Extensive pneumocephalus after nose blowing: an unusual cause of severe headache

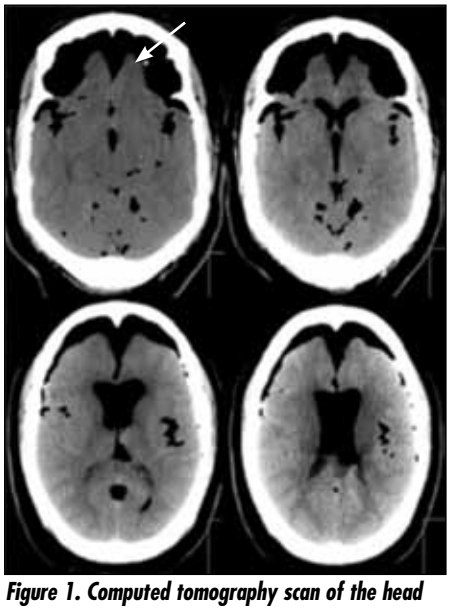

Figure 1. Computed tomography scan of the head showing extensive frontal pneumocephalus with compression and separation of the frontal lobes. The wider inter-hemispheric space between the two lobes is called the Mount Fuji sign (white arrow).

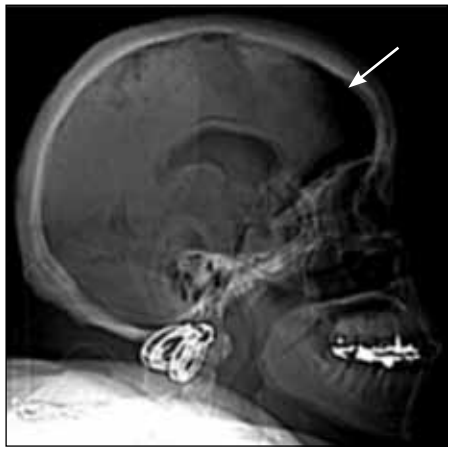

Figure 2. Right lateral computed tomography scanogram of the head demonstrating the large frontal air level consistent with pneumocephalus (see white arrow).

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Introduction

Headache is a common presentation in the emergency department. The differential diagnosis for unexplained acute onset of severe headache is wide and must exclude intracerebral pathology such as cerebrovascular accidents or thrombosis. Pneumocephalus is the presence of air or gas within the cranium. Spontaneous pneumocephalus is a rare event but has been described in the literature. This case highlights the importance of early imaging in unexplained acute severe headache and emphasizes the presentation and the importance of history, examination and awareness in this diagnosis.

Discussion

Diffuse and extensive pneumocephalus is an extremely rare cause of headache and is usually associated with penetrating trauma (70%), tumours (13%), neurosurgical intervention and more rarely infections and lumbar puncture (Villa and Capdevila, 2008). Simple plain skull radiography is diagnostic of the condition and can identify as little as 2 ml of air (Chan et al, 2000; Onal et al, 2006).

Rare cases of similar barotrauma-induced pneumocephalus have been reported (Chan et al, 2000; Schrijver and Berendse, 2003). Chiari et al described abnormalities in the sphenoid possibly secondary to a

Case Report

A 54-year-old Afro-Caribbean woman presented to the emergency department with a 1-day history of severe headache and general malaise. The pain started suddenly after blowing her nose, was frontal in location and became rapidly severe and throbbing in nature. There were no symptoms that would suggest orthostatic headache, no dizziness or vertigo, no visual or auditory disturbance and no neurological weakness. The pain was worse on movement, coughing and bending and was associated with photophobia, nausea and the development of a clear nasal discharge. Previous medical history was unremarkable; there was no history of sinus or nasal problems, no recent headaches or migraines, no visual abnormalities and no life history of head injury or nasal trauma. Examination was largely unremarkable; on arrival her Glasgow Coma Scale was 15 and she was apyrexial with no meningism or photophobia. No evidence of intracranial hypertension was found. There was slight skull tenderness on palpation over the frontal sinus, but the remainder of her neurological (including cranial nerve) examination and general examination was unremarkable. Biochemical (electrolytes, liver function, glucose, calcium) and haematological tests revealed a mild neutrophilia (12.5×10^9 cells/litre) but were otherwise normal.

Over the course of the admission, she became increasingly unwell with increasing nausea, further vomiting and fluctuant levels of consciousness. A computed tomography scan of the head showed an extensive pneumocephalus extending to the foramen magnum with marked sulcal and basal cistern effacement (*Figure 1* and *2*). Bone windows revealed a hole in the roof of the right sphenoid sinus. The clear discharge was found to be CSF and sent for microbiology analysis.

Prophylactic cefotaxime and metronidazole antibiotics were commenced and she underwent endoscopic endonasal exploration. The bony defect in the roof of the right sphenoid and the CSF leak were identified. The dural defect was closed with a fascia lata graft and fat harvested from the thigh.

Four days after the operation, she became increasingly confused and a repeat computed tomography scan showed new hydrocephalus. A lumbar puncture was performed and showed an opening pressure of 43 cm (5–20 cm). Two days later she underwent ventricular-peritoneal shunting. She eventually made a full recovery. It is still uncertain whether the hydrocephalus was secondary to a disruption of the sinus by the air pressure in the skull or whether there was hydrocephalus before the events leaking through the ethmoidal bone, suggesting the possibility of spontaneous CSF leak syndrome complicated with pneumocephalus (Schievink, 2000).

chronically infected sinusitis in 1884 (Apostolakos and Roistacher, 2007).

It is thought that the patient increases air pressure, for example in a Valsalva manoeuvre, and the air is forced through the dura defect via a ball-valve effect that only closes when there is equalization of the pressures on either sides (Chan et al, 2000). Although most simple CSF leaks occur without pneumoencephalus, in the presence of a defect the dura is easily ruptured by the increased baropressure such as repeated forceful nose blowing or by a Valsava manoeuvre (Chan et al, 2000; Schrijver and Berendse, 2003).

A reported pathognomonic physical sign of pneumocephalus is an intracranial succussion splash but this is only present in 7% of patients (Steudel and Hacker, 1986). Evidence for the use of prophylactic antibiotics is poor (Steudel and Hacker, 1986). High flow oxygen has been used as well as head elevation and vertical positioning and patients are advised to avoid the Valsalva manoeuvre. Reabsorption of the air occurs spontaneously in about 80% of cases within the first week although rarely aspiration is required in cases of tension pneumocephalus (Lin et al, 2000). The persistence of air in the brain is associated with a worse prognosis, an increased risk of infection and neurological sequelae. **BJHM**

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