



Pneumocephalus: an unusual case of postoperative seizure after intradural spine surgery

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To the Editor,

We report an unusual case of postoperative seizure after resection of an intramedullary spinal cord tumour with the patient in the prone position.

A 66-yr-old female presented for an elective posterior cervicothoracic laminectomy for removal of an intramedullary spinal cord ependymoma (C7 to T1) followed by instrumented fusion. As a result of the tumour, the patient had progressive preoperative symptoms of paresthesias, weakness, and hyperreflexia of the right upper extremity. Her medical history included hypertension and mild gastroesophageal reflux. Baseline bloodwork was normal. Anesthesia was induced with fentanyl ($2 \mu\text{g}\cdot\text{kg}^{-1}$ *iv*), propofol ($2.5 \text{ mg}\cdot\text{kg}^{-1}$ *iv*), and rocuronium ($0.7 \text{ mg}\cdot\text{kg}^{-1}$ *iv*) and maintained by total intravenous anesthesia with propofol, remifentanyl, and morphine 10 mg in divided doses. The patient was positioned prone on a JacksonTM table with her head in Mayfield® pins slightly below the level of the incision. The eight-hour surgery was uneventful, the dura and other layers were closed, and the wound was infiltrated with local anesthetics (0.25% bupivacaine 20 mL). There were no changes with intraoperative neurophysiological monitoring. The patient's trachea was extubated when she was fully

awake in the operating room; she exhibited no new neurologic deficits and experienced minimal postoperative pain.

In the recovery room, the patient was placed in the head-up position, and 1.5 hr after surgery, she had a generalized tonic-clonic seizure which lasted one minute and was terminated with lorazepam 4 mg *iv*. She had stable vital signs, was afebrile, and her pupils were equal and reactive. Due to a postictal Glasgow coma scale of 8, the patient's trachea was re-intubated, she was given Dilantin 1 g *iv*, and her lungs were ventilated with 100% oxygen while in the supine position. Serum electrolytes, ionized calcium, magnesium, and glucose were all normal. Emergency computed tomography of her head showed diffuse pneumocephalus in the frontotemporal lobes and basal cistern (Figure). The patient was transferred to the intensive care unit for mechanical ventilation.

Further investigations were negative for other causes of convulsions, including meningitis, epilepsy, and structural lesions. The patient had no further seizures, and she was extubated on postoperative day 2. She was discharged to a rehabilitation centre on day 7 with mild residual right arm weakness and no noticeable cognitive deficits.

Seizures after spine surgery can be related to anesthetic or surgical causes.¹ Our patient did not receive epileptogenic anesthetics and suffered no hypoxic or hypotensive insults. No antibiotics were applied to the spinal cord and local anesthetic doses were well under toxic ranges. Possible surgical causes of seizure include pneumocephalus, stretching of the meninges due to cerebrospinal fluid leak, subdural hematoma from intracranial hypotension, or dural injury from skull pins. In this case, no cause was found other than pneumocephalus.

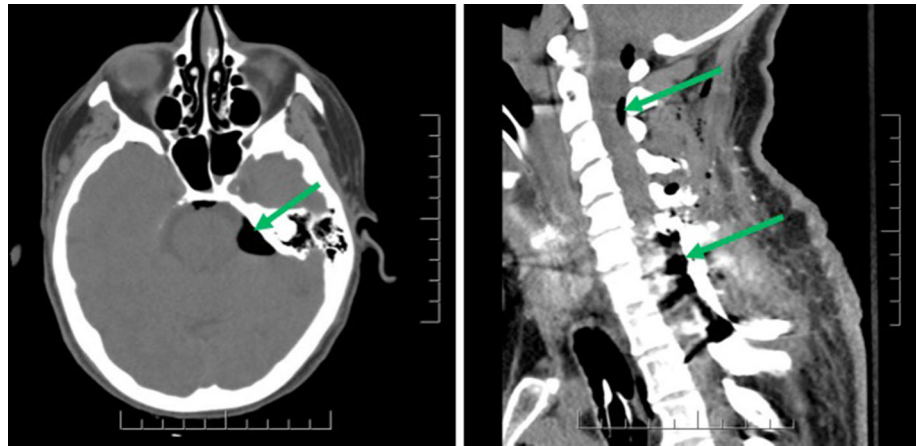
Pneumocephalus is rare after spinal cord surgery with the patient in the prone position. It is typically seen in

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Figure Axial computed tomography scan of the brain showing air locules (green arrow) in basal cisterns and in the left cerebellopontine angle (left). Sagittal view of the cervical spinal canal with small air locules (green arrows) seen within the thecal sac in the upper cervical spine (right)



posterior fossa or upper cervical spine surgery with the patient in the sitting position, more commonly with nitrous oxide anesthesia, as has also been reported with hydrocephalus surgery and with the use of lumbar drains.²⁻⁴ Signs and symptoms are typically non-specific and include headache, dizziness, nausea, altered level of consciousness, and meningismus. Treatment includes supplemental oxygen to facilitate resorption of nitrogen from the intracranial gas pocket, bed rest, and surgical repair of any dural defects if conservative management fails.⁵

We hypothesize that air entrained during tumour resection and closure of the cervicothoracic dura may have migrated intracranially when the patient was positioned head up in the recovery room, resulting in delayed seizure. Thus, pneumocephalus should be considered in the differential diagnosis of patients who present with seizures or neurologic deficits after intradural spine surgery. In cases of suspected air entrainment during intradural surgery, placing patients fully supine for the initial recovery period may prevent cephalad migration of entrained air. Nevertheless, the practicality of this as a

routine recommendation is unclear and warrants further study.

Conflict of interest None declared.

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