Cavernous Sinus Thrombosis and Air Embolism Following Surgery for Acoustic Neurinoma: A Case Report

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Summary

A 55 year old male patient was operated on for a massive and vascular acoustic neurinoma in a sitting position. The tumor was completely excised. Post-operatively, the patient developed irritability and clinical features suggestive of contralateral cavernous sinus thrombosis. CT scan showed air within the dural walls of the cavernous sinus on the side of surgery. However, there was no radiological evidence of cavernous sinus thrombosis on the contralateral side. Cavernous sinus thrombosis as a post-surgery complication has not been reported. Air within the dural confines of the cavernous sinus has also not been observed or radiologically recorded in the literature.

Key words: Cavernous sinus, Thrombosis, Posterior fossa surgery, Air embolism.

Introduction

Post-operative cavernous sinus thrombosis and asymptomatic presence of air within the dural confines of the cavernous sinus have not been recorded on post-operative imaging. Both these events were observed in a patient with a large acoustic neurinoma operated in sitting position. These unusual features involving the cavernous sinus are analyzed in this report.

Case Report

A 55 year old male presented with progressively worsening bifrontal headache, vomiting, giddiness and ataxia of three months duration. He had associated hoarseness of voice, dysphagia, left facial weakness and left sided deafness. On examination, fundi showed papilledema. Cranial nerves 5, 7 and 9 to 11 were partially affected, while hearing was completely absent on the left side. In addition, he had left cerebellar signs. CT and MRI showed a massive left acoustic neurinoma extending into the left internal acoustic meatus (Fig. 1). The tumor was large and extended from the foramen magnum up to the tentorium. Routine hematological investigations, including a coagulation profile, were normal.

A left retromastoid craniectomy was carried out with the patient in sitting position. The tumor was completely removed after a tedious surgery. The
The seventh nerve could not be saved and eighth nerve could not be identified. The rest of the cranial nerves were preserved. There were no clinical indications of air embolism or other unusual hemodynamic changes during the surgical procedure. Postoperatively, the patient was markedly irritable. He developed a subtle axial proptosis and chemosis of the right eye; within six hours he had a total ophthalmoplegia. No bruit was auscultated over the eyeball. CT scan showed no intraorbital pathology. The right cavernous sinus appeared normal and did not demonstrate any evidence of sinus thrombosis. Large air bubbles were seen in the left cavernous sinus (Figs. 2, 3). The Hounsfield numbers of these blobs confirmed the presence of air and excluded fat. Air was also present in the frontal horn of the left lateral ventricle. A relatively large blood clot was seen in the region of the tumor resection (Fig. 2).

The patient was treated conservatively without any anticoagulants. Anticoagulants were contra-indicated in view of the recent surgery and the presence of hemorrhage in the operative site. Instillation of antibiotic ointment and lubricating eye drops was done. A lateral third tarsorrhaphy was done for inadequate eye closure on the left side and proptosis on the right side. The proptosis and congestion slowly resolved. At the end of a month, the right eye had full ocular movements. Left 5th, 7th, 8th and lower cranial nerve paresis persisted. The ataxia had resolved.

Discussion

Complications involving the cavernous sinus, following a remote neurosurgical operation are rare. Cortical venous thrombosis due to direct handling of large veins during operation has been recorded. About 25% of cerebral venous thrombosis cases show no obvious cause. Post-operative cortical venous thrombosis has been observed in patients operated in sitting position and may be related to air embolism and pathophysiologic effects of gas bubbles on the vascular endothelium. The air embolism occurring in sitting position may be clinically evident or may not be detected at all. Non-infective conditions associated with thrombosis of cerebral veins and dural sinuses include tumors such as meningiomas, metastases to skull, leukemias and lymphomas, dehydration and anemias. Dehydration secondary to fluid loss and inadequate replacement or anemia secondary to excessive blood loss during a surgical procedure may have a contributory role towards cerebral venous thrombosis.
During surgery, due care was taken to detect as well as treat intra-operative air embolism. Our anesthesiologists had failed to document any clinically obvious air embolism during this operation. An esophageal stethoscope and a right atrial central venous pressure (CVP) line were passed. A capnometer was used to measure the end tidal carbon dioxide concentration. A positive end expiratory pressure (PEEP) value was included in the anesthesia circuit to provide end expiratory pressure of 5 to 10 cms of water. We do not have the additional facility of esophageal or precordial doppler monitoring.

In our patient, the clinical evidence was definitive of a cavernous sinus thrombosis in the eye contralateral to the side of surgery, though this was not radiologically demonstrated. Considering the timing of its occurrence, it was clearly a sequelae of the surgical procedure. The exact cause of the event could not be definitely proved. The air in the cavernous sinus ipsilateral to the side of the surgery was also unusual. Its architecture and location suggested that it was present not only within the dural confines of the Meckel’s cave but was also present actually within the space for venous sinuses. Fat globules (-35 HU to –40 HU) were ruled out by measuring the Houndfield units, and the numbers corresponded to that of air (-1000 HU).

The air may have lodged into the cavernous sinus via the superior petrosal sinus or directly through the subarachnoid pathways along the trigeminal nerve within the Meckel’s cave. Microbubbles of air may have passed through the inter cavernous venous connections and precipitated thrombosis by endothelial injury in the contralateral sinus.\textsuperscript{5-7} If air could have been the cause of thrombosis it is unclear as to why the ipsilateral cavernous sinus did not thrombose. There is a possibility that the occurrence of cavernous sinus thrombosis of the contralateral side and the presence of air within the ipsilateral cavernous sinus were entirely unrelated events.

As the exact cause of the pathophysiologic events leading to the cavernous sinus thrombosis are not clearly evident, the means of prevention of this complication cannot be laid down. However, the possibility of cavernous sinus thrombosis and air embolism as potential, though extremely rare complications of skull base surgery should be noted.

References


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