CASE REPORT

Middle Ear Mucocele: An Unusual Complication of the Tranlabyrinthine Approach to Acoustic Neuroma

Paul Farris, M.D., Karla Brown, M.D.,
Frank Vuitch, M.D., and
William L. Meyerhoff, M.D., Ph.D.

ABSTRACT—The complications of posterior fossa surgery continue to decrease in incidence as our collective experience broadens. Most complications are seen in the immediate postoperative period and are minimized by careful attentiveness to subtle changes in mental status, vital signs, and cranial nerve examination. Long-term follow-up is necessary to identify tumor recurrence, but strict imaging protocols as yet do not exist to facilitate the early identification of recurrent disease, as recurrence is very rare. We report the first case of secondary mucocele formation in the middle ear cleft following translabyrinthine excision of an intracanalicular acoustic neuroma. This complication was found in the fourth postoperative year on routine magnetic resonance imaging, which itself followed previously normal contrasted magnetic resonance imaging in the second postoperative year. The genesis of this complication and possible treatment options are discussed.

Postoperative complications following acoustic neuroma excision are essentially those that can happen after any middle or posterior fossa neurosurgical procedure. The severity of the complication is directly dependent on the size of the lesion and the approach used. Wiet et al¹ provide an exhaustive list and review of the reported complications, including those related to patient positioning and postoperative medical problems. Cerebrospinal fluid leakage remains the most common postoperative complication, occurring in 10% of cases. Unlike the suboccipital approach, in which the placement of a lumbar drain is often effective, the presence of a cerebrospinal fluid (CSF) leak following translabyrinthine excision generally requires a second surgical procedure.²⁻⁴ Mucocele formation following translabyrinthine dissection has not previously been reported.

decreased auditory acuity of 3 months duration. Tinnitus was also present. She denied vertigo or gait disturbances as well as trauma or prior surgery. Audiometry at that time revealed a significant sensorineural loss and a discrimination score of 88% in the affected ear. The possibility of a cerebellopontine angle mass was entertained and a magnetic resonance image (MRI) obtained. This revealed an intracanalicular mass on the right with 2 to 3 mm extension into the posterior cranial fossa. Repeat audiometry revealed a discrimination score of 22% 1 week preoperatively. She underwent an uncomplicated translabyrinthine excision and Rambo meatoplasty on September 9, 1988. Proplast and a muscle plug were used to obliterate the eustachian tube lumen, and an abdominal fat graft was placed. The Rambo meatoplasty is a modification of a mastoid obliteration technique originally described in 1957 (the modification was described in 1988), providing a water-tight closure of the external auditory canal following skull base procedures.⁵ Her immediate postoperative course was unremarkable except for a temperature elevation to 101.4°F on postoperative day 1 that resolved with incentive spirometry and progressive am-

CASE REPORT

The patient is a 41-year-old white female who presented to her local otolaryngologist with complaints of

ulation. She was discharged on postoperative day 6 in good condition.

Postoperative follow-up visits proceeded uneventfully until the 1 month postoperative visit, when an 8-cm subgaleal fluid collection was noted. This collection was somewhat tender, but aspiration failed to identify an infectious agent. Simple pressure dressing application was attempted, but reaccumulation occurred. She was returned to the operating room on postoperative day 29 for excision of her presumed pseudomeningocele (Fig. 1). At surgery, a thin layer of inflamed arachnoid was found and removed. Postoperatively, no recurrent accumulation was evident. She remained free of complaints for the first 3 years follow-up; a surveillance MRI was negative in the second postoperative year (Fig. 2).

She returned in the fourth year with complaints of a "cyst" medial to the external auditory meatus component of her Rambo meatoplasty skin flap. She described puncturing this site at home with the extrusion of a small amount of mucus with resolution of the mass. Given the theoretical risk of entrapment cholesteatoma following canal excision and meatoplasty, another contrasted MRI was obtained. This revealed a 3×3 cm mass in the region of the middle ear cleft on the right, bright on both T_1 and T_2 imaging (Fig. 3).

She was returned to the operating room for exploration and obliteration of a presumed mucocoele or entrapment cholesteatoma. The postauricular incision was opened and the periosteal tissue and cicatrix elevated to expose the bony cavity. Approximately 10 cc of clear mucus was aspirated from a mucosa-lined labyrinthectomy cavity. Examination revealed the Proplast to be visible and firmly impacted within the proximal eustachian tube.

Figure 2. Axial MRI, negative for recurrence in the second postoperative year.

Efforts were made to excise the mucosal lining in a single sheet, but several small fragments remained embedded within the sinodural and hypotympanic areas. To minimize the chance of recurrence, a solution of 5-fluorouracil was instilled and allowed to remain briefly within the cavity. Following the insertion of abdominal fat, the wound was closed. Her postoperative course was uneventful and she was discharged on postoperative day 1. She remains asymptomatic 1 year postoperatively.

Figure 1. Axial CT scan, postoperative, with apparent fluid collection.

Figure 3. Axial MRI, exhibiting 3×3 cm mass in the region of the middle ear cleft.

PATHOLOGY

Histological review shows chronically inflamed fibrovascular tissue with cholesterol clefts (Fig. 4). Focal regions of benign respiratory epithelium were also identified (Fig. 5).

DISCUSSION AND LITERATURE REVIEWS

Complication rates have fallen dramatically with the advent of microsurgical techniques in the era of skull base surgery. Presently, mortality rates of 1 to 3% are the standard for all approaches. Mortality is usually associated with a brain stem stroke due to interruption of thrombosis of the anterior inferior cerebellar artery or brain stem perforator. Posterior fossa hemorrhage and secondary hydrocephalus is another well-recognized acute postoperative event requiring emergent evacuation of the clot. The sitting position for suboccipital craniotomy has been associated with the tearing of bridging veins and resultant epidural bleeding as well. Other complications are related to nerve VII paralysis and other cranial nerve injuries, cerebellar edema, men-

Figure 5. Routine H & E stain, medium magnification; respiratory epithelium consistent with tissue of middle ear origin.

Figure 4. Routine H & E stain, medium magnification; cholesterol clefts in otherwise unremarkable fibrovascular stroma.

ingitis, pneumocephalus, spinal fluid leak, and postoperative diabetes insipidus. These problems have been reported many times by multiple authors.^{6,7}

An unusual complication found in our review is the recurrence of an undifferentiated spindle cell lesion following acoustic neuroma excision. McLean et al⁷ described a 75-year-old gentleman with no stigmata of neurofibromatosis I, who underwent the uneventful suboccipital excision of a “large” cerebellopontine angle mass. Pathology showed typical Antoni A and B areas. The postoperative course was uneventful. The patient presented 11 months later with left-sided hemianesthesia and computed tomography evidence of a diffusely recurrent mass invading the temporal bone and displacing the brain stem. Invasion of the cerebellar peduncle was also evident. Invasion of brain parenchyma was evident in postmortem tissue samples. We are aware of no other cases of malignant conversion in previously documented acoustic neuromas in nonsyndromic patients.

Our patient had a well-circumscribed lesion with MRI evidence of mucoid or keratinaceous contents. In the absence of bone erosion, new cranial nerve palsy, or significant pain, we considered the possibility of malignant conversion unlikely. The remainder of our

literature review was not helpful in identifying a similar case.

The suggestion of mucocoele on MRI raises the question of possible treatment options. Externalization versus complete excision with burnishing of the bony margins with a diamond burr seem ideal, extrapolating from the frontal sinus mucocoele literature. The need for chronic, daily care of the deep postoperative cavity may exceed the capacity of most patients as well as cause aesthetic and social handicap. A clinically analogous situation was addressed by Smith⁸ in his approach to the chronically draining mastoid cavity following radical mastoidectomy. In his article, a significant proportion of patients reported resolution of the mucoid secretion following the use of topical 5-fluorouracil.⁸

CONCLUSION

We present the first case of postoperative mucocoele following the translabyrinthine excision of an acoustic neuroma. Management is relatively straightforward, with the excision of the cyst wall presumably curative. The possibility of retained mucous-secreting elements is significant following simple physical stripping of the cyst margin, and 5-fluorouracil instillation is presented for consideration as a possible option in attempting to decrease the incidence of recurrence.

REFERENCES

---

1. Wiet RJ, et al: Complications in acoustic neuroma surgery. *Otolaryngol Clin North Am Acoustic Neuroma* 25:389-412, 1992
2. Bryce GE, et al: Cerebrospinal fluid leaks and meningitis in acoustic neuroma surgery. *Otolaryngol Head Neck Surg* 104, 1991
3. House WF (ed): Monograph. Transtemporal bone microsurgical removal of acoustic neuromas. *Arch Otolaryngol* 80:197-756, 1964
4. House JL, et al: Wound closure and cerebrospinal fluid leak after translabyrinthine surgery. *Am J Otol* 4:126-128, 1982
5. Meyerhoff WL, Stringer SP, Roland PS: Rambo procedure: Modification and application. *Laryngoscope* 98:795-796, 1988
6. Tos M, Thomsen J: Sequelae after translabyrinthine removal of 400 acoustic neuromas. In Fisch U (ed): *Neurological Surgery of the Ear and Skull Base*. New York: Raven Press, 1982
7. McClean CA, et al: Recurrence of acoustic neurilemmoma as a malignant spindle cell neoplasm. *J Neurosurg* 73:946-950, 1990
8. Smith M: The topical use of 5-fluorouracil in the ear in the management of excessive mucous secretions. *Laryngoscope* 95: 1202-1203, 1985

REVIEWER'S COMMENTS

Formation of a mucocoele or, more commonly, an epithelial cyst are potential complications in those procedures requiring obliteration of the middle ear and closure of the external auditory canal (e.g., subtotal petrosectomy for a skull base tumor, cochlear implant placement in an ossified cochlear). Following acoustic tumor resection by a translabyrinthine approach, the posterior fossa defect must be closed to prevent bacterial contamination and/or a cerebrospinal fluid leak through the incision or eustachian tube. This is usually accomplished by obliterating the mastoid with fat and closing the aditus ad antrum and/or eustachian tube with muscle, fascia, etc. Closure of the eustachian tube does create the possibility of mucocoele formation. It has been our practice to close only the aditus ad antrum (and any open facial recess cells) with temporalis muscle. Total obliteration of the middle ear and closure of the external auditory canal is required for acoustic tumor surgery requiring the addition of trans-cochlear exposure.

Paul Lambert, M.D.