

Tension Pneumoventricle Following Transsphenoidal Surgery

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Pneumocephalus and pneumoventricle are most commonly found following trauma or intracranial surgery. Tension pneumoventricle is rare and may lead to reversible clinical deterioration. We report a case of tension pneumoventricle occurring after transsphenoidal surgery.

A 30-year-old male underwent transsphenoidal surgery for resection of a craniopharyngioma. The post-operative result was good (Figure 1). He developed a cerebral spinal fluid (CSF) rhinorrhea post-operatively that required repair. Nine days following the initial operation, the patient experienced a rapid decline in the level of consciousness. An urgent computed tomography (CT) head was ordered (Figure 2). The CT scan revealed extensive pneumocephalus in the suprasellar cistern, third ventricle, and lateral ventricles. He was started on high flow oxygen and taken for external ventricular drain (EVD) placement.

Operatively, placement of the drain was confirmed using attachment of the EVD to a syringe filled with saline, and bubbling of air was seen. Multiple passes were required. The patient tolerated the procedure well and improved post-operatively. He required two nasal septal flap operations with fat grafting and fascia lata. He was discharged 2 weeks after his second repair.

Tension pneumoventricle is rare.¹ Tension pneumoventricle results in intracranial hypertension within the ventricle and can result in rapid deterioration in the level of consciousness.² Two mechanisms have been proposed: (1) Dandy's ball valve mechanism and (2) Horowitz's inverted soda bottle mechanism.³ In our case, given the CSF leak and extensive cisternal air, the inverted soda bottle mechanism seems to explain the finding, with the floor of the third ventricle being the entry point. This type of surgery should be considered high risk due to disruption of the basal cisterns near the floor of the third ventricle. Tension pneumoventricle has been seen after trauma,⁴ spontaneously with suprasellar lesions,^{5,6} skull base surgery^{7,8} and shunt placement.^{3,9}

Identifying the tension pneumoventricle is crucial to allow for treatment. The mainstay of treatment is ventriculostomy. Perrin et al. also described a technique of gentle rotation of the patient's head to displace air to the least dependent region with irrigation of fluid.³ As this condition has a high mortality associated with it at around 10%, a high degree of clinical and radiographic suspicion must be exercised to ensure correct treatment.²

We had some difficulty with the placement of the drain due to the absence of CSF flow. We eventually attached a blunt-ended

syringe filled with saline to the end of the tubing and were able to visualize bubbling of air after placement of the EVD.

The patient improved dramatically after placement of the ventriculostomy tube. His GCS returned to 15, and he was successfully weaned off of his EVD following two transsphenoidal skull base repairs.

Tension pneumoventricle is a rare condition that may occur secondary to transsphenoidal surgery. Ventriculostomy is the mainstay of treatment.

Our key points in publication of this case are that tension pneumoventricle should be suspected in patients with rapid decline following transsphenoidal pituitary surgery and that drain placement may be assisted using a saline-filled syringe to check for bubbling of air.

DISCLOSURES

The authors have no conflicts of interest to declare.

STATEMENT OF AUTHORSHIP

NP collected patient data and drafted the original article. AP edited the article and provided direct supervision. KM approved the final manuscript and was the responsible surgeon for the patient.

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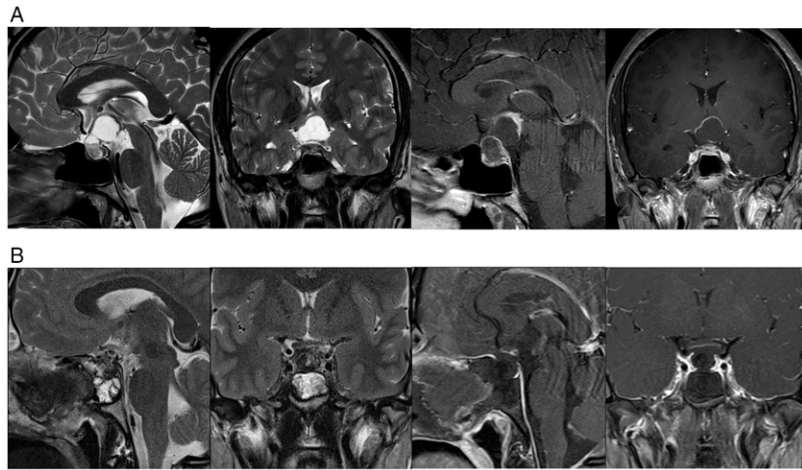


Figure 1: (A) Pre- and (B) post-operative imaging of the patient's craniopharyngioma. Sagittal and coronal pituitary views with T2 and T1 post-gadolinium sequences are included.

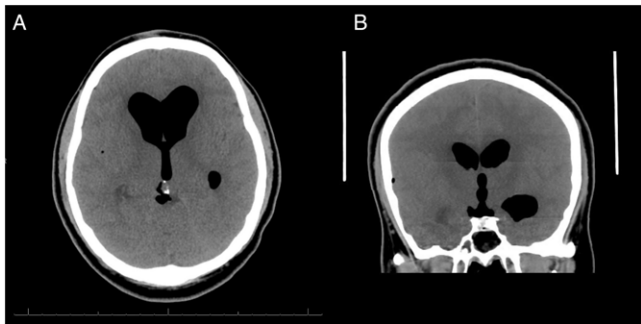


Figure 2: (A) Axial and (B) coronal CT images showing extensive tension pneumoventricle.

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