Tension pneumocephalus in a patient with obstructive sleep apnea and morbid obesity

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Introduction

Tension pneumocephalus is a rare complication resulting from skull base trauma or neurosurgical procedures. It is even more unusual when this condition presents spontaneously. While postoperative instructions following sinus or otologic surgery include avoidance of CPAP, a Pubmed search yielded only six reported cases since the CPAP was introduced in 1981. In only one of these cases did the patient have neither head trauma nor surgery as a risk factors.

Case Report

A 61-year-old morbidly obese woman with a history of obstructive sleep apnea, CPAP use, and chronic otorrhea presented with a two-week history of worsening left-sided headache, neck pain and photophobia. She experienced a sudden acceleration in the rate of pain progression beginning 24 hours prior to presentation. CT and MR examination on admission revealed a large intraparenchymal pneumocephalus in her left temporal lobe. CT also demonstrated a left tegmen tympani defect. She was taken to the operating room where the tegmen defect was repaired via a middle fossa approach during which an encephalocele was removed from the mastoid and middle ear. Postoperative recovery was uneventful. CT on postoperative day two showed reduction in the size of the pneumocephalus. CT on six-week follow up demonstrated complete resolution of the pneumocephalus. At her three-month follow up, her headache and hearing had improved and she had no evidence of either CSF leak or pneumocephalus.

Discussion

As the prevalence of obstructive sleep apnea continues to increase along with trends of increased obesity, CPAP use among both surgical and nonsurgical patients is expected to increase. As a result, it is becoming increasingly important to recognize the history and physical exam findings of a patient presenting with pneumocephalus. In particular, symptoms of non-traumatic tension pneumocephalus may mimic those of meningitis and include headache, dizziness, cranial nerve palsies and seizures.

The development of tension pneumocephalus is thought to occur as a result of either a ball-valve mechanism or inverted-bottle mechanism. In the ball-valve theory, increases in positive pressure (sneezing, coughing or straining) force air through a cranial defect. When positive pressure ceases, intracranial pressure pushes the defect closed thereby preventing air from escaping. In the inverted-bottle theory, CSF leak causes a decrease in the intracranial pressure gradient, drawing air in through the defect.

Conclusion

Non-traumatic tension pneumocephalus is rare and signs and symptoms can mimic those of meningitis. It is important to consider pneumocephalus in the differential in patients with meningismus and longstanding obesity and OSA.

Diagnosis is made be made using any imaging modality capable of differentiating air from fat and other soft tissues.

There is no standardized treatment for tension pneumocephalus. However, if a cranial defect is found and repaired, even large pockets of trapped air will absorb over time.