Spontaneous tension pneumocephalus in a patient with subdural empyema

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ABSTRACT

We report a 45-year old male who developed subdural empyema (SE) with tension pneumocephalus. The patient was admitted unconscious with tonic extensor response to pain. A "gas-forming" organism, *Escherichia coli*, was detected. Surgical evacuation of the pus and treatment with the appropriate antibiotic did not result in amelioration of his symptoms and the patient died. We identified a rare clinical situation when the SE cavity had a relatively large air loculus that was clearly related to gas-forming bacteria. It appeared that the patient had developed tension pneumocephalus related to the air produced by the pathogen. To our knowledge, this is the first report of a gas-forming organism in an abscess cavity that resulted in tension pneumocephalus and related symptoms.

1. Introduction

Subdural empyema (SE) is an uncommon entity seen mostly in children as a sequel of meningitis. In adults parameningeal infection and hematogenous spread are commoner causes.[1] Tension pneumocephalus is a life-threatening emergency that can occur as a result of accumulation of pressurized air in the intracranial cavity. We report an apparently healthy adult male who developed a SE with tension pneumocephalus, leading to sudden deterioration and death from brain herniation. Culture of the pus from the subdural collection grew *Escherichia coli*. Our literature search did not find any other report of tension pneumocephalus due to SE caused by a gas-forming organism.

2. Case report

A 48-year-old male had a 10-day history of headache and dizziness. He had suffered a high fever for 3 days, with progressive clouding of his sensorium. There was no suggestion of any immunocompromised clinical state, he did not have diabetes, and there was no history of trauma. When admitted, he was unconscious and had bilateral decerebrate response to pain. Investigations 3 days prior to admission revealed a large, air-filled cavity in the left fronto-parietal convexity with a relatively small amount of subnatant fluid in the subdural space. There was significant mass effect. (Fig. 1 [upper]). Investigation repeated on admission, 3 days after the first scan, showed an increase in the amount of air, at which time the mass effect had increased markedly (Fig. 1 [lower]). A craniotomy was performed. On opening the dura, a gush of foul smelling air and thin greenish-colored liquid pus escaped. The pus in an SE is usually spread extensively over the cortex and the surgical outcome is generally not as satisfactory as for cerebral abscess. The pus was evacuated and a thorough wash was given. The patient was moved out of the operating theatre on ventilatory support. Neurologically, he showed marginal improvement. He was empirically started on broad spectrum antibiotics with anaerobic coverage (intravenous ceftriaxone, vancomycin and metronidazole). Culture of the evacuated pus showed growth of *Escherichia coli*. Blood cultures did not show any growth. Despite the treatment, the patient succumbed on postoperative day 4.

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3. Discussion

SE is an uncommon infectious process of the subdural space secondary to meningitis, paranasal sinusitis, middle ear infection, trauma and brain surgery or through hematogenous spread.[1,2] It is seen mostly in infants and children after meningitis and less commonly in adults. It is associated with a high mortality rate of 15% to 40%.[3] SE is commonly caused by *Staphylococcus* and *Streptococcus* bacteria,[4] and less commonly by *Hemophilus influenza*, *Escherichia coli*, *Klebsiella pneumoniae* and anaerobes.[4] The clinical presentation of patients is often vague with headache, disturbed consciousness, signs of infection, nuchal rigidity and convulsions.[2] The presence of fever in the clinical setting can be diagnostic. Treatment consists of prompt evacuation of the subdural pus with burr holes or craniotomy and also treatment of the primary source of infection.[3]

Pneumocephalus, or intracranial gas collection, can be seen in the epidural, subdural, subarachnoid, intraventricular or intraparenchymal spaces.[5] Most instances occur following trauma or are iatrogenic following cranial/craniofacial surgery. Spontaneous pneumocephalus is uncommon. Infection is the second most common cause of spontaneous pneumocephalus after neoplasms[6] and other causes include bacteremia[7] and surrounding air sinus infection.[8]

Various theories have been proposed to explain the development of tension pneumocephalus. *Escherichia coli* is a gas-forming bacterium reported to cause emphysematous pyelonephritis, emphysematous cholecystitis, emphysematous cystitis and also infections in the spine, myocardium, spleen and subcutaneous tissues.[9] Gas in infections can occur with both aerobic and anaerobic microbial metabolism. Carbon dioxide and water are the end products of aerobic metabolism, whereas hydrogen, nitrogen, hydrogen sulfide and methane gas are produced from a combination of aerobic and anaerobic bacterial infection. These gases, except carbon dioxide, accumulate in tissues because of their reduced water solubility and consequently have the potential to cause tension pneumocephalus.[9]

Pneumocephalus occurring secondary to an infection with a gas-forming organism has been reported, but we could not find a report of a patient with tension pneumocephalus due to SE caused by a gas-forming organism such as *Escherichia coli*. The clinical course of these patients can be quite fulminant as was seen in our patient. Air in subdural collections can be a clue to the diagnosis of SE. These patients need evacuation of the collection and a thorough lavage followed by culture-specific antibiotic treatment.

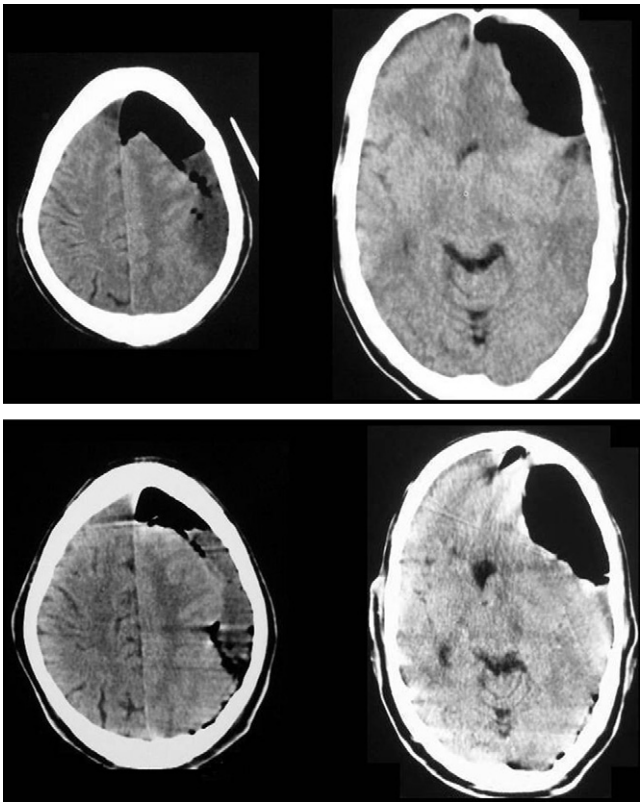

Fig. 1. Axial brain CT scans (upper) 3 days prior to admission showing a large air-filled cavity with subdural fluid; and (lower) on admission showing an increase in the amount of air and the mass effect compared to 3 days prior.

We conclude that early suspicion, rapid intervention and aggressive treatment are necessary for a favorable outcome.

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Paediatric ganglioglioma of the conus medullaris

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ABSTRACT

Gangliogliomas of the conus medullaris are very rare, with only 12 patients reported so far. We report a 6-year-old male who presented with a painless numbness of the left lower limb and with bladder dysfunction. MRI revealed an intramedullary lesion at the T11–T12 vertebral levels. The tumour was subtotally removed. Histopathological examination demonstrated ganglioglioma.

1. Introduction

Gangliogliomas are generally benign, slow growing, and well-circumscribed lesions. The incidence is reportedly 0.4% to 1.7% of all central nervous system tumours.[1] They are most often located

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