

Tension Pneumocephalus

RUSSELL G. PRICHARD, MD

ABSTRACT

Tension pneumocephalus (TPC) is a rare but devastating intracranial condition where increased intracranial pressure due to entrapped air causes compression of the brain leading to headache, seizures, altered mental status (AMS), and death. The author presents the case of patient with a past medical history of eye-enucleation who subsequently developed TPC in the setting of occult trauma. The diagnosis was made via computed tomography (CT) scan and the patient underwent needle and burr-hole decompression in the emergency department (ED). TPC is a rare cause of altered mental status, which occurs most often secondary to trauma, and should be considered in patients with AMS and trauma.

KEYWORDS: tension pneumocephalus, trauma, altered mental status, Mount Fuji sign, radiology

Upon arrival to the Emergency Department the patient was protecting his airway but not following commands. After stabilization, the patient underwent emergent imaging which demonstrated tension pneumocephalus, hemorrhagic contusion of the left occipital lobe, trace parafalcine hemorrhage, and bilateral subdural collections thought to be either empyemas or chronic subdural hematomas [Figures 1,2].

Neurosurgery and Ophthalmology were consulted. The patient received reversal of his anticoagulation and antibiotics, followed by emergent needle decompression and bilateral burr hole placement with reduction in his TPC [Figures 3,4]. He had a one-time seizure after decompression, which was treated with lorazepam and a levetiracetam load.

Consistent with a previously theorized mechanism,^{1,2} it is likely that air was entering through the wound in the patient's eye and the skin flap there caused a valve effect – allowing air in but not out [Figure 2]. This was treated in the Emergency Department with iodine impregnated gauze and an occlusive dressing over the wound site. Despite the above

CASE REPORT

A 92-year-old male with a past medical history of atrial fibrillation on warfarin, and skin cancer with eye enucleation surgery 3 years ago, presented with a Glasgow Coma Scale of 10 after an unwitnessed fall at home. From family members it was learned the patient had presented to an outside hospital 3 days earlier for a chronic wound at the site of the previous eye enucleation. Although it was not stated at the time, the patient had fallen several times without telling anyone, and only notified his son because the wound was now “bubbling.” After the wound was cleaned, he was discharged without imaging and he continued to get weaker and less interactive until this morning, when he fell out of bed.

Figure 1. CT scan without contrast, transverse plane view showing extensive pneumocephalus, with effacement of the frontal lobes bilaterally (Mount Fuji Sign), as well as bilateral mixed-density collections.



Figure 2. CT scan without contrast, transverse plane view again showing extensive pneumocephalus, and also possible entry site of air with bone loss in the left orbit.



efforts, over the next 24 hours his mental status remained poor, he developed acute kidney injury and sepsis from central nervous system infection. He was made comfort measures only the following morning and subsequently passed away 1 day later.

Figure 3. Lateral Portable Skull X-ray showing extensive bilateral pneumocephalus with 2 distinct air-fluid levels.

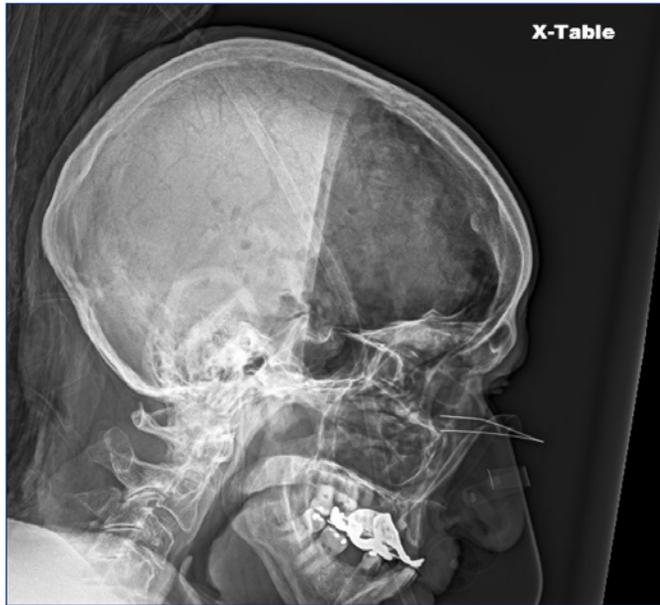


Figure 4. Lateral Portable Skull X-ray (the fourth in the series) showing improved bilateral pneumocephalus after several needle decompression attempts, but prior to bedside external ventricular drain placement.



DISCUSSION

Pneumocephalus, or air in any of the intracranial spaces, is a rare event and is often caused by trauma as in our patient, or iatrogenically.¹ Diagnosis is made by CT scan, which is more sensitive and specific than cranial X-rays. Smaller volumes of air, 1–2 mL, usually resolve without intervention and monitoring is the mainstay of therapy in most patients with skull fracture and pneumocephalus.^{1,2} TPC is the extreme endpoint of air inside the skull, leading to compression of the brain with predominate effect exerted on the frontal lobes. Although it has its own radiographic sign, Mount Fuji Sign – so named because the frontal lobes resemble a lonely mountain silhouetted against the sky – very little data exists on its overall prevalence or mortality.^{1,3}

Definitive treatment is with early surgical intervention,^{1,4} and decompression of TPC should be paired with early antibiotic therapy for presumed CNS infection. Although exact statistics are unknown, progression to TPC seems to carry a very poor prognosis. Because it is a devastating injury, TPC should be considered in the differential of patients with head trauma and altered mental status.

References

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Author

Russell G. Prichard, MD, PGY3, Emergency Medicine Residency, the Alpert Medical School of Brown University, Providence, RI.

Correspondence

Russell G. Prichard, MD
Rhode Island Hospital
593 Eddy Street
Providence RI, 02904
rprichard@lifespan.org