This 7-year-old boy presented with a history of intermittent headache for 1 month and nausea for 2 weeks. A neurological examination demonstrated mild ataxia and bilateral papilledema. Magnetic resonance imaging of the brain revealed a solid tumor arising from the right cerebellum with a significant mass effect on the fourth ventricle and brainstem, and associated obstructive supratentorial hydrocephalus (Fig. 1). The boy underwent an operation in a sitting position and a gross-total tumor resection was achieved. Frank pneumocephalus was present on the immediate postoperative MR image. Histopathological examination of the tumor revealed that it was a WHO Grade 2 ependymoma. On the 1st postoperative day, periorbital swelling developed in his left eye. Intraventricular pneumocephalus and air in the episcleral space around his left eye was detected at his follow-up CT scan (Fig. 2).

With the elevation of intracranial pressure, cerebrospinal fluid was drained via pathways that are less evident under normal pressure. The possible pathways of cerebrospinal fluid drainage were first noted by Schwalbe.  

In their study, Schurr et al. injected Pantopaque into the cisterna magna of a dog and found that contrast medium passes into the arachnoidal tubes surrounding the olfactory nerves, enters into the sheaths of optic nerves, and passes into the epichoroidal and episcleral spaces from which it reaches the filtration angle of the eye. McComb and colleagues found similar results in their experimental studies in rabbits.

It is obvious in this case that increased intracranial pressure caused by the pneumocephalus resulted in intraventricular air being directed to the subarachnoid space surrounding the optic nerves and the air passed to the episcleral area by following this route (Fig. 3).

References

Fig. 1. Sagittal T1-weighted MR image demonstrating a large mass occupying the floor of the fourth ventricle.

Fig. 2. Postoperative CT scans demonstrating air in the episcleral space around the patient’s left eye on the 1st postoperative day (left) and absorption of the air with little residue on postoperative Day 7 (right).

Fig. 3. A diagram demonstrating the pathway air could follow (arrows) around the optic nerve and into the episcleral space. Ch = choroidea; EP = episclera; ON = optic nerve; R = retina; SAS = subarachnoid space; Sc = sclera.