



## The Paradoxical Cerebral Herniation and Pseudohypoxic Brain Swelling: Two Lethal Forms of Severe Intracranial Hypotension

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### Abstract

Paradoxical Cerebral Herniation (PCH) is a life-threatening condition in patients with large craniectomies precipitated by a gradient between the atmospheric and intracranial pressure resulting in brain compression.

**Keywords:** Paradoxical cerebral herniation; Pseudohypoxic brain swelling; Severe intracranial hypotension

### Introduction

There are several reports of sudden neurological impairment after uneventful surgeries with imaging resemble those of hypoxic encephalopathy, and are caused by a sudden intracranial hypotension by the effect of negative pressure drainage this entity is known as Pseudohypoxic brain swelling (PBS) [1-3].

### Case Presentation

#### Case 1

This is a case report of a 17-year-old male that suffered a severe TBI with bifrontal craniectomy. After uneventful cranioplasty repair with autologous graft a sudden neurological deterioration up to coma was verified, concomitant with a high output of the aspiration subgaleal drainage; head CT showed diffuse cerebral swelling with hypodensity predominantly on the basal ganglia. Soon after the patient developed signs of brain death and dies (Figure 1).

#### Case 2

A 46-year-old male underwent hemicraniectomy after a severe TBI with satisfactory recovery with a GCS of 14. Two and half month's later patient suffered rapid neurologic deterioration, accompanied by prominently depressed skin flap. No evident CFS leak was found. An emergency cranioplasty repair was performed followed within a few hours by dramatic clinical and radiological improvement. The patient returned to his previous condition and remained asymptomatic at the one-year follow-up (Figure 2).

### Conclusion

We report two infrequent but lethal caused by severe intracranial hypotension. For PBS epidural

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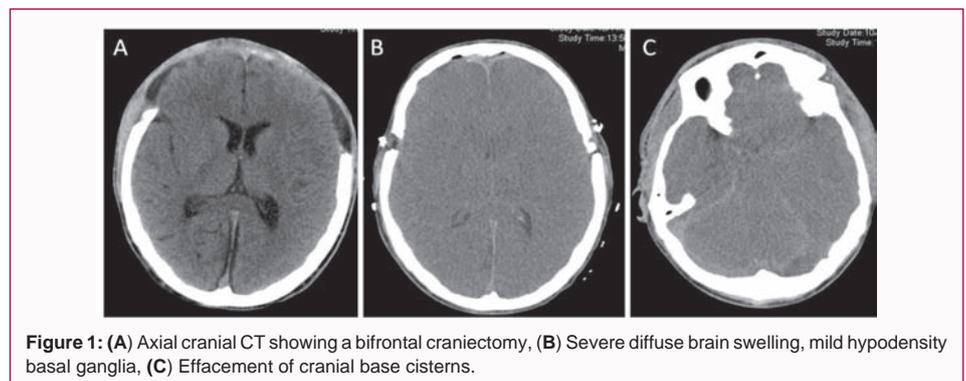
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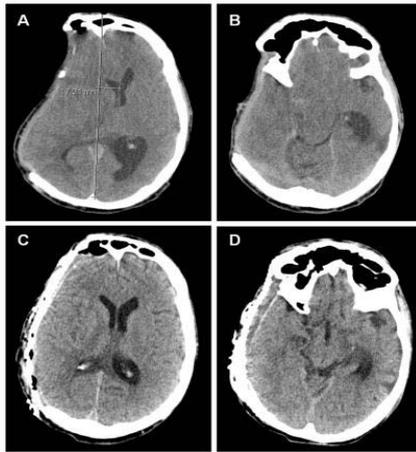
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**Figure 1:** (A) Axial cranial CT showing a bifrontal craniectomy, (B) Severe diffuse brain swelling, mild hypodensity basal ganglia, (C) Effacement of cranial base cisterns.



**Figure 2:** Axial CT scans. (A, B) Marked concavity at the craniectomy site, displacement and compression of the brain with 17 mm midline shift, effaced sulci, basal cistern obliteration and uncal herniation with brainstem compression immediately prior to the emergency cranioplasty. (C, D) Five hours after this cranioplasty significant decrease of the midline shift is noted along with reappearance of basal cisterns and resolution of signs of transtentorial herniation with reduced dilation of left temporal horn.

aspiration drains should be avoided and is advisable to perform cranioplasty before 3 months for preventing PCH.

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