

Eyebrow Incision Approach for Aesthetic Reconstruction of Frontal Bone Fractures: A Case Series

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ABSTRACT

Frontal bone fractures represent approximately 5–10% of all maxillofacial injuries, most frequently resulting from high-impact trauma such as road traffic accidents. The conventional treatment approach, typically involving a bicoronal incision, provides excellent surgical access but carries notable drawbacks, including visible scarring, alopecia, longer operative times, extended hospital stays, and a risk of facial nerve injury. In response to these limitations, minimally invasive techniques using eyebrow incisions—such as the eyebrow-split and suprabrow approaches—have emerged as effective alternatives that prioritize both function and aesthetics. These approaches offer sufficient exposure for fracture management while minimizing soft tissue disruption and enhancing cosmetic outcomes. This case series highlights the use of the eyebrow incision technique in the management of a frontal bone fracture, evaluating surgical accessibility, aesthetic results, and overall patient satisfaction. The findings support the viability of this approach as a safer and cosmetically superior alternative to traditional methods, particularly in select cases where extensive exposure is not required.

Key Words : Eyebrow incision, Craniofacial trauma, Minimally invasive surgery, Frontal bone fracture

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INTRODUCTION

The rise in vehicular traffic, technological advancements, and industrialization has led to a significant increase in maxillofacial trauma, with the head being one of the most commonly affected regions due to its prominent position. Frontal bone fractures account for approximately 5% to 10% of maxillofacial injuries, as reported in various studies.^[1-7] According to Rohrich and Hollier,^[8] open reduction and internal fixation (ORIF) is an effective approach for uncomplicated fractures of the anterior table of the frontal bone. While anterior table fractures primarily result in cosmetic deformities, posterior table fractures pose more severe risks, including cerebrospinal fluid (CSF) leaks, meningitis, encephalitis, cavernous sinus thrombosis, dural tears, brain parenchyma injuries, and progressive neurological deterioration.²³⁷⁹ The conventional method for treating frontal

bone fractures typically involves a coronal incision. However, this approach can result in extensive scarring and prolonged recovery times, raising concerns regarding aesthetic outcomes. To address these challenges, we propose two minimally invasive techniques for the reduction of anterior wall fractures of the frontal bone: the eyebrow-split approach and the supra-brow approach. This article presents a case report of two patients treated at Jaya Maxwell Hospital, Haridwar, using these innovative eyebrow incision techniques to achieve effective fracture reduction with superior aesthetic outcomes.

CASE REPORT

Case 1: Management of Anterior Table Frontal Bone Fracture Using an Eyebrow-Split Incision
A 27-year-old male presented to the emergency department following a road traffic accident. On clinical examination, no signs of neurological

deficit or cerebrospinal fluid (CSF) leakage were observed. A three-dimensional computed tomography (3D CT) scan revealed a comminuted fracture of the anterior table of the left frontal bone, with fragments displaced inward. Notably, there was no involvement of the frontal sinuses or posterior table.

Surgical Procedure

After obtaining informed consent, the patient was prepared for surgical intervention. The surgical site was meticulously scrubbed, and sterile draping was applied. A precise incision was marked, splitting the left eyebrow into two equal halves (Figure 1). This approach was chosen to ensure optimal access to the fracture site while maintaining an aesthetically pleasing postoperative outcome. The incision was carefully made, and a skin flap was elevated to expose the fractured anterior table. The comminuted segments were visualized, manipulated, and meticulously reduced to their anatomical position. Stabilization was achieved using fixation techniques tailored to the size and position of the fragments, ensuring structural integrity and minimizing the risk of recurrence or displacement.



Figure 1: A precise incision was made, dividing the left eyebrow into two equal halves.

Outcome and Follow-Up

Postoperatively, the patient demonstrated excellent cosmetic and functional outcomes. The incision healed without complications and there was no evidence of residual deformity or neurological impairment. Follow-up imaging confirmed the proper alignment of the reduced fragments and the absence of any late complications such as infection or displacement. This case highlights the efficacy of the eyebrow-split approach in managing anterior table frontal bone fractures. The technique allows precise access to the fracture site while minimizing visible scarring, making it a valuable alternative to traditional coronal incisions for select cases. Case 2: Management of Complex Frontal Bone Fracture Using a Suprabrow Incision A 21-year-old male presented to the

emergency department following a road traffic accident. The patient reported a positive history of nasal bleeding but no bleeding from the mouth or ears. Clinical examination revealed severe periorbital ecchymosis of the right eye, subconjunctival hemorrhage, and a noticeable depression on the right side of the forehead, accompanied by tenderness on palpation. Neurological status was stable, with no signs of cerebrospinal fluid (CSF) leakage. A computed tomography (CT) scan reported a comminuted and displaced fracture of the frontal bone with segments impinging on the brain parenchyma, as well as a fracture of the supraorbital ridge on the right side. The patient was promptly prepared for surgical intervention to relieve the impingement, stabilize the fracture, and restore the craniofacial contour.

Surgical Procedure

After obtaining informed consent, the surgical area was scrubbed and draped. A suprabrow incision was planned and executed using a #15 blade. To preserve the hair follicles and minimize visible scarring, the scalpel blade was angled but maintained parallel to the axis of the follicles (Figure 2).



Figure 2: To protect the hair follicles and reduce visible scarring, the scalpel blade was angled while kept parallel to the follicular axis.

The incision provided access to the fracture site while preserving the patient's aesthetic appearance. The comminuted fragments were carefully visualized. Thin and unstable bone segments that could not be effectively stabilized were removed to prevent complications. Bleeding encountered during the procedure was controlled using Surgicel, ensuring hemostasis. To restore the structural integrity of the frontal bone and maintain an optimal craniofacial contour, a 0.4 mm titanium mesh was contoured and secured over the defect. The mesh was fixed using appropriate screws, ensuring stability while minimizing the risk of postoperative complications.

Outcome and Follow-Up

The patient had an uneventful recovery. The incision healed well, with minimal visible scarring, preserving the aesthetic appeal of the forehead and eyebrow region. confirmed adequate fracture reduction, proper placement of the titanium mesh, and relief of brain parenchyma impingement. This case demonstrates the utility of a suprabrow incision in managing complex frontal bone fractures. The technique provides adequate access to the surgical site, minimizes visible scarring, and enables effective fracture stabilization, particularly in cases where aesthetic and functional outcomes are critical.

DISCUSSION

The bicoronal approach is one of the most widely employed techniques for addressing frontal bone fractures. However, it carries notable complications, including visible alopecia along the incision line, potential injury to the frontal branch of the facial nerve, extended operation times, prolonged hospital stays due to the extensive area of dissection, and an increased risk of postoperative bleeding.^[10] In contrast, the suprabrow and split-brow incision techniques offer a minimally invasive alternative with distinct advantages. These approaches provide sufficient access and direct visualization of the fracture site, while resulting in aesthetically acceptable scars. The reduced incision size minimizes the risk of alopecia, shortens surgical time, and decreases hospital stay durations, enhancing overall patient recovery and satisfaction. Although these methods are more aesthetically pleasing and technically simpler for surgeons, anatomical variations in patients should be carefully considered before employing them. One significant limitation of these techniques is the difficulty in adequately evaluating and restoring the natural contour of the forehead. Despite this drawback, when selected appropriately, these approaches are effective in managing anterior table frontal bone fractures with fewer complications than traditional methods.^[10]

CONCLUSION

The split-brow or suprabrow incision techniques are viable and effective alternatives for managing frontal bone fractures. They balance surgical efficacy with improved aesthetic outcomes, making them a valuable choice in select cases.

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