



Case Report

# Right fronto parietal decompressive craniotomy in an 8 years-old child with ICA infarct: An enhanced case report

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## Abstract

**Background:** Decompressive craniotomy is a life-saving neurosurgical procedure performed to relieve intracranial hypertension secondary to trauma, infarction, or hemorrhage. This case report presents an 8-yrs-old male who initially had recurrent giddiness and transient limb weakness for 8 months, and then developed acute neurological deterioration, fever, and left-sided hemi paresis due to a Right Internal Carotid Artery (ICA) infarct with malignant cerebral edema. Emergency right fronto-parietal decompressive craniotomy with brain biopsy and cisternostomy for CSF analysis was performed on August 13, 2025. Postoperatively, the patient required mechanical ventilation and intensive care management, focusing on ICP control with 3% NaCl infusion, anticonvulsants, and immediate physiotherapy. This enhanced case report highlights the importance of early recognition, detailed vascular imaging (MRA/MRV findings suggesting potential Moyamoya Syndrome), and timely surgical intervention in pediatric ICA occlusion leading to malignant cerebral edema.

**Key words:** Decompressive craniotomy; Pediatric stroke; ICA infarct; Cerebral edema; Moyamoya case reports

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## 1. Introduction

Pediatric stroke is rare but potentially devastating, with internal carotid artery (ICA) occlusion being a significant cause of cerebral infarction in children.

Massive cerebral infarcts often result in malignant brain swelling, leading to raised intracranial pressure (ICP), herniation, and death. Medical therapy alone is often insufficient in such cases, and decompressive craniotomy (craniectomy) is a crucial surgical intervention to relieve pressure and preserve neurological function. Brain biopsy may be performed in uncertain etiologies, such as demyelinating disorders or vasculitis. We report the case of an 8-yrs-old male with ICA infarct and malignant cerebral edema managed by right fronto-parietal decompressive craniotomy and brain biopsy.

## 2. Case Report

### 2.1 Chief complaints and history

The child had a prolonged history of recurrent giddiness with transient weakness of the left upper and lower limb for 8 months, occurring about one episode per month and lasting 1–2 min. These episodes improved completely afterward.

The acute illness began with a low-grade, intermittent fever (3 day), followed by progressive weakness of the left upper and lower limbs (2 day), headache (2 day), vomiting (1 day), drowsiness (1 day), and inability to walk or stand (1 day).

### 2.2 Past History

The child was the 3rd born child to 3rd-degree consanguineous parents. Developmental history was normal, and scholastic performance was good. The child had one episode of seizure which was aborted with anticonvulsants at outside hospital.

## 3. Clinical Examination (On Admission to ER)

- GCS: E2V4M5
- Vital Signs: Febrile, Pulse-64/min, RR-26/min, SpO<sub>2</sub> -99% on O<sub>2</sub> via facemask, BP:110/70mmHg.
- Neurological Assessment: Left-sided hemiparesis. Power assessment showed Hypotonia in the left upper and lower limbs (Rt UL>3/5, LL>3/5; LtUL1/5, LL1-2/5). Signs of raised ICP were present, along with a Right UMN Facial Nerve Palsy (deviation of mouth to right side).
- Blood Sugar: GRBS 164 mg/dL.

## 4. Investigations and Diagnosis

### 4.1 CT Brain (Plain)

Hypodensity in the right fronto-temporo-parietal cortical and subcortical area with hemorrhage, midline shift of 5mm to the left

### 4.2 CE MRI Brain with MRA/MRV

Showed acute infarct in the right MCA and ACA territory with significant mass effect and midline shift. Angiography revealed diffuse narrowing of the bilateral ICA from its origin up to the distal end. Right ACA and MCA opacified showed significant luminal narrowing (vasospasm). No evidence of thrombosis was seen.

### **4.3 CSF Analysis**

Collected intra-operatively. Showed elevated RBC's and LDH sign of hemorrhagic CSF. Gram stain and fungal stain were negative.

### **4.5 Brain Biopsy**

Showed Reactive Gliosis associated with inflammation and surface inflammatory exudates.

### **4.6 Lipid Profile**

Showed borderline elevation of all lipid components, and fasting lipid profile done post-operatively showed elevated LDL Cholesterol and decreased HDL and mildly increased triglycerides.

### **4.7 Diagnosis**

Acute Ischemic Stroke/Left Hemiparesis secondary to Right ICA Stenosis with Right Malignant MCA/ACA Territory Infarct and Left Upper motor neuron Facial Nerve Palsy.

## **5. Surgical Procedure Date: 13/08/2025**

### **5.1 Procedure**

Right Fronto-Temporo-Parietal (FTP) Decompressive Craniotomy with Brain Biopsy and Cisternostomy for CSF Analysis under General Anesthesia.

### **5.2 Findings**

Brain bulged, and the dura was tensed.

### **5.3 Key Steps**

A large bone flap was removed and not replaced. A non-pulsatile cisternostomy was performed in the tentorial cistern. A frontal lobe 2cm×8cm tissue biopsy was taken. Duraplasty was done with a pericranium graft. Hemostasis was secured and drains were placed.

## **6. Post-operative Management and Hospital Course**

### **6.1 Intensive Care and ICP Management:**

- Post operatively, the child was initially on mechanical ventilation. ICP management utilized:
- Started on 3% NaCl bolus and infusion.
- Mannitol was restarted on post-op day 3, then stopped on day 4.

- Head elevation 30°
- Strict intake/output(I/O) chart was maintained to prevent electrolyte imbalance and for adequate hydration.

## **7. Nursing Management**

Nursing care was crucial for optimizing recovery:

### **7.1 Preoperative Care**

Included neurological assessment, GCS monitoring, control of fever, and securing IV access.

### **7.2 Airway and Ventilation**

Maintaining airway and ventilator support until extubation

### **7.3 Neurological Monitoring**

Hourly neuro checks (GCS, pupils, limb movement).

### **7.4 Infection and Wound Care**

Administration of IV antibiotics (Inj.Cefuroxime), and meticulous wound and drain care with aseptic precautions.

### **7.5 Nutrition and Rehabilitation**

Nutritional support through NG feeds and eventual shift to tolerated oral feeds. Early, regular physiotherapy (chest and limb exercises) and mobilization were initiated.

### **7.6 Integumentary Care**

Regular repositioning and care were managed for the surgical wound site and prevention of pressure injuries. The child developed itching and watery discharge from the wound during HDU stay, necessitating reinforcement of sterile dressings.

## **8. Hospital Course and Discharge**

The child was successfully extubated to room air on day 3 of the ICU stay and was shifted to further ward care.

### **8.1 Final Condition at Discharge**

Child was stable, afebrile, and alert GCS E4V5M6, hemodynamically stable, with adequate hydration and urine output.

## 8.2 Neurological Outcome

There was gradual improvement in hemiparesis. At discharge, the child was alert and able to sit and stand with support. Power: RtUL5/5, LL5/5;LtUL1/5,LL2-3/5.

## 8.3 Discharge Planning

The child was discharged and shifted to HAMSA for neuro-rehabilitation.

## 8.4 Follow-up Investigation

Plan to collect the Whole Exome Sequencing (WES) report and schedule a Digital Subtraction Angiography (DSA) after 4 weeks.

## 8.5 Future Surgical Plan

If DSA confirms Moyamoya, the plan is to proceed with Superficial Temporal Artery-Middle Cerebral Artery (STA-MCA) bypass surgery, starting on the left side, with coordination from the plastic surgery team.

## 8.6 Rehabilitation

Continued occupational therapy and physiotherapy were strongly advised.

## 9. Discussion

Large vessel occlusion in pediatric patients is uncommon but carries high morbidity. In this case, recurrent ischemic symptoms (TIAs) preceded an acute ICA infarct with malignant cerebral edema. The key findings from the MRA/MRV, showing diffuse bilateral ICA narrowing and significant ACA/MCA vasospasm, strongly suggests an underlying vasculopathy. This pattern, combined with the child's presentation, is highly suspicious for Moyamoya Syndrome (MMS). MMS is a progressive disorder characterized by stenosis or occlusion of the internal carotid arteries, leading to the compensatory growth of small, fragile collateral vessels (the "moyamoya" puff of smoke appearance on angiography). Medical management alone proved inadequate to control the swelling, making the decompressive craniotomy (craniectomy) the appropriate life-saving treatment to prevent catastrophic brain herniation and mortality. The brain biopsy helped to rule out other inflammatory causes, such as Acute Disseminated Encephalomyelitis (ADEM), confirming reactive gliosis in the presence of hemorrhage. The patient's post-operative care was aggressive and specialized. For Intracranial Pressure (ICP) control, hypertonic agents like 3% NaCl were used. Hypertonic saline is often preferred in large ischemic strokes as it effectively reduces cerebral edema and can help maintain adequate cerebral perfusion pressure, particularly when compared to standard mannitol protocols. The patient's positive outcome—demonstrated by improved GCS E4V5M6 and the ability to

sit and stand with support upon discharge—confirms the benefit of early surgical intervention and aggressive neuro-critical care. Crucially, the planned future revascularization (STA-MCA bypass) is necessary to improve cerebral blood flow to the ischemic brain area and prevent future strokes, which is the standard of care for confirmed MMS. The STA-MCA bypass involves surgically connecting the superficial temporal artery (STA) to a branch of the middle cerebral artery (MCA) to provide a new blood supply, thus reducing the reliance on the damaged ICA system.

#### **10. Conclusion**

This case emphasizes the importance of early recognition of progressive neurological deficits in children with suspected vascular pathology. Decompressive craniotomy remains a critical intervention for malignant cerebral infarction, significantly improving survival. The clinical and radiological findings strongly point toward a diagnosis of Moyamoya Syndrome, necessitating planned future vascularization (STA-MCA bypass). Comprehensive, specialized nursing care and early intensive neuro-rehabilitation are essential for optimizing neurological recovery and function in these complex pediatric patients.