Pneumocephalus following thoracic surgery is a very rare complication. There is only a reported case in the previous literature. We report a case of tension pneumocephalus after resection of posterior mediastinal Schwannoma by video-assisted thoracic surgery. The patient presented with severe headache and neurological deterioration one week after the surgery. Computed tomography (CT) scan revealed extensive pneumocephalus. Emergent decompression of the tension pneumocephalus was performed. Pneumocephalus and neurological deficits resolved completely one week later. Literature reviewed and mechanism of pneumocephalus was discussed.

Pneumocephalus is defined as an intracranial air collection in the intraaxial or extraaxial spaces [1-4]. Markham et al. [5] revealed many etiologies, such as head injury, intracranial tumors, CSF shunting, operation, anesthesia, barotraumas and infections, are associated with pneumocephalus. Pneumocephalus is a common complication after head injury and following neurosurgical procedure. Tension pneumocephalus is a rare but important complication of surgery. Owing to its less invasiveness than open surgery, video-assisted thoracic surgery (VATS) has becoming acceptable method for the management of mediastinal masses [6]. There is only a previously reported case of pneumocephalus after combined radiation treatment and thoracic surgery in the literature [4]. To the best of our knowledge, this is the first reported case of tension pneumocephalus after VATS in the English literature.

CASE REPORT

A 66-year-old male was admitted to the thoracic surgery department due to the posterior mediastinal tumor. Computed tomography (CT) revealed a 3x3 cm posterior mediastinal tumor with intraspinous extension (Fig. 1). Under general anesthesia, the tumor was resected by video-assisted thoracic surgery. Following completion of the procedure, air leakage, cerebrospinal fluid (CSF) leakage and hemostasis were checked meticulously. Chest tube was inserted and the wound was closed in separated layers. The histopathologic examination revealed the tumor was a Schwannoma. During the following one week, the patient felt well except the wound pain, and large amount of clear yellowish pleural fluid (250cc/ per day) was drainaged out via the chest tube. On the 8th postoperative day, the patient suffered from sudden onset of severe headache with conscious change. Brain CT revealed extensive intraaxial and extraaxial air collection with mass effect on bifrontal lobes (Fig. 2). However, the chest radiograph did not reveal any significant pneumothorax at the same time. After emergent decompression...
Tension pneumocephalus after thoracic surgery

After one week of intensive care, uneventful recovery ensured.

**DISCUSSION**

Pneumocephalus is defined as the presence of intracranial air [1, 2]. The air may be seen in the epidural, subdural, subarachnoid, intraparenchymal or intraventricular compartments. The most common causes of pneumocephalus are head trauma and cranial surgery [5]. Other causes include tumor, infection, CSF shunting, following invasive procedures such as ventriculostomy and lumbar puncture, nitrous oxide anaesthesia, and barotraumas [1, 2, 5, 7].

Pneumocephalus is rare following thoracic surgery [4]. Smith et al. [4] reported a case of pneumocephalus due to a bronchopleural-subarachnoid fistula following pneumonectomy. Tension pneumocephalus as a complication following VATS, to the best of our knowledge, has not been previously reported.

The surgical removal of the para-dural component of the mediastinal tumor may have resulted in an unsuspected spinal dural tear in this case. The mechanism of pneumocephalus in our case may be due to CSF leakage causing a suction effect of pleural gas. The intra-dural air is then float up to intracranial subarachnoid space and ventricles along the path of CSF flow. This can be explained by the observation that chest tube discharge decreased immediately after the shunting procedure. The source of air may be from the pulmonary air leakage, but not proved radiographically.

This complication can be avoided by precautions. For instance, prevention of air leakage and reduced intrapleural free air are the most important measure to avoid post-operative pneumocephalus. Repairing the dural and pleural tear during the operation can avoid CSF and intrapulmonary air leakage. When in doubt, bed-rest on supine position may reduce CSF leakage, hence facilitating the repair of dura tear. In addition, adequate drainage function of the chest tube can also prevent extracorporeal air reflux into pleural cavity. The tension pneumocephalus may be asymptomatic or symptomatic. Beware of any neurological symptoms and signs that appear following thoracic surgery for mediastinal lesion especially those involved the spinal canal. CT scan is the best modality for detecting the intracranial air as even small amounts of air. Treatment consists of adequate drainage by a chest tube and decompression of the pneumocephalus, as in our case.
REFERENCES

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胸腔外科縱膈腔腫瘤切除術後之張力性顱內積氣：
病例報告

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胸腔手術後的顱內積氣是很少見的併發症。在文獻上只報告過一個病例。我們在此報告一個接受電視輔助胸腔手術切除後縱膈腫脹式細胞瘤後產生張力性顱內積氣的病例。此病患於術後一周發生嚴重頭痛及神經學症狀，電腦斷層掃描顯示張力性顱內積氣。緊急施行顱顱術減壓，一周後顱內積氣消失且神經功能也都恢復。在此作文獻回顧及顱內積氣的機制討論。