Traumatic Pneumocephalus

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December 2011

Edited by
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Introduction

Pneumocephalus is defined as an intracranial gas collection which can be localized in the epidural, subdural, subarachnoid, intraventricular or intraparenchymal spaces. Pneumocephalus has numerous causes, including barotrauma, neoplasms, and spinal anesthesia. However, the majority of pneumocephalus cases are traumatic or iatrogenic in nature. A review of 295 patients with pneumocephalus by Markham also indicated that trauma is the most common cause of pneumocephalus and accounts for 75% of cases. Similar research finds pneumocephalus occurring in 0.5 to 1.0% of head trauma. In such traumatic cases, air can gain access into the cranium through a fracture involving a paranasal sinus or the middle ear cavity or less frequently in association with a compound depressed fracture of the cranial vault.

Intracranial pneumocephalus was first described 1866 by Thomas in a report of a trauma patient autopsy. Another early description of traumatic pneumocephalus was in 1934 when the author assumed the negative pressure difference between the sinus and the cranium was the etiology of pneumocephalus. Traumatic pneumocephalus was then hypothesized to be due to cranial fractures which were adjacent to higher pressure cavities, such as the transsphenoid sinus. The most common complaint in pneumocephalus is headache. Other symptoms include CSF rhinorrhea, meningeal signs, hemiparesis, papilledema, and cranial nerve palsies. However, the appearance of pneumocephalus is often vague and the diagnosis is often unsuspected. Most cases of

spontaneous pneumocephalus require surgery. However, if there is no evidence of infection or cerebrospinal fluid leak, bed rest and follow-up imaging is an alternative treatment. Herein, we report on a 74 year old male who presented to the trauma department with a crush injury to his head with traumatic pneumocephalus.

Key Words:
intraventricular spaces, intraparenchymal spaces, transsphenoid sinus.

Case Report

A 74 y/o male presented to the trauma bay with a crush injury to his head. The patient had been trapped in the wheel well of a 747 jet. At the scene, he was alert and moving all extremities, but secondary to respiratory compromise was intubated. Upon arrival to the trauma bay, physical exam revealed a 12cm "V" shaped scalp laceration to the left temporal bone, unequal pupils, and blood from both nares and left ear. Additionally, a lower extremity deformity was identified. He was stabilized in the bay and transported to the CT scanner.

CT scan showed multiple basilar skull fractures, cervical spine injury, multiple facial fractures, intracranial hemmorhage and massive pneumocephalus with air within the spinal cord. Following CT scan, he was transferred to the ICU for serial neurological exams.

Despite the multiple intracranial injuries, the patient followed simple commands and moved all extremities. On hospital day five the patient's mental status declined and a CT scan was obtained. The scan showed extensive cerebral infarction but remarkably the final CT showed minimal pneumocephalus.

Discussion

The majority of cases of pneumocephalus are secondary to trauma or medical intervention. Spontaneous, non-traumatic pneumocephalus is an uncommon condition. Despite the mechanism, pneumocephalus can be symptomatic or asymptomatic. Symptomatic pneumocephalus is a neurosurgical problem, which requires decompression and possible repair of the defect. If asymptomatic, as in the case of our patient, conservative therapy including serial neurological exams, supplemental oxygen and time are the therapy of choice.

FIG 1 shows pneumocephalus within the cranium of a middle aged female traumatized following a motor vehicle accident. The patient was ejected from the car and sustained a severe traumatic brain injury. CT scan of the patient's head revealed subdural hematoma, subarachnoid hemorrhage and intracerebral contusions as well as the presence of air within her cranium i.e. pneumocephalus. FIG 2 depicts an X-ray showing nasal and orbital fractures and pneumocephalus.

FIG 1

FIG 2

References

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