Postoperative pneumocephalus

Etiology

- **craniotomy**: risk is higher when patient is operated with surgery in the **sitting position** ¹

- shunt insertion ² ³.

- **burr hole drainage** of **chronic subdural hematoma** ⁴ ⁵: incidence is probably < 2.5% ⁶ although higher rates have been reported.

Ventriculostomy.

Common causes of postoperative pneumocephalus are **intracranial surgery** or **spinal surgery** as well as some ENT operations, such as paranasal sinus surgery, nasal septum resection, or nasal polypectomy ⁷. In some cases, the incidence after supratentorial craniotomy has been reported to be 100%. Sixty-six percent of these PNC were judged to be moderate or large, and the incidence decreased to 75% by postoperative day 7. Nonetheless, 11.8% of the scans obtained during the 2nd postoperative week had PNC that were judged to be moderate or large ⁸.

Pneumocephalus after Nitrous oxide

Pneumocephalus after Deep Brain Stimulation

Contributing factors have been implicated in the pathogenesis, including nitrous oxide anesthesia, duration of surgery, hydrocephalus, a functional ventriculoperitoneal shunt, intraoperative administration of mannitol, head position, duration of surgery, hydrocephalus, hyperventilation, spinal anesthesia, barotauma, continuous CSF drainage via lumbar drain, epidural anesthesia, infections, and neoplasms ⁹.

The risk of pneumocephalus following craniofacial procedures is significant, and may be increased by the use of lumbar drainage of CSF intraoperatively.

see Pneumocephalus in the sitting position.

see Tension pneumocephalus after chronic subdural hematoma evacuation.

Posterior fossa surgery

Postoperative pneumocephalus after posterior fossa surgery.
Endoscopic endonasal skull base surgery

Postoperative pneumocephalus is a common occurrence after endoscopic endonasal skull base surgery (ESBS). The risk of cerebrospinal fluid (CSF) leaks can be high and the presence of postoperative pneumocephalus associated with serosanguineous nasal drainage may raise suspicion for a CSF leak.

Postoperative pneumocephalus is much more common following extended approaches than following transsellar surgery. Merely the presence of pneumocephalus, particularly in the frontal or intraventricular locations, is not necessarily associated with a postoperative CSF leak. A “suspicious” pattern of air, namely pneumocephalus in the convexity, interhemispheric fissure, sella, parasellar, or perimesencephalic locations, is significantly associated with a postoperative CSF leak. The presence and the score of “suspicious” pneumocephalus on postoperative imaging, in conjunction with the learning curve and the type of endoscopic approach, provide the best predictive model for postoperative CSF leaks.10