

Management of Post Traumatic Tension Pneumocephalus

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Abstract: *The presence of intracranial air (pneumocephalus) following a brain trauma is a common event and is often trivial. However, tension pneumocephalus can be defined as a large asymmetric accumulation of air, may act as a space occupying lesion causing brain compression and resulting in neurological deterioration. We report a case of post-traumatic compressive pneumocephalus responsible for severe neurological deterioration. CT scan confirmed the skull base fracture with a huge pneumocephalus and the patient operated successfully with clinical improvement of his symptoms and radiographic resolution of his condition. Compressive pneumocephalus is a rare and serious complication, also his management should also be well known by the medical staff.*

Keywords: Pneumocephalus, head traumatism, surgery, CT scan.

Abbreviations: CT: cerebral tomography; TP: tension pneumocephalus

1. Introduction

Tension pneumocephalus (TP) is the presence of air in the cranium that is under pressure, most commonly secondary to a traumatic head injury. Post-traumatic tension pneumocephalus can become a life-threatening condition, resulting from an open communication between the intracranial space and the outside world [1]. TP is associated with increased intracranial pressure and can cause serious neurological deterioration requiring urgent intervention to repair the causal breach in the dura via craniotomy.

2. Case report

We present the case of a 40-year-old gentleman who presented to the emergency department following a car accident. He was alert, GCS = 14/15, bilateral periorbital ecchymosis, with no clinical evidence of raised intracranial pressure.

The CT scan showed skull base fracture and significant pneumocephalus without parenchymal anomalies (Figure 1). Six hours later the patient showed clinical signs of raised intracranial pressure, and decrease GCS to 10/15. However, an additional CT scan using a bone window and thin slices, demonstrate a tension pneumocephalus which necessitates urgent decompression (Figure 2). The volume of intracranial air even increased therefore, surgical repair of the leak remained the only solution. Surgery was done under general anaesthesia, after identifying the dural defect; it became clear that the CSF leak and air entry were caused by the avulsion of the olfactory filaments from the cribriform plate. Free autologous pericranium was glued against the defects using the fibrin glue.

After surgery, the patient regained consciousness, and was extubated. Moreover, gradual decrease of the amount of intracranial air was confirmed by CT scan (Figure 3). He was discharged home 10 days later with no neurological deficit.

3. Discussion

The terms pneumocephalus and tension pneumocephalus (TP) were created by Wolff [2] and Ectors [3] respectively. When the presence of air within the intracranial cavity causes increased intracranial pressure that leads to neurological deterioration, it is called TP [4]. Due to a perceived similarity with an iconic mountain peak in Japan, Ishiwata et al. [5] described the image of TP with compression of the frontal lobes and widening of the interhemispheric space between the frontal lobes. The pathophysiology is based on the principle of a ball valve explained by increased pressure allows air to be forced intracranially and the air remains trapped [6].

The clinical signs of TP such as intracranial hypertension or neurological deterioration of consciousness are the most common. The goal of the treatment consists of emergent decompression to decrease pressure on the brain parenchyma [7]. Surgical options for TP include the drilling of burr holes, needle aspiration, and also closure of the dural defect as performed in our case. Although, different surgical procedures has been reported using intracranial intradural endoscopic approach, as simple and safe alternative for closing CSF leaks in patients with TP [4]. In the other hand, the conservative treatment may be discussed in some patients with bed rest, oxygen therapy sessions in a monoplace hyperbaric chamber, neurological monitoring

and anti-epileptic with rehydration and normobaric oxygenation [8].

Conclusion

Symptomatic compressive pneumocephalus is a rare complication following head trauma that should be known by neurosurgeon. An emergent surgical treatment might be adequate even in presence of severe symptomatic manifestations.

4. References

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Figures

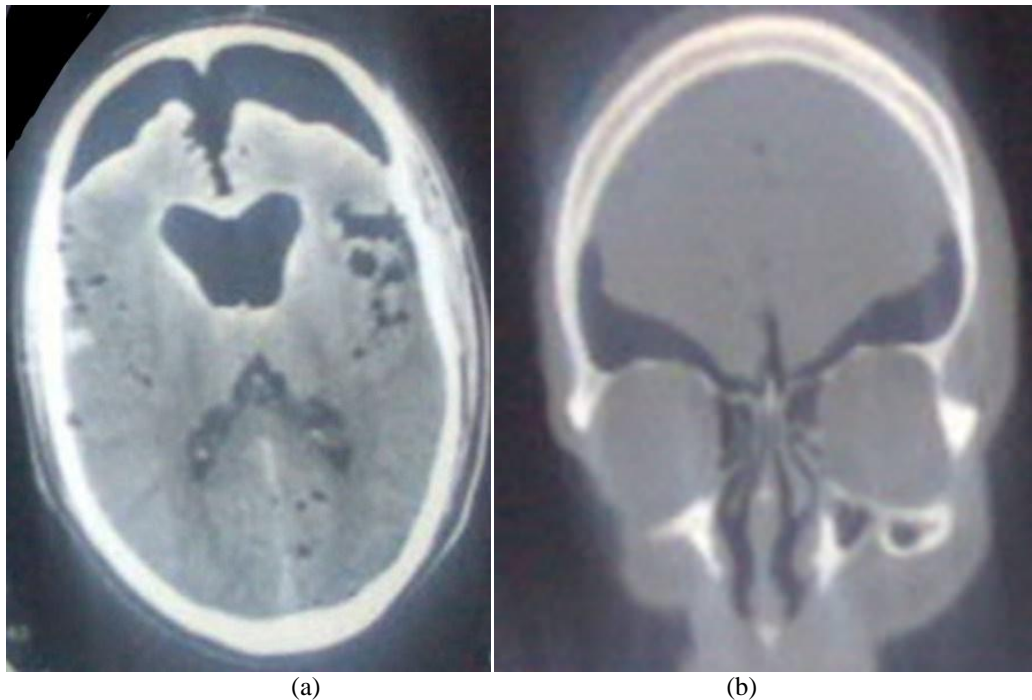


Figure 1: Axial (a) and coronal CT cerebral CT scan showing bifrontal pneumocephalus

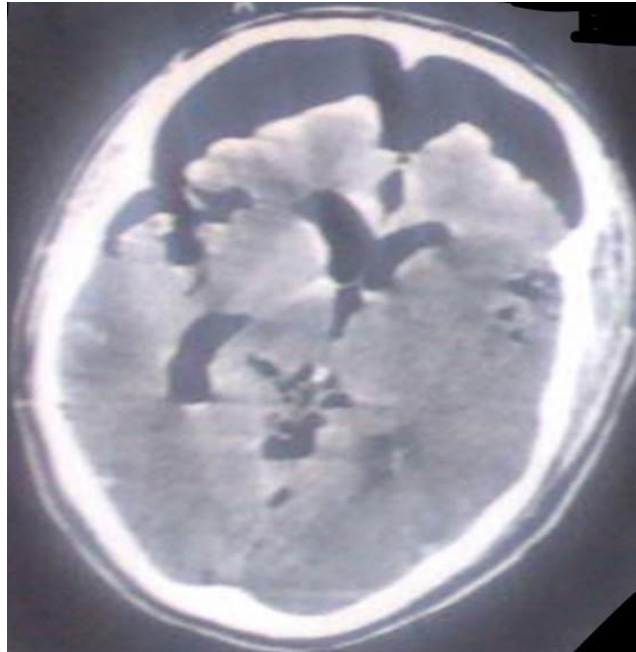


Figure 2: Axial cerebral CT scan demonstrating the Mont Fuji sign

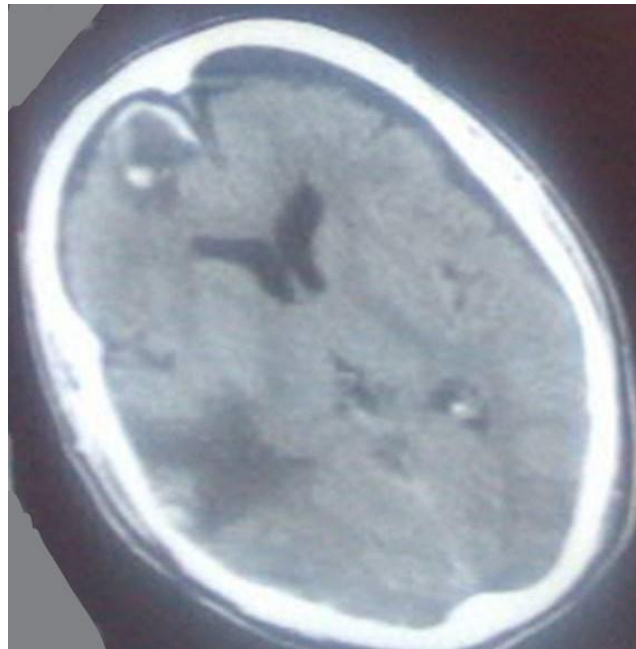


Figure 3: Post-operative CT scan showing decreased pneumocephalus