CEREBROSPINAL FLUID RHINORRHOEA FOLLOWING REMOVAL OF AN ACOUSTIC NEUROMA

A CASE REPORT*

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(Received for publication November 14, 1955)

An uncommon complication of the radical removal of an acoustic tumor is cerebrospinal rhinorrhea by way of the Eustachian tube. This sequel appears to have been recorded only by Dandy, although from personal correspondence and discussion, it is apparent that many other surgeons have encountered it. Since its cure may present difficulties, the following case is reported in detail.

CASE REPORT

A. De la S. (#686149), a 29-year-old housewife, was admitted to The Johns Hopkins Hospital on Oct. 6, 1954. At the age of 12, she had had an attack of measles following which the hearing in the right ear was impaired. In the ensuing years, the auditory acuity in this ear gradually diminished. In July 1954, the patient noted formications and numbness on the right side of the face and tongue. Upon awakening on Aug. 8, 1954, she experienced severe vertigo with things whirling about in a clockwise direction; she felt nauseated and vomited. Because of persisting nausea and vomiting she remained in bed 2 weeks. About this time she noted that the right ear was deaf. A second attack of vertigo and nausea of a milder degree occurred in the latter part of August. She had no other symptoms referable to the central nervous system. Her past history was not particularly significant.

Examination. The general physical status of the patient was normal. There was slight blurring of the optic discs but because of a high degree of myopia the significance of this finding was uncertain. The extraocular movements and pupillary reactions were normal in all respects. There were hypesthesia and hypalgesia in the 2nd and 3rd divisions of the right trigeminal nerve and a slight but definite paresis of the right facial muscles. The hearing was markedly impaired and the caloric reactions were absent on the right side. Motor, sensory and reflex systems were normal. The patient’s usual gait was on a broad base and when walking tandem she was unsteady and tended to sway or fall to the left.

On roentgenograms of the skull a large defect was seen in the right petrous apex (Fig. 1). On the basis of the history, findings and complete absence of acoustic and vestibular function on the right side and the marked erosion of the petrous portion of the temporal bone, a diagnosis of right acoustic neuroma was made.

1st Operation. On Oct. 10, 1954 through a vertical right occipital incision the right cerebellar hemisphere was exposed, and its lateral third was ablated to expose a firm encapsulated tumor in the cerebellopontine angle. Just anterior to the 9th, 10th and 11th nerves the tumor had eroded the petrous portion of the temporal bone over an area approximately 2 cm. in diameter. The capsule of the tumor was cut from the margin of the internal acoustic meatus, gradually dissected from the adjacent cerebellum and with little difficulty was removed in one piece. Tumor tissue in the internal acoustic meatus was curetted out and the cavity, which measured almost 2 cm. in diameter, was thoroughly cauterized with the electro surgical
unit and bone wax was applied to its roughened surface. The wound was closed without drainage.

Postoperative Course. The patient's convalescence was uneventful until, on October 18, watery discharge from the right nostril was noted. During the next few days varying amounts of fluid drained from the nostril, on some occasions there being no drainage and again considerable. On October 25 the fluid collected had 68 mg. per cent of reducing substance.

2nd Operation. Because of the persistent drainage the wound was explored on Oct. 26, 1954. Under Pentothal anesthesia a vertical incision was made in the right temporal region and carried down to the squamous portion of the temporal bone. The bone was perforated and the opening was enlarged. Upon elevating the dura mater from the petrosal ridge a darkened area of thin bone—the tegmen tympani—was seen overlying the dilated internal acoustic meatus. When this was ruptured a large cavity in the petrous tip was exposed in which could be seen the lateral aspect of the pons and cerebellum. In the base and walls of this cavity were numerous large mastoid air cells which were plugged with bone wax and Gelfoam.

Course. The patient recovered from this operation quite well and had no rhinorrhoea. She was discharged from hospital on Nov. 4, 1954, but within a week was readmitted for a lateral tarsorrhaphy because of a corneal ulceration. Two days later fluid was seen draining
Fig. 2. (A) Sketch to indicate the operative incision and approach to the temporal tip through the middle fossa. (B) The muscle flap has been cut from the temporal muscle and aponeurosis and swung across the floor of the middle fossa to the defect in the temporal tip.
from the right nostril. After consultation, Dr. Walter Loch, of the Ear, Nose and Throat Service, decided to explore the mastoid with the intent of plugging the mastoid air cells leading to the middle ear and in this way eliminate the leak. This was done on Nov. 16, 1954. For 2 or 3 days there was no drainage but on November 21 the rhinorrhea was noted again. The mastoid wound became infected and cultures grew out a hemolytic Staphylococcus aureus insensitive to penicillin, Terramycin or Achromycin and only slightly sensitive to Aureomycin and moderately sensitive to erythromycin. On December 4 the patient was complaining of severe headache. Her temperature had risen to 101.4° F. and her neck was stiff. A diagnosis of meningitis seemed obvious and the mastoid wound was reopened. It was found that the purulent drainage came from a soft-tissue abscess. The mastoid cavity previously filled with Gelfoam was cleaned out but there was no purulent discharge in that area. The wound was packed with iodoform wax which stopped the cerebrospinal fluid discharge from the pyramidal region of the mastoid.

The patient recovered rapidly from this procedure but continued to have a low-grade fever. Upon lumbar puncture on December 5 the fluid was found to contain 247 lymphocytes and 13 polymorphonuclear leukocytes.

Because the drainage was continuing both from the mastoid and nose, and since there was frank infection in the mastoid it was imperative that a radical attempt be made to seal off the intracranial cavity. There seemed little to be gained from attempting to plug the mastoid itself.

**Fig. 3.** Vertical section looking at the posterior aspect of the base of the skull to show the erosion of the internal auditory meatus, the extensive pneumatization of the petrous tip and the method of plugging the osseous defect with the muscle flap.
3rd Operation. Under local anesthesia on Dec. 12, 1954 the previous defect in the temporal bone was uncovered and the dura mater was elevated from the floor of the middle fossa. This gave a good exposure of the defect in the dura mater and petrous tip (Fig. 2). A tennis racket-shaped piece of temporal muscle, approximately 2 cm. in diameter, attached by the aponeurosis and fascia was dissected out and swung across the floor of the middle fossa and down into the dehiscence in the petrous tip (Fig. 3). This muscle was packed in the defect and seemed to cover completely the mastoid air cells. The aponeurosis was then sutured to the margin of the dural defect in order to prevent it from pulling out with contraction of the temporal muscle. The temporal lobe was allowed to fall back into place and the muscles were sutured in anatomic layers.

Course. The patient’s condition improved quite rapidly. She was given Crysticillin in addition to erythromycin and her temperature gradually decreased. There was a moderate but decreasing amount of watery drainage from the mastoid wound for approximately 3 days. On December 23 the patient was quite well and was discharged from the hospital. She had no further rhinorrhea but returned on Feb. 1, 1955 for a hypoglossofacial anastomosis and a plastic operation upon the right side of the face.

The patient was last seen on Feb. 27, 1955 at which time she had no complaints. The right side of her face felt a bit numb, a feeling that had been present since her plastic operation. She had very slight difficulty in swallowing and since her last operation at times had to use milk or water to wash down her food. All of her wounds had healed. She had considerable drooping of the right side of the face and the eyelids did not quite approximate when an attempt was made to close them. The masseters, however, contracted well. The corneal sensation was good. The right ear was completely deaf. Otherwise the neurological findings including the gait were normal. The patient has written several times since her discharge stating that she has been quite well and has had no further complaints.

DISCUSSION

There seems little doubt that the cerebrospinal fluid leak in this case resulted from the extensive erosion of the tumor into and the subsequent operative opening of the mastoid air cells. That this complication occurs so rarely is probably because of the fact that pneumatization of the mastoid tip is not common,1 and that extensive erosion of the internal acoustic meatus occurs in only a small percentage of cases of acoustic tumors. In the usual extirpation of an acoustic tumor, air cells in the petrous tip are not entered; only in the exceptional case is there such pneumatization in this area that erosion of the petrous tip allows the cerebrospinal fluid of the pre-pontine cistern free access to the tympanic antrum, middle ear and Eustachian tube. Unless there is a defect in the tympanic membrane the fluid will drip into the nasopharynx, and, if the head is flexed, into the ipsilateral nares. This paradoxical rhinorrhea has been commented upon by previous writers on the subject of rhinorrhea and otorrhea.2 The fact that a fluid level is usually present in the middle ear as it was in the present case should assist in the differential diagnosis.

The treatment of this paradoxical rhinorrhea secondary to removal of an acoustic tumor is not simple. The prophylactic sealing of the mastoid air cells with bone wax probably prevents many such leaks, but in some cases air sinuses make watertight waxing impossible. Because of the inaccessibility it is difficult, if not impossible, to seal off the region of the internal acoustic meatus with a piece of fascia such as is usually advocated for a rhinorrhea through the cribiform plate. Nor does Gelfoam give an adequate seal.*

* Dr. Joseph P. Evans in a discussion of this paper stated that he had plugged a leak in the petrous pyramid with a muscle pedicle flap from the posterior muscles of the neck and placed a piece of fibrin film over it for a dural substitution. Dr. George Baker referred to a case in which the hole was plugged successfully with "Tivalon sponge."
There remain at least two other routes of attack. Through a mastoid approach the tympanic cavity might be opened and mastoid cells or the orifices of the Eustachian tube blocked with bone wax, Gelfoam, iodoform gauze or sutures. This technique is not entirely suitable since fluid has access to the middle ear and mastoid region. It was not successful in Dandy's case nor in this case. The other approach is through the tegmen tympani. By this route it is possible to pack the entire tympanic cavity and defect in the petrous tip with muscle. In the usual case a free muscle graft might be an adequate pack, but in the presence of infection a viable graft is considered more desirable. A few sutures in the aponeurosis and dura mater over the petrous tip will hold the transplant for a few days until fibrous tissue has fixed it in place.

SUMMARY

Following a radical excision of a right acoustic neuroma, a rhinorrhoea developed. In spite of two attempts to close the fistula from the petrous tip to the Eustachian tube by bone waxing and plugging the mastoid cells with Gelfoam the cerebrospinal fluid leak continued. Infection developed in the mastoid wound, which had been made in an attempt to seal off the air cells, and meningitis ensued. Through a temporal approach a flap of muscle was inserted into the tympanic antrum and defect in the petrous tip and sutured to the dura mater. The leak ceased and the patient made an uneventful recovery from the meningitis.

REFERENCES