

## Traumatic Head Injury and Pneumocephalus

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A 17-year-old previously healthy boy was admitted to the emergency department with a frontal traumatic head injury (head-to-head collision) that occurred one hour before during a football game. He presented with frontal headache, dizziness, and epistaxis. Denied loss of consciousness, amnesia, somnolence, or vomiting. Upon physical examination, he had a 15 Glasgow coma scale, left frontal area erythema, and anterior and posterior epistaxis confirmed by otorhinolaryngology. The neurological examination was normal. A skull radiography showed air inside the intracranial cavity (Figs. 1 and 2) and, therefore, a head computed tomography (CT) was performed thereby revealing a fracture at the base of the left frontal sinus with intracranial air (Figs. 3 and 4). After discussing the case with neurosurgery, a prophylactic antibiotic (ceftriaxone) and aminocaproic acid were started and he was hospitalized for analgesia, bed rest (head elevation of 30°), and monitoring. He presented a favorable evolution with the resolution of symptoms in 48 hours. On the fourth day of hospitalization, a head CT was repeated revealing a practically total reabsorption of the intracranial air foci. The patient was discharged with scheduled neurosurgery reevaluation.

Pneumocephalus consists of air accumulation inside the intracranial cavity<sup>1</sup> and is associated with firearm injuries, neurosurgery, barotrauma, basilar skull and nasopharyngeal tumors, meningitis, basilar skull and paranasal sinuses fractures.<sup>2</sup> Pneumocephalus may occur in 0.5%-1% of all traumatic head injury. The anatomy of the frontal bone and its proximity to the *dura mater* predisposes the air entrance into the subdural space after trauma.<sup>3</sup> The symptomatology is caused by increased intracranial pressure and is characterized by headache, seizures, loss of consciousness, nausea, vomiting, dizziness, and hemiparesis.<sup>2</sup> A head CT is the gold standard exam to diagnose and evaluate its extension.<sup>4</sup> There is no consensus in the literature regarding the use of prophylactic antibiotics.<sup>5</sup> The pneumocephalus tends to regress spontaneously with conservative treatment and, in most cases, there is no need of surgery.<sup>4</sup>



**Figure 1.** Skull radiography, sagittal plan, showing air inside the intracranial cavity (blue arrows).



**Figure 2.** Skull radiography, coronal plan, showing air inside the intracranial cavity with bilateral frontal expression (blue arrows).

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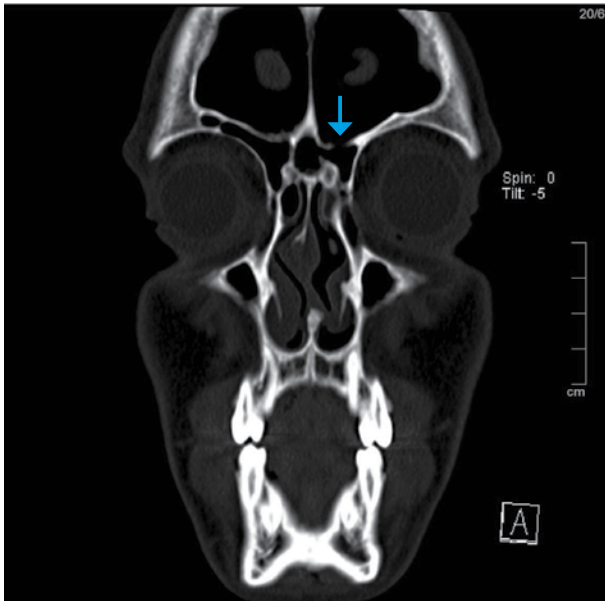
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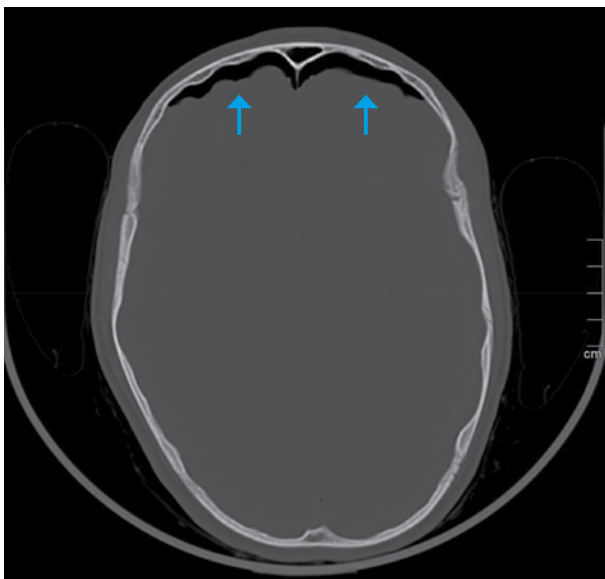
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**Figure 3.** Head computed tomography, coronal plan, revealing recent fracture at the base of the left frontal sinus (blue arrow).



**Figure 4.** Head computed tomography, axial plan bone window, revealing extra-axial intracranial air component, with bilateral frontal expression (blue arrows).

**Keywords:** Adolescent; Brain Injuries, Traumatic/ complications; Pneumocephalus/diagnosis; Pneumocephalus/etiology; Pneumocephalus/therapy; Skull Fractures

#### WHAT THIS REPORT ADDS

- Pneumocephalus consists of an air accumulation inside the intracranial cavity.
- Traumatic head injury is the most important cause of pneumocephalus.
- Pediatricians must consider pneumocephalus in a patient with a history of traumatic head injury and presence of some of these symptoms: frontal headache, seizures, loss of consciousness, nausea, vomiting, dizziness, and hemiparesis.
- The duration and intensity of symptoms are directly related to the amount of intracranial air and the head CT is the gold standard exam.
- A complete physical exam and an adequate monitoring of patients with a traumatic head injury are particularly important to detect intracranial lesions, such as the pneumocephalus, which is a benign and self-limiting condition that can be managed conservatively.

#### Conflicts of Interest

The authors declare that there were no conflicts of interest in conducting this work.

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#### Consent for publication

Consent for publication was obtained.

#### Confidentiality of data

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

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