unicortical frontal-bone fracture. Initial irrigation, debridement, traumatic-flap remodeling, and primary closure were followed by epidermolysis and skin necrosis with recurrent bone exposure. A second-stage reconstruction was therefore performed using bilateral opposing advancement flaps configured as an H-plasty. The flaps incorporated the galea and were elevated in a suprapariosteal plane to preserve the remaining periosteum and regional vascular supply. Layered closure was completed with 6-0 absorbable polydioxanone skin sutures. At postoperative days 6 and 10, the flap remained viable and provided complete coverage with a satisfactory early aesthetic and functional result. This case illustrates that H-plasty can provide vascularized, like-with-like coverage for selected traumatic pediatric forehead defects when careful debridement, broad-based flap design, tension redistribution, and preservation of the supratrochlear and supraorbital vascular territories are prioritized.

KEYWORDS: H-plasty; advancement flap; forehead reconstruction; pediatric trauma; soft-tissue avulsion.

ARTICLE DETAILS

Published On:
23 July 2026

Available on:
<https://ijmscrs.com>

INTRODUCTION

Reconstruction of frontal soft-tissue defects requires simultaneous restoration of durable coverage, forehead contour, eyebrow position, hairline symmetry, and scar orientation. These goals are particularly demanding when the wound is contaminated, bone is exposed, periosteum is deficient, or the surrounding tissue is tight. The reconstructive choice should therefore be individualized according to defect size, depth, location, tissue viability, and the quality of the wound bed. Local flaps often provide the closest match in thickness, color, and texture while avoiding a distant donor site [1–3].

The O-to-H flap, or H-plasty, is a bilateral modification of a unipedicle advancement flap. Two opposing flaps advance along a common vector to close a central defect, sharing closure tension between both sides. It is particularly useful on the forehead, where limited laxity can make primary closure unreliable and can increase the risk of eyebrow or hairline

distortion [2–6]. Most published applications concern adult oncologic defects; reports addressing traumatic pediatric defects with calvarial exposure are uncommon.

This report describes staged management of a severe frontal avulsion in a three-year-old child and highlights the technical considerations that enabled successful early coverage after necrosis of the initial traumatic closure.

CASE PRESENTATION

Patient information and initial injury

A three-year-old girl was involved in a road-traffic accident while riding as a motorcycle passenger. She sustained craniofacial trauma with severe soft-tissue injury of the left frontal region. Examination demonstrated an approximately 8 × 4 cm avulsion defect with exposed outer table of the frontal bone, partial periosteal loss, traumatic flaps with necrotic edges, gross contamination, and an associated unicortical frontal-bone fracture (Figure 1A–B).

H-Plasty Reconstruction of a Traumatic Frontal Avulsion: A Case Report



Figure 1 A



Figure 1 B Initial management and complication

At the first operation, the wound underwent copious irrigation, debridement of nonviable tissue, remodeling of the traumatic flaps, and primary closure (Figure 1C). During the early postoperative period, epidermolysis progressed to

cutaneous necrosis, resulting in recurrent frontal-bone exposure (Figure 1D). The failure of the initial closure prompted reassessment and a planned second-stage reconstruction with an H-plasty.



Figure 1 C



Figure 1 D

Reconstructive procedure

Two opposing advancement flaps were designed on either side of the defect (Figure 2A). The flaps were elevated with the galea aponeurotica in a suprapariosteal plane, preserving the remaining periosteum and minimizing disruption of the supraorbital and supratrochlear vascular territories (Figure

2B). Bilateral advancement allowed the flaps to meet centrally and distributed closure tension across both donor areas. Layered closure was performed, and the skin was approximated with 6-0 absorbable polydioxanone sutures (Figure 2C).



Figure 2A



Figure 2 B



Figure 2 C

Outcome and follow-up

The immediate postoperative appearance showed complete coverage of the exposed bone without overt distal flap compromise. At days 6 and 10, the reconstruction remained viable, with satisfactory early contour, wound closure, and facial function (Figure 3-4).



Figure 3



Figure 4

DISCUSSION

The central reconstructive problem in this case was not simply defect size but the combination of contamination, tissue devitalization, periosteal deficiency, calvarial exposure, and failed primary closure. Primary closure under excessive tension in tight forehead tissue may impair perfusion and increase the risk of dehiscence or necrosis. In a 10-year scalp-reconstruction series, both defect depth and size significantly influenced the selected technique, and local or regional vascularized tissue was favored when cranial bone was exposed [1]. The early epidermolysis and necrosis observed here underscore the importance of serial viability assessment and definitive debridement before reconstructive commitment.

H-plasty addresses limited laxity by dividing advancement requirements between two opposing flaps. This decreases the displacement demanded from either side and may reduce distortion of adjacent landmarks. Contemporary descriptions emphasize its usefulness for quadrangular forehead defects and its ability to distribute strain evenly across the repair [2–4]. Compared with a skin graft, a local flap supplies vascularized tissue over exposed bone and more closely reproduces neighboring color, thickness, and texture; it also avoids graft contraction and donor-site morbidity. Compared with a free flap, it is faster, less invasive, and does not require microvascular anastomosis, although free tissue transfer remains appropriate for larger composite defects or an inadequate local vascular environment [1,3].

Forehead perfusion is supported principally by the paired supraorbital and supratrochlear systems, with additional lateral contributions. A broad flap base, limited disruption of subdermal perfusion, and atraumatic handling are essential. In this patient, inclusion of the galea and suprapariosteal elevation were selected to preserve the remaining periosteum and vascular pathways. The approach is consistent with the reconstructive principle of replacing “like with like” and with reports describing reliable H-flap coverage of selected forehead defects [3–5,7,8].

The approximately 32 cm² traumatic defect in this child was larger than many adult dermatologic Hplasty examples, which are frequently used after tumor excision. Consequently, this result should not be interpreted as a

universal size indication. Pediatric skin biology, traumatic undermining, defect geometry, intact surrounding perfusion, and surgeon judgment all influence feasibility. Alternative strategies could include rotation or transposition flaps, tissue expansion for delayed reconstruction, dermal substitutes followed by grafting when a vascularized bed can be established, regional flaps, or free-tissue transfer for extensive composite loss [1,3].

The principal limitation is the short documented follow-up. Early viability at 10 days cannot establish long-term scar quality, hairline and eyebrow stability, alopecia, contour, sensation, or the effect of growth. In addition, the source poster did not provide medication details, imaging, fracture management, hospitalization duration, patient/guardian perspective, or standardized aesthetic and functional measures. Longitudinal pediatric follow-up and objective outcome reporting would strengthen future evidence.

CONCLUSION

A bilateral H-plasty provided complete early coverage of a complex traumatic frontal defect with exposed bone after failure of initial primary closure in a three-year-old child. Careful debridement, preservation of remaining periosteum, broad-based suprapariosteal flap elevation, and balanced tension distribution were central to the favorable early outcome. H-plasty may be considered for selected pediatric traumatic forehead defects when local tissue is viable and adequate advancement can be achieved without compromising perfusion or distorting adjacent facial landmarks. Longer follow-up is required before definitive aesthetic and functional conclusions can be drawn.

REFERENCES

- I. Jang HU, Choi YW. Scalp reconstruction: a 10-year experience. *Arch Craniofac Surg.* 2020;21(4):237–243. doi:10.7181/acfs.2020.00269.
- II. Miccio L, Mioso G. Bilateral advancement O-to-H flap or H-plasty. *Dermatol Rep.* 2023;15(2):9673. doi:10.4081/dr.2023.9673.
- III. Krishna D, Khan MM, Dubepuria R, Chaturvedi G, Cheruvu VPR. Reconstruction of scalp and forehead defects: options and strategies. *Cureus.*

H-Plasty Reconstruction of a Traumatic Frontal Avulsion: A Case Report

- 2023;15(7):e41479. doi:10.7759/cureus.41479.
- IV. Redondo P. Simplifying forehead and temple reconstruction: a narrative review. *J Clin Med*. 2023;12(16):5399. doi:10.3390/jcm12165399.
- V. Schopper HK, Kriet JD. Advancement flaps. *Plast Aesthet Res*. 2022;9:5. doi:10.20517/23479264.2021.72.
- VI. Gagnier JJ, Kienle G, Altman DG, Moher D, Sox H, Riley D; CARE Group. The CARE guidelines: consensus-based clinical case reporting guideline development. *J Med Case Rep*. 2013;7:223. doi:10.1186/1752-1947-7-223.
- VII. Ebrahimi A, Nejadsarvari N. Upper forehead skin reconstruction with H-flap. *J Cutan Aesthet Surg*. 2013;6(3):152–154. doi:10.4103/0974-2077.118415.
- VIII. Rose V, Overstall S, Moloney DM, Powell BWE. The H-flap: a useful flap for forehead reconstruction. *Br J Plast Surg*. 2001;54(8):705–707. doi:10.1054/bjps.2001.3689.