Cerebrospinal fluid rhinorrhea following surgery for acoustic neurinoma

Report of two cases

DEREK S. GORDON, M.CH., F.R.C.S., AND ALAN G. KERR, F.R.C.S.

Departments of Neurosurgery and Otological Surgery, Royal Victoria Hospital, Belfast, Ireland

In a series of 48 patients with acoustic neurinoma removed by the suboccipital route, one patient developed cerebrospinal fluid rhinorrhea and another patient had delayed-onset meningitis. Each complication was attributed to opening the posteromedial air-cell tract in the posterior wall of the internal auditory meatus. In operations requiring removal of the posterior meatal wall, it is important to look for the air-cell tract which may not be apparent on computerized tomography. If the tract is opened the cells should be occluded by bone wax.

KEY WORDS □9 acoustic neurinoma □9 cerebrospinal fluid rhinorrhea □9 temporal bone air cells □9 suboccipital approach □9 surgical technique

MONTGOMERY² reported an 18% incidence of cerebrospinal fluid (CSF) otorhinorrhea following the suboccipital approach to the cerebellopontine angle and the internal auditory meatus. This has not been our experience. We have been aware of this problem in only one proven case and in a second possible case in a series of 48 patients.

Case Reports

Case 1

This 35-year-old female computer manager presented with a 2-year history of left tinnitus and progressive left sensorineural deafness. Eighteen months later she noticed tingling in the left side of the lower lip and tongue. This progressed to numbness. She also gave a history of mild frontal headaches.

Examination. There was diminution of light touch and pain sensation in the first and third divisions of the left trigeminal nerve and marked impairment of the left corneal reflex. Severe hearing loss on the left side was confirmed audiometrically and, although pure-tone hearing was not lost, speech discrimination ability was absent. There was a little unsteadiness in the heel-to-toe test and on standing on one foot. Computerized tomography (CT) showed a left acoustic neurinoma, approximately 3 cm in diameter.

First Operation. A small left suboccipital craniectomy was carried out to expose the lateral and sigmoid sinuses. Care was taken to occlude all the exposed mastoid air cells with bone wax. Following the opening of the dura there was good access to the tumor. The bulk of the tumor was reduced by a combination of laser vaporization and curettage. The posterior wall of the internal auditory meatus was removed by drilling and the intracanalicular part of the tumor was exposed. After the facial nerve was identified at the lateral end of the meatus, the tumor was separated from it in a medial direction and removed. The elements of the eighth nerve were identified, but they ran into the tumor and could not be preserved.

On the 9th postoperative day, the patient complained that her left nostril was moist; examination confirmed that CSF dripped from her nose in certain head positions. It was thought that the CSF was coming from the middle ear via the eustachian tube. On the following day the wound was explored on the assumption that the CSF was entering the middle ear through one of the mastoid air cells. However, inspection showed that the cells had been satisfactorily occluded by wax at the original operation. When the wax was removed from one of the mastoid cells, CSF welled up. This wax was replaced and further waxing of the other cells was carried out. The CSF otorhinorrhea persisted, occasionally becoming quite profuse.
Second Operation. Six weeks after the original operation, the left mastoid process was explored through a postauricular incision, and CSF was found to be oozing from most of the mastoid air cells. On further drilling, the CSF leak was traced to the pneumatized area located deep and posterior to the posterior semicircular canal. The CSF flow was stopped by the application of bone wax to these air cells.

The patient had no further leakage of CSF. Thereafter her nose was dry, and she had full movement of the muscles of the left side of the face. There was still some reduction in sensation in the mandibular division of the left trigeminal nerve and she was, of course, totally deaf in the left ear.

Comment

It is routine procedure in the suboccipital approach to the cerebellopontine angle to occlude all the exposed mastoid air cells with bone wax. This usually prevents CSF otorhinorrhea. The presence of a flow of CSF from the region behind the posterior semicircular canal suggested that the leakage had been coming through air cells in the posterior meatal wall. If such cells are present they would be opened during removal of the posterior wall for exposure of the tumor in the internal auditory meatus.

In a detailed investigation of the pneumatization of the temporal bone, Allam1 has described the numerous air-cell tracts. One of these, the posteromedial tract, was shown to extend posterior to the bony labyrinth and into the posterior wall of the internal auditory meatus. We had not previously noticed air cells in the posterior meatal wall, but this case brought to mind a patient who had been operated on 6 years earlier.

Case 2

This 40-year-old male radio-sound engineer presented with a 4-year history of progressive right sensorineural deafness and occasional mild imbalance.

Examination. Examination was unremarkable apart from showing a mild degree of sensorineural hearing loss on the right side and somewhat impaired heel-toe walking. Audiometry confirmed a mild degree of sensorineural hearing loss on the right side, averaging 30 dB for the speech frequencies. Speech discrimination was very good. Hearing was normal on the left side. Tomograms of the internal auditory meatus showed enlargement on the right side. Radiological contrast studies demonstrated a tumor in the right cerebellopontine angle.

Operation. A small right suboccipital craniectomy was carried out. The exposed mastoid air cells were occluded with bone wax. The presence of a 2.5-cm acoustic neurinoma was confirmed, and the posterior wall of the internal auditory meatus was removed by drilling to expose the lateral extent of the tumor. During this procedure a small opening in the bone was seen and it was thought that the vestibule of the bony labyrinth had been opened. The facial nerve was identified at the lateral end of the internal auditory meatus, and the tumor was dissected from it in a medial direction. The tumor was also readily separated from the auditory nerve and removal was straightforward. At the end of the procedure both the facial and auditory nerves were intact.

Postoperative Course. There was normal facial nerve function after the operation. When the patient was discharged from the hospital 2 weeks after surgery, his hearing level in the right ear was 65 dB with very good speech discrimination. A few days later he complained of headache. Ten days after discharge he was readmitted to the hospital suffering from meningitis. This responded slowly to antibiotic treatment and he was discharged again almost 4 weeks later. On recovery from the meningitis, the hearing in the right ear was found to have deteriorated considerably with impairment of speech discrimination.
Comment

This was the first patient in whom we carried out a total removal of a large acoustic neurinoma with preservation of serviceable hearing. Having inadvertently opened what we thought to be the vestibule of the labyrinth, we had expected total deafness to ensue. In retrospect, we think that the space in the bone was one of the air cells of the posteromedial tract. This explains the preservation of hearing and could account for the development of meningitis almost 3 weeks after surgery. Review of the x-ray films confirmed a highly pneumatized temporal bone, and showed air cells extending into the posterior wall of the internal auditory meatus.

Discussion

The posteromedial air-cell tract has been described in the otological and neurological literature. Rhoton\(^3\) has appreciated the potential surgical hazard of these cells. An investigation of histological sections of temporal bones showed that approximately 20% of ears show pneumatization of the posterior wall of the internal auditory meatus (unpublished data, 1983) (Fig. 1). The risk of CSF leakage or meningitis must be considered when an operation involves removal of bone from the posterior wall of the internal auditory meatus. If these complications are to be avoided, it will be necessary first to be aware of these air cells, second to look for them in every case where the posterior meatal wall is removed, and third, if they are present, to ensure that they are sealed with bone wax.

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References


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Address reprint requests to: Derek S. Gordon, M.Ch., F.R.C.S., Department of Neurosurgery, Royal Victoria Hospital, Belfast BT12 6BA, Northern Ireland.