Widespread subarachnoidal pneumocephalus development as a complication of influenza: a case report

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Abstract

We present a widespread pneumocephalus case as an unreported complication of influenza infection. The patient suffered from headache, mental changes, delirium, unconsciousness and seizures after a massive and clear running nose. Cranial CT showed widespread air collection in the subarachnoid spaces. The patient was hospitalised and treated with a conservative regimen. Pneumocephalus resolved spontaneously and the patient healed completely. Cranial CT from the third week of treatment was nearly normal.

Key words: pneumocephalus influenza.

Introduction

Pneumocephalus is defined as air collection in the cranium [1]. Most causes of pneumocephalus are due to head trauma or surgical procedures. But cough or sneezing may also be responsible for this pathology [2]. In influenza, it is hypothesized that the replicating viruses at the nasopharyngeal epithelium disrupt the olfactory mucosa and air access to the brain via the olfactory nervous system [3]. Increased intra-thoracic or intra-abdominal pressure may increase intracranial pressure [4]. High intracranial pressure may create a microfistula between the sinuses and the brain and air transport into the cranium through this way. Pneumocephalus presents with mental and motor disturbances [5-7] and even cerebral herniation [1]. Diagnosis is made by identification of air collections on cranial CT or MRI [5]. Fistulas may close spontaneously and surgery is not required [1]. In the presented case, all symptoms and signs were relieved by conservative treatment.

Case report

After a bout of influenza, a nine-year-old boy in a mentally disordered state was admitted to hospital. He had fever, throat pain, nausea and vomiting, cephalalgia, coughing, nasal congestion, high fever (40°C) and drowsiness for two weeks. Recently, after a massive and clear running nose, he suddenly had mental changes, delirium and convulsions followed by unconsciousness. He had no previous injury or congenital malformation. On neurological examination, he had a blood pressure of 90/60 mm Hg, a pulse rate of 130/min, a respiratory rate of 15-20/min and temperature

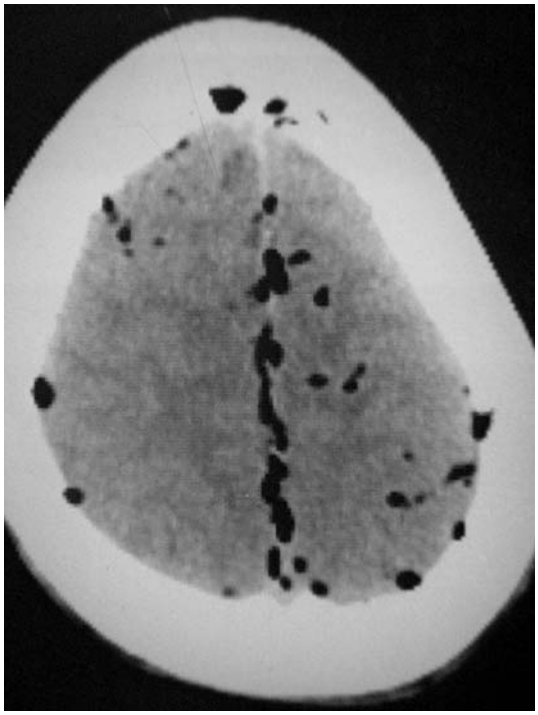

Figure 1. Cranial CT shows widespread pneumocephalus in the subarachnoidal spaces at the frontoparietal and inter-hemispheric locations

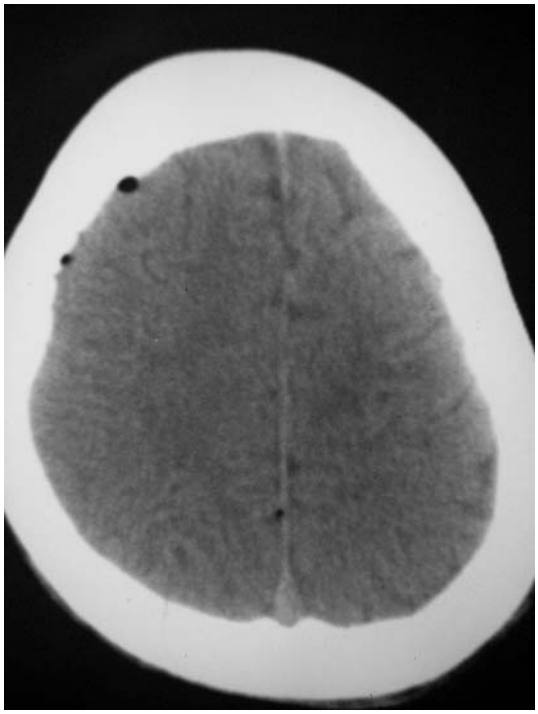

Figure 2. Cranial CT has nearly normal appearance after the end of the third week of treatment

of 41°C. He appeared to have severe psychomotor retardation, was lethargic and had intermittent seizure attacks. There were no signs of meningeal irritation.

Cranial CT revealed widespread subarachnoidal pneumocephalus, especially at the parietal regions (Figure 1). The patient was hospitalized and sedated with Luminaletten and seizure attacks were interrupted. The next day, the laboratory examination revealed mild changes of blood and biochemical parameters: white blood cell (WBC) count 8500 /ml, platelet count 136 000/µl, C-reactive protein (CRP) 7.2 mg/dl and blood sugar 174 mg/dl. Hepatic and renal function tests were normal. The third day after admission, the patient was mildly lethargic, but oriented and cooperative. The cerebrospinal fluid (CSF) was determined sterile and negative for pleocytosis. CSF cultures were negative.

He was treated with intravenous ceftriaxone to prevent meningitis. Luminaletten was also continued for seizure prophylaxis in doses. Within four days of treatment, the patient was significantly improved. Complete disappearance of symptoms occurred progressively over 10 days and CT showed no major evidence of pneumocephalus (Figure 2). At the end of the third week, he was discharged and given oral ceftriaxone and Luminaletten. The patient was normal after 6 months.

Discussion

Neurological infections only occur following direct viral inoculation or contact with the free nerve endings in specialized tissues [8], and cranial nerve complications may occur within 12-48 h after the beginning of a febrile episode. Influenza viruses produce severe encephalopathy and encephalitis in children [9]. Atypical febrile convulsions, transient lethargy, agitation, delirium, seizures, and unarousable coma may be observed in serious influenza epidemics [3]. Although pneumocephalus development has not been frequently reported in influenza epidemics, it is possible that this complication could not be understood previously. In our opinion, pneumocephalus may be considered as a developing complication in such cases.

Pneumocephalus refers to the presence of air in the epidural, subdural, subarachnoid or ventricular spaces. Most causes of pneumocephalus are due to head trauma or surgical procedures [3, 10]. The Valsalva manoeuvre, cough or recurrent sneezing may also cause pneumocephalus [2]. High intracranial pressure creates a microfistula between the sinuses and the brain. Air and infective agents may transport to the intracranial compartments *via* these fistulas [11]. Pneumocephalus is formed by one of two mechanisms: (1) the ball valve mechanism comes into play in the presence of a fistula between a paranasal sinus and the cranial cavity. The high pressure waves open the fistula due to the leptomeningeal tamponade

effect; or (2) the inverted bottle mechanism in the presence of a CSF leak; the amount of CSF loss is replaced by air flowing into the cranium, sucked in by negative pressure until the pressure equalizes between the two media [1]. Cranial CT and MRI is the diagnostic modality of choice for pneumocephalus, since as little as 0.5 cc of air can be identified [10, 12].

Pneumocephalus behaves like any space-occupying lesion of the brain, and in some cases causes imminent cerebral herniation [10]. Clinical examination may reveal cranial nerve paresis, pupillary changes, visual field defects and hemiparesis [5-7]. Symptoms of pneumocephalus are visual disturbances, headache, dizziness, seizures, confusion and personality changes. Meningitis may also develop and exhibit signs of meningeal irritation. In the late phase of the disease, seizures, delirium and deep coma may appear [3].

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