CASE REPORT

Symptomatic Subdural Hygroma and Temporal Lobe Edema After Translabyrinthine Removal of Acoustic Neuroma

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ABSTRACT

The translabyrinthine approach is familiar to most neurosurgeons and neuro-otologists and is frequently used to remove acoustic neuromas. Some of the complications associated with this surgery include cerebrospinal fluid (CSF) leaks, meningitis, and rarely fat graft prolapse. The authors report a 60-year-old woman who underwent a translabyrinthine approach and microsurgical resection of a right-sided 1-cm acoustic neuroma. Initially, she was discharged home after an uneventful postoperative course. Four days later, she sought treatment in the emergency room complaining of headaches, dizziness, and lethargy. A computed tomographic (CT) scan showed a large right-sided subdural hygroma and right temporal lobe edema. The patient underwent burr hole evacuation of the collection and placement of a subdural drain, after which the edema in the temporal lobe and hygroma resolved. We speculate that the underlying mechanism was the result of inadvertent damage to the venous drainage and an arachnoid tear that was not appreciated during surgery. Neurosurgeons and neuro-otologists should be aware of this unusual complication of translabyrinthine surgery and its possible underlying mechanisms.

KEYWORDS: Acoustic neuroma, translabyrinthine, subdural hygroma

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William House¹ developed the translabyrinthine approach for excision of acoustic neuromas in 1964. Since then several published series have demonstrated the efficacy of this approach in enabling complete tumor removal while sparing facial nerve function.²⁻⁴ The translabyrinthine approach offers the most direct access to lesions of the internal auditory canal (IAC). In addition, the dural-based blood supply to tumors in this region is encountered and may be interrupted early in the course of dissection. Finally, in many cases, little or no cerebellar retraction is required. The major disadvantage of this approach is the risk of cerebrospinal fluid (CSF) fistulae, and it is necessary to use muscle or fat graft to close the dural defect and mastoid air cells. The incidence of CSF leaks after translabyrinthine surgery is not negligible.^{2,5,6} Other less common but potentially dangerous complications include migration of the fat graft into the cerebellopontine angle,⁷ formation of mastoid pneumatocele,⁸ meningitis,⁹ and inadvertent injury to the sigmoid sinus leading to thrombosis and subsequent venous insufficiency or infarction.¹⁰

The authors present a case of a delayed symptomatic subdural hygroma and temporal lobe edema following translabyrinthine removal of an acoustic neuroma. The clinical presentation and possible underlying mechanisms for this unusual complication of translabyrinthine surgery are discussed.

CASE REPORT

History

A slightly obese 60-year-old right-handed woman presented with a 6-month history of progressive hearing loss on the right. Initially, she was referred to the otolaryngologist, who performed a formal hearing test that verified significant sensorineural hearing loss in the right ear. A magnetic resonance imaging (MRI) study with gadolinium showed a

1-cm lesion in the IAC compatible, with an acoustic neuroma (Fig. 1). Her physical and neurologic examinations were otherwise normal, including facial nerve function.

Operation

The patient underwent a translabyrinthine approach and microsurgical excision of the right-sided acoustic neuroma. The patient was placed in the lateral position in three-point fixation. A generous mastoidectomy was performed, and a wide exposure was achieved as the patient had a well-pneumatized temporal bone. While the bone was drilled, some bleeding from the superior petrosal sinus was encountered as well as a small tear in the dura. The bleeding was controlled by Gelfoam, and the rest of the exposure was completed. The tumor was now well visualized and completely excised, and the facial nerve was spared. The closure was performed in a routine fashion, and the bone defect was filled with abdominal fat.

Figure 1 MRI with gadolinium, demonstrating small, right-sided intracanalicular acoustic neuroma.

Postoperative Course

Postoperatively, the patient was monitored in the intensive care unit. The course was unremarkable. Her facial nerve function was intact. A routine computed tomographic (CT) scan was performed on postoperative Day 1 to rule out a postoperative hematoma. This scan was unremarkable (Fig. 2). She was discharged home on postoperative Day 6 in intact neurologic condition, with the exception of her right hearing loss.

She returned to the emergency department 4 days later, complaining of severe headaches, dizziness, and lethargy. A CT scan demonstrated a

right-sided subdural hygroma causing significant mass effect and midline shift, with associated edema in the right temporal lobe (Fig. 3A,B). She was taken to the operating room, and a right-sided parietal burr hole was performed. The subdural fluid was clear and under high pressure; a subdural drain was left in place for 5 days. Afterward, the patient improved clinically and the drain was removed. A postoperative CT scan showed the collection to have disappeared and the edema in the temporal lobe to be resolving. Two days after the drain was removed, the patient again developed headaches. A CT scan showed that the subdural hygroma had recurred. It was drained through the

Figure 2 CT scan obtained on postoperative Day 1 showing bone removal associated with the translabyrinthine approach that was used. The rest of the brain is normal.

A

B

Figure 3 (A) CT scans obtained on the tenth postoperative day when the patient presented to the emergency department complaining of headaches showing temporal lobe edema and the subdural hygroma with midline shift. (B) CT scan showing the brain pathology shown in Fig. 3A in greater detail.

same burr hole, and a new subdural drain was inserted. After 5 days, the drain was gradually clamped and removed. The hygroma did not recur (Fig. 4). She was discharged home after the second drain was removed with no sequelae.

DISCUSSION

Subdural hygromas are collections of clear, xanthochromic, or blood-tinged fluid located in the subdural space. They are thought to be the result of tears in the arachnoid, usually from head trauma, leading to the escape of CSF into the subdural space. The hygroma can enlarge as a result of a flap valve effect and become symptomatic, or chronic subdural hematomas can form.^{11,12} Although there

is one published report of symptomatic subdural hygroma after foramen magnum decompression,¹³ there have been no reports of this complication after translabyrinthine surgery.

The underlying pathophysiology leading to the complication in this case is unclear. At surgery, the drill caused a small tear in the superior petrosal sinus and adjacent dura. We speculate that a simultaneous arachnoidal tear resulted in the gradual accumulation of CSF in the subdural space. The fluid, which could not leak outside due to packing of the surgical site with fat, continued to accumulate. The temporal lobe edema was likely due to diminished blood flow through the vein of Labbé, which was stretched by the accumulation of CSF under pressure. Radiographically, this situation appeared as the edema noted in the right temporal lobe on the CT scan. The timing and progressive nature of the clinical presentation would also support the suggestion of progressive venous insufficiency. Clinically, the patient's recovery correlated well with the resolution of the edema in the temporal lobe after evacuation of the collection. Postoperative MRI demonstrated good blood flow in the sigmoid sinus and in all draining veins including Labbé. Fortunately, there was no evidence of venous infarction, and the edema subsequently resolved with no adverse sequelae.

During translabyrinthine surgery, problems are encountered with venous insufficiency when the sigmoid sinus is injured during exposure.¹⁰ Bleeding from the transverse or sigmoid sinus can be troublesome when this occurs, but care should be taken because excessive packing can lead to thrombosis and resultant venous insufficiency, and even infarction. Also, most problems with CSF leaks cause external fistulas and meningitis. In this patient, we believe that an arachnoid tear caused CSF to accumulate in the subdural space, resulting in venous insufficiency from stretching of the vein of Labbé.

The lesson that we learned from this unusual complication is that the amount of bone removed during the translabyrinthine approach should be

Figure 4 CT scan after drainage of the subdural hygroma, demonstrating resolution of the mass effect and temporal lobe edema.

tailored to the size of the tumor. The postoperative CT scan showed that the large translabyrinthine approach had exposed a portion of the middle fossa dura. The dural and arachnoidal tears and disruption of the petrosal vein might have been avoided without compromising tumor exposure if bony removal had been limited. This rare and unusual complication of translabyrinthine surgery underlies the importance of venous structures and CSF dynamics in this region.

COMMENTS FOR PUBLICATION

This case highlights the concept that supratentorial complications can occur from infratentorial procedures. The authors properly cite the putative mechanisms for the development of subdural hygromas. What is novel about their theory is that the hygroma fluid progressively stretched the vein of Labbé, inducing temporal lobe edema from obstruction of the venous outlet. A less likely mechanism would be the injury to the superior petrosal sinus, as this channel rarely serves as the only outlet for temporal lobe venous drainage. In the article by Leonetti et al. cited in this article, the three cases of temporal lobe venous insufficiency documented by those authors were all attributable to complete occlusion of the superior petrosal sinus, along with packing of the cavernous sinus. The authors suggest that this complication can be avoided by performing less drilling of the middle fossa plate. In large mastoids, this strategy may be feasible but typically would not allow enough exposure to treat anything other than very small acoustic tumors adequately.

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REFERENCES

1. House WF, ed. Monograph: transtemporal bone microsurgical removal of acoustic neuromas. *Arch Otolaryngol* 1964;80:597-756
2. Bryce GE, Nedzelski JM, Rowed DW, Rappaport JM. Cerebrospinal fluid leaks and meningitis in acoustic neuroma surgery. *Otolaryngol Head Neck Surg* 1991;104:81-87
3. Darrouzet V, Guerin J, Aouad N, et al. The widened retrolabyrinthine approach: a new concept in acoustic neuroma surgery. *J Neurosurg* 1997;5:812-821
4. Gormley WB, Sekhar LN, Wright DC, et al. Acoustic neuromas: results of current surgical management. *Neurosurg* 1997;41:50-60
5. Celikkanat SM, Saleh E, Khashaba A, et al. Cerebrospinal fluid leak after translabyrinthine acoustic neuroma surgery. *Otolaryngol Head Neck Surg* 1995;112:654-658
6. Hoffman RA. Cerebrospinal fluid leak following acoustic neuroma removal. *Laryngoscope* 1994;104:40-58
7. Chen TC, Maceri DR, Levy ML, Giannotta SL. Brain stem compression secondary to adipose graft prolapse after translabyrinthine craniotomy: case report. *Neurosurg* 1994;35:521-524
8. Yoshida GY, Woods TR, Barrs DM. Mastoid pneumatocele: unusual complication after transmastoid translabyrinthine labyrinthectomy. *Otolaryngol Head Neck Surg* 1991;105:877-800
9. Callanan V, O'Conner AF, King TT. Air travel induced meningitis following vestibular schwannoma (acoustic neuroma) surgery. *J Laryngol Otol* 1996;110:258-260
10. Leonetti JP, Reichman OH, Silberman SJ, Gruener G. Venous infarction following translabyrinthine access to the cerebellopontine angle. *Am J Otol* 1994;15:723-727
11. Lee KS, Bae WK, Park YT, Yun IG. The pathogenesis and fate of subdural hygroma. *Br J Neurosurg* 1994;8:551-558
12. Park CK, Choi KH, Kim MC, et al. Spontaneous evolution of posttraumatic subdural hygroma into chronic subdural hematoma. *Acta Neurochir Wien* 1994;127:41-47
13. Ranjan A, Cast IP. Symptomatic subdural hygroma as a complication of foramen magnum decompression for hindbrain (Arnold Chiari deformity). *Br Neurosurg* 1996;10:301