

Pneumocephalus Following Lumbar Epidural Injection: A Rare Complication of a Common Procedure

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CASE PRESENTATION

A 47-year-old woman with a history of chronic back pain from disc herniation, anemia, previous lower extremity bone cancer (treated 6 years ago), and a recent seizure diagnosis presented with a 3-day history of worsening occipital headache, vertigo, nausea, and vomiting. Symptoms began after a lumbar steroid injection for her chronic back pain. She denied trauma, fever, photophobia, vision changes, extremity weakness, numbness, or paresthesias. Vital signs were normal, and physical exam was unremarkable except for localized lumbar tenderness. A non-contrast head CT revealed intracranial air at the frontal horn of the right lateral ventricle (Figure 1), consistent with pneumocephalus, without evidence of mass effect or intracranial hypotension (Figure 2).

On days 1-3 of hospitalization (days 4 through 7 of illness), her symptoms persisted but vital signs and labs remained normal. Treatment was supportive with IV fluids, oxygen, pain control (acetaminophen, ketorolac, oxycodone, hydromorphone), and antiemetics (diphenhydramine, metoclopramide, ondansetron).

The patient's symptoms significantly improved by day 4. Follow-up brain MRI showed no definitive intracranial air and spine MRI showed no evidence of CSF leak (Figure 3). She was discharged in stable condition the same day.

INTRODUCTION

Pneumocephalus is the presence of air within the cranial cavity. Although rare, it is a potentially life-threatening condition. Clinical presentation varies depending on the volume of intracranial air and the specific regions involved. Pneumocephalus may arise spontaneously or result from traumatic, infectious, neoplastic, or iatrogenic causes. Head trauma remains the most common etiology, accounting for approximately 75% of cases. In traumatic cases, air enters the cranial cavity through an open skull fracture. Non-contrast head CT is the gold standard for diagnosis.



Figure 1 Axial non contrast head CT demonstrating a small, well-defined pocket of air within the right frontal horn of the lateral ventricle, consistent with intraventricular pneumocephalus

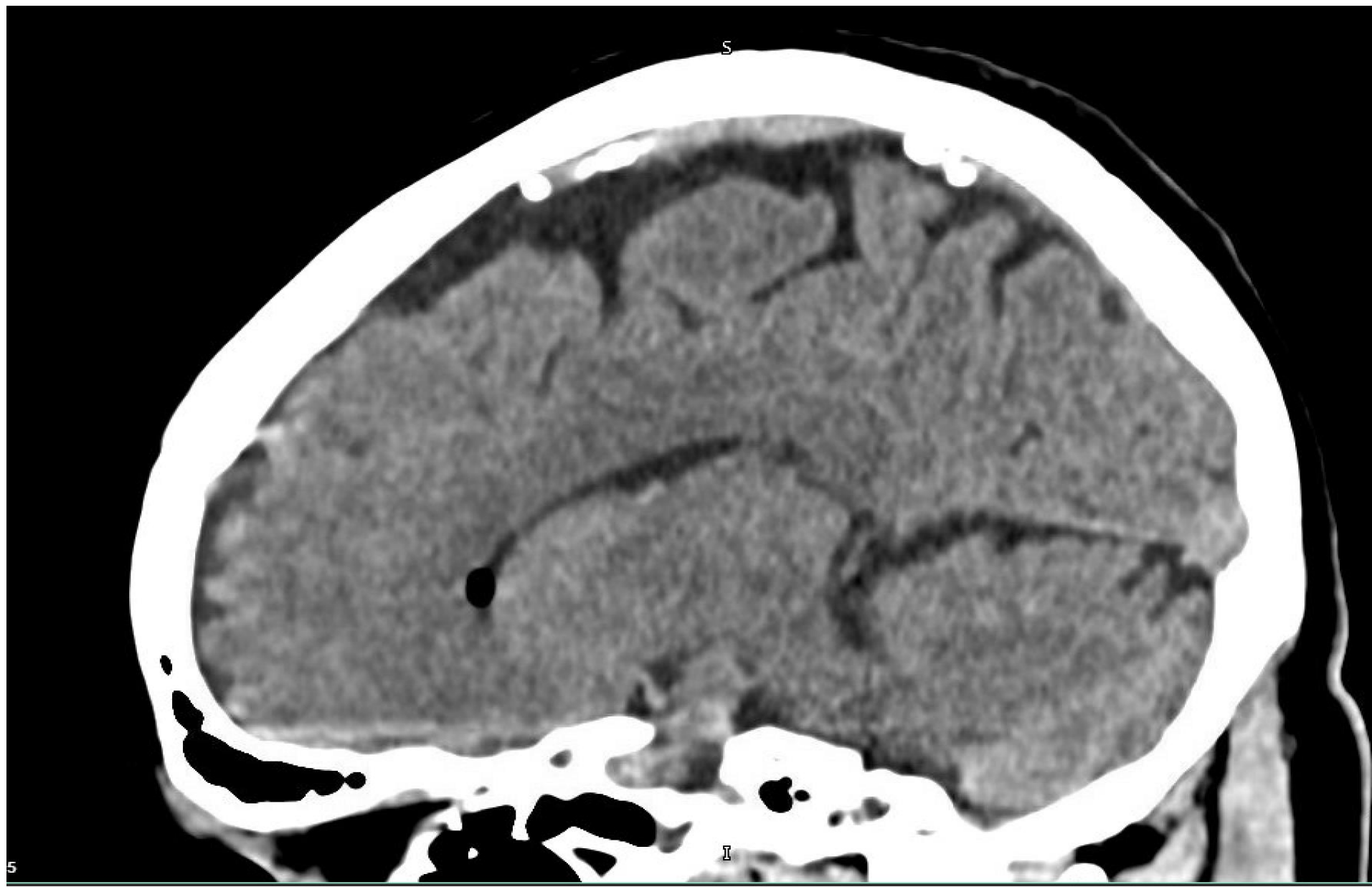


Figure 2 Sagittal view demonstrating a localized intraventricular air bubble anteriorly without signs of mass effect or cisternal effacement.

DISCUSSION

Pneumocephalus is a rare but recognized complication following lumbar epidural injection. The presumed mechanism inadvertent dural puncture with subsequent air entry into the subarachnoid space (1). Intracranial migration of air is facilitated by pressure gradients, especially when patients assume an upright position shortly after the procedure. The use of air rather than saline for the loss-of-resistance technique is implicated in most reported cases (2). The true incidence may be underestimated due to self-limiting symptoms and lack of routine imaging. Clinical presentation ranges from mild headache to more severe symptoms such as nausea, vomiting, or neurological deficits in tension pneumocephalus. Managed conservatively with high-flow oxygen which creates a nitrogen gradient that facilitates the reabsorption of intracranial air into the bloodstream (3). Surgical intervention is rarely needed but may be indicated in tension pneumocephalus or worsening neurological status. Use of saline rather than air during epidural localization can minimize risk. Differentiation from PDPH is critical since management differs. PDPH presents with postural headache, that improves in the supine position and worsens in the upright position (4). Pneumocephalus, however, may lack postural dependence (5).

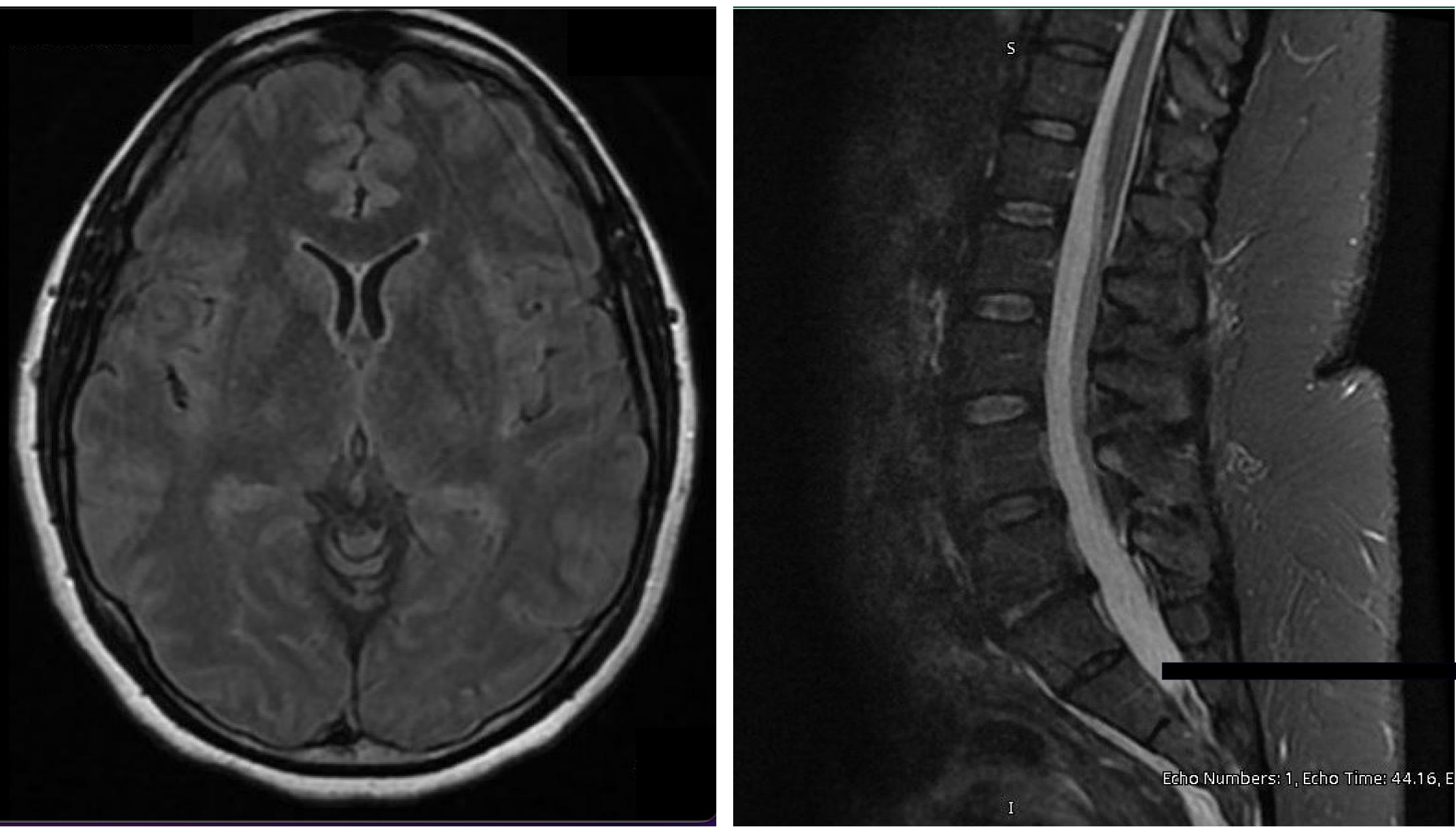


Figure 3 Axial brain MRI demonstrates normal ventricular size without evidence of residual intracranial air. Sagittal T2-weighted MRI spine demonstrating no visible evidence of dural puncture or CSF leak.

CONCLUSION

This case underscores the importance of recognizing pneumocephalus as a rare complication of epidural injections, particularly when air is used for loss of resistance. A high index of suspicion is needed in patients presenting with severe headache following neuraxial procedures. Avoiding the use of air and ensuring patient monitoring post-procedure can reduce the risk of this complication.

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