

# External brain tamponade syndrome after subgaleal drain removal: A case report

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## Abstract

**Background and importance:** Only two cases of external brain tamponade syndrome have been reported in the literature, both of them occurring after decompressive craniectomy. We report the first case to our knowledge of External Brain Tamponade (EBT) syndrome occurring after subgaleal drain removal in a patient with frontal fractures.

**Clinical presentation:** We present a case of a 25-yr-old male with immediate neurological deterioration and brain herniation syndrome after subgaleal drain removal, leading to a massive subgaleal hematoma. The hematoma caused a huge mass effect in the frontal lobes through a frontal fracture and EBT syndrome.

**Conclusion:** External brain tamponade syndrome is a rare complication following decompressive craniectomy. We reported a case of EBT syndrome following subgaleal drain removal. We advise for the terminology EBT syndrome, instead of only EBT.

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**Keywords:** External brain tamponade syndrome; Cerebral herniation; Subgaleal drain.

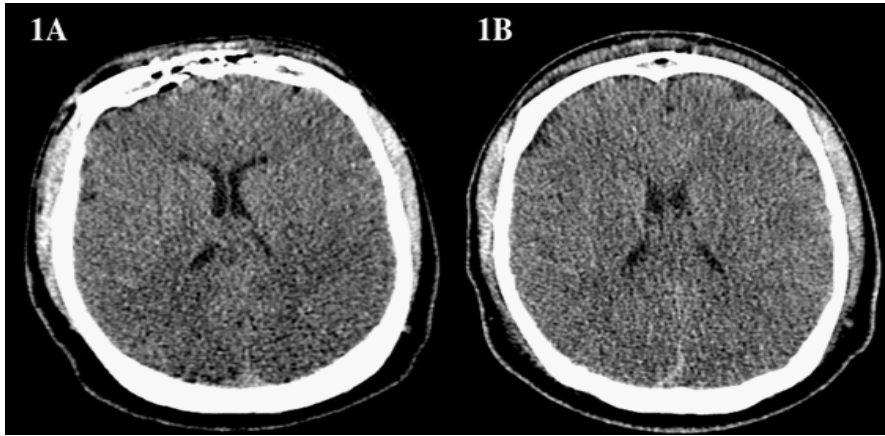
## Introduction

Acute neurological deterioration following Traumatic Brain Injury (TBI) can stem from a wide range of causes, and its early recognition is crucial for favorable neurological outcomes. In addition to metabolic disturbances, the underlying pathophysiology is often explained by the Monro-Kellie doctrine [1]. This doctrine posits that the cranium, as a rigid compartment, maintains Intracranial Pressure (ICP) through a delicate balance of cerebrospinal fluid, intracranial blood, and brain parenchyma. Once a critical volume threshold is exceeded, even small increases in volume can cause significant rises in ICP. However, extracranial factors causing mass effects and resulting in intracranial hypertension are rare and not well-documented in the literature. Here, we present the first reported case of External

Brain Tamponade (EBT) syndrome following subgaleal drain removal, which led to acute neurological deterioration and brain herniation.

## Clinical presentation

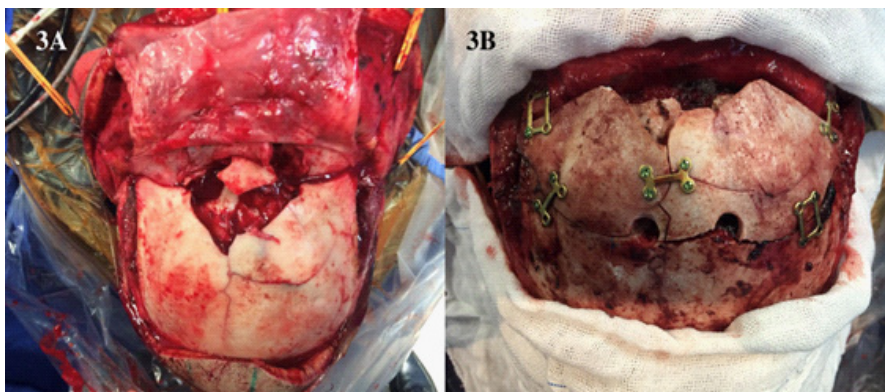
A 25-year-old male was admitted to our hospital following a motorcycle accident with a Glasgow Coma Scale (GCS) score of 6 at the scene. His initial Computed Tomography (CT) scan revealed an epidural hematoma, pneumo cranium, and multiple facial and frontal fractures (Figure 1A). The patient underwent surgical repair of the frontal fractures and correction of liquoric fistulae (Figure 1B). External Ventricular Drainage (EVD) and a subgaleal drain were placed during surgery. Postoperatively, he was transferred to the Trauma Intensive Care Unit (ICU), where he showed neurological improvement and was successfully



**Figure 1:** (A) Admission (CTu). (B) CT after surgical correction of the frontal fractures and liquoric fistulae correction.



**Figure 2:** (A) Massive facial edema after subgaleal drain removal. (B) Massive subgaleal hematoma generating a mass effect in the frontal lobes through a frontal fracture.



**Figure 3:** Surgery for evacuation of the hematoma and surgical correction of the frontal fractures.

weaned off mechanical ventilation. One day after surgery, the subgaleal drain was removed. Within minutes, the patient developed significant facial edema (Figure 2A), a decreased level of consciousness, and anisocoria. An increase in External Ventricular Drainage (EVD) output was also noted. Immediate clinical interventions for intracranial hypertension were initiated. Blood tests revealed no abnormalities.

Given the patient's acute neurological deterioration, a brain CT scan was promptly ordered (Figure 2B), and the neurosurgical team was consulted. The CT revealed a large subgaleal hematoma exerting mass effect on the frontal lobes through a frontal fracture. These radiologic and clinical findings were consistent with external brain tamponade (EBT) syndrome. The pa-

tient was swiftly taken to the operating room, where the hematoma was successfully evacuated, and the frontal fractures were surgically repaired (Figures 3A,3B). He was discharged from the hospital 32 days after the trauma with a Glasgow Coma Scale (GCS) score of 13.

### Discussion

External brain tamponade (EBT) syndrome is a rare complication following Traumatic Brain Injury (TBI). In the only two case reports available in the literature [2,3]. EBT occurred after decompressive craniectomy. Pressurized subgaleal fluid can exert a mass effect through a compromised skull. Diagnosis is primarily clinical, based on a history of skull fracture, neurological deterioration, and tense scalp swelling. Imaging studies can aid in

identifying the source of fluid accumulation and assessing the extent of the mass effect. Neurological improvement following fluid drainage further supports the diagnosis.

Historically, the term “brain tamponade” has been used to describe a reduction in cerebral blood flow resulting from an acute increase in Intracranial Pressure (ICP) [4,5]. More broadly, it can be considered synonymous with intracranial hypertension when cerebral perfusion pressure falls below recommended levels.

We recommend using the term “EBT syndrome” rather than simply “EBT,” as the combination of signs and symptoms dictates the need for urgent intervention. The presence of fluid accumulation alone does not determine the need for surgical intervention or clinical management, as evidenced by asymptomatic subgaleal hematomas.

### Conclusion

External Brain Tamponade (EBT) syndrome is an exceptionally rare complication following decompressive craniectomy. In this report, we present a case of EBT syndrome that occurred after subgaleal drain removal in a patient with traumatic frontal fractures. A comprehensive neurological examination, combined with clinical findings, effectively leads to the diagnosis and guides the need for surgical intervention.

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