

Surgical Findings to Differentiate Between Facial Nerve Schwannoma and Vestibular Schwannoma

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Objectives. Facial nerve schwannomas may be misdiagnosed as vestibular schwannomas (VSs) if the tumor is confined to the internal auditory canal (IAC) without involvement the geniculated ganglion or labyrinthine segment of facial nerve. Because facial nerve schwannomas may be misdiagnosed as VSs, we investigated the differences between the two.

Methods. The study included 187 patients with a preoperative diagnosis of VS. Of these, six were diagnosed with facial nerve schwannomas during surgery. We reviewed the preoperative evaluations and surgical findings of facial nerve schwannomas mimicking VSs.

Results. No useful preoperative predictors are available for facial nerve schwannomas mimicking VSs. Facial nerve schwannomas are usually confined to the IAC. After opening the dura of the IAC, a facial nerve schwannoma can be diagnosed after identifying a normal-appearing nerve located lateral to the tumor. When this was the case, we performed facial nerve preservation surgery or decompression.

Conclusion. Facial nerve schwannomas can be differentiated from VSs by identifying specific findings during surgery.

Keywords. *Facial nerve, Neurilemmoma, Acoustic neuroma*

INTRODUCTION

Facial nerve schwannomas are typically multi-segmental and most often involve the geniculate or tympanic segment [1,2]. However, facial nerve schwannomas involving the internal auditory canal (IAC) or cerebellopontine angle (CPA) without extension to the labyrinthine segment or beyond have been reported [3,4].

It is important to identify a facial nerve schwannoma with preserved facial nerve function because surgical removal of the tumor can lead to facial nerve injury and permanent facial palsy. However, no useful preoperative evaluation tools are available for determining the nerve origin of a schwannoma when the tu-

mor is confined to the IAC or CPA [5,6]. Therefore, we investigated the differences between facial nerve and vestibular schwannomas (VSs).

MATERIALS AND METHODS

We retrospectively reviewed the charts of 187 patients who were preoperatively diagnosed with VS at Soonchunhyang University Hospital and Severance Hospital between January 2000 and December 2011. We excluded cases with preoperative facial palsy. Of the 187 patients, six were diagnosed with facial nerve schwannoma during surgery. We called this ‘facial nerve schwannoma mimicking vestibular schwannoma’ (FNSMVS). We reviewed the preoperative and surgical findings of FNSMVS.

RESULTS

All six patients with FNSMVS had cochleovestibular symptoms

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without facial palsy (Table 1). There was no involvement of geniculate ganglion or labyrinthine segment of facial nerve in all cases. Three patients presented with hearing loss on the lesion side; of these, two presented with sudden hearing loss. Of the remaining three patients, two complained of tinnitus and one case presented with dizziness. Five cases of FNSMVS were confined to the IAC and one was a small tumor. There was no specific finding to find the nerve of origin of the tumor in magnetic resonance imaging (MRI). We performed facial nerve preservation stripping surgery or decompression after making the correct diagnosis.

Surgical findings for VS and FNSMVS

For a VS, the tumor mass can only be seen after the dura of the IAC is opened using a translabyrinthine approach (Fig. 1). The facial nerve is identified in the fundus area proximal to the tumor. For a FNSMVS, a normal-appearing nerve lateral to the tumor mass can be seen after opening the IAC (Fig. 2). The normal-appearing nerve runs from fundus to porus laterally. By continuing to drill along the tumor at the fundus, we can confirm the origin of the tumor. The tumor is connected with laby-

rithine segment of facial nerve. The normal-appearing nerve starting at the fundus is the superior vestibular nerve.

DISCUSSION

With the increasingly widespread use of MRI, retrocochlear tumor lesions are being detected more frequently. Schwannomas of IAC or CPA arise mainly from the vestibular nerve, while the facial nerve is rarely involved. Several studies have reported facial nerve schwannomas that were initially diagnosed as VS [3,4,6]. However, no useful tools are available for the preoperative determination of the nerve origin of a schwannoma, when the tumor is confined to the IAC or CPA. As in our study population, most facial nerve schwannomas in the IAC or CPA are diagnosed during surgery.

A facial nerve schwannoma in the IAC and CPA usually manifests as perceptive hearing impairment and tinnitus because the tumor compresses the cochlear nerve [7,8]. Sherman et al. [9] reported that a facial nerve schwannoma limited to the CPA/IAC presents with a higher rate of hearing loss and a much lower rate of facial palsy. In our study population, most patients had cochlear symptoms without facial palsy.

Large CPA tumors with preoperative facial palsy are likely to

Table 1. Summary of patients with facial nerve schwannoma mimicking vestibular schwannoma

Case no.	Sex	Age (year)	Presenting symptoms	Tumor location	Surgery
1	M	30	Sudden hearing loss	IAC	Translabyrinthine (stripping)
2	M	53	Tinnitus	IAC-CPA	Translabyrinthine (stripping)
3	F	56	Hearing loss	IAC	Translabyrinthine (stripping)
4	F	39	Dizziness	IAC	Translabyrinthine (decompression)
5	M	40	Tinnitus	IAC	Translabyrinthine (decompression)
6	M	46	Sudden hearing loss	IAC	Translabyrinthine (decompression)

IAC, internal auditory canal; CPA, cerebellopontine angle.

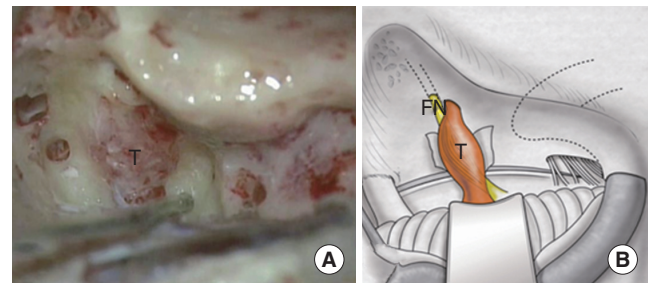


Fig. 1. Surgical finding of vestibular schwannoma (VS). (A) The VS is seen only as a tumor mass after opening the dura of the internal auditory canal (IAC). (B) Schematic drawing of a VS after opening the dura of the IAC. T, tumor; FN, facial nerve.

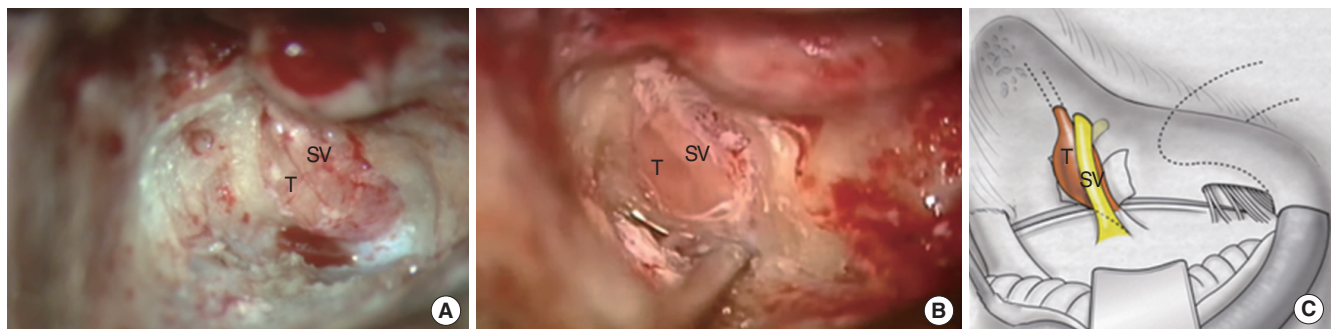


Fig. 2. Surgical finding of facial nerve schwannoma mimicking a vestibular schwannoma (VS). (A, B) Facial nerve schwannoma has a normal-appearing nerve lateral to the tumor mass in each case. (C) Schematic drawing of a facial nerve schwannoma mimicking a VS after opening the dura of the internal auditory canal. T, tumor; SV, superior vestibular nerve.

be considered facial nerve schwannoma. Although approximately 30% of facial nerve schwannomas present with no facial palsy, large facial nerve schwannomas extending to the posterior cranial fossa quite often present with facial palsy [10]. None of our patients had a large tumor and it is likely that large facial nerve schwannomas usually present with facial palsy.

Although there were attempts to identify a small lesion arising eccentrically from the anterior superior location of the facial nerve in either the CPA or IAC using sagittal oblique reconstructions of the three-dimensional MRI, the distinction between VS and FNS of the CPA or IAC alone cannot be made reliably on imaging so far [2]. We also could not differentiate the FNSMVS on MRI findings in our cases.

When a facial nerve schwannoma is identified unexpectedly during surgery for a presumed VS, the surgeon is faced with a dilemma regarding how to proceed. The patient may not have been informed of, or given appropriate consent for, issues associated with tumor removal. A biopsy is generally contraindicated unless malignancy is suspected [11]. There have been several reports of tumor excision in which the nerve is left intact and functioning [12,13]. In some cases without facial dysfunction, we were able to dissect the tumor from the facial nerve because the neural compression was minimal. Angeli and Brackmann [14] reported that wide decompression is an alternative to surgical removal in cases of unsuspected facial neuromas in patients with normal facial nerve function. In other cases, we chose to use decompression because the exposed tumor could not be dissected from the facial nerve.

Although preoperative differentiation between FNSMVS and VS is impossible, early detection during surgery is very important to avoid inadvertent damage. The surgeon can also establish a treatment plan for an unexpected facial nerve schwannoma during surgery. When the anatomic relationship of the vestibular nerves to the facial nerve is considered, the facial nerve is typically deflected medially by the tumor. Therefore, the facial nerve is identified as both proximal and distal to the tumor, for smaller tumors. When a normal-appearing nerve appears lateral to the tumor, one might question the diagnosis of FNSMVS. The tumor diagnosis can be confirmed by dissecting the facial nerve both proximal and distal to the tumor.

FNSMVS can be differentiated from VS by identifying specific surgical findings after opening the dura of the IAC. Surgeons should familiarize themselves with these surgical finding and suspect FNSMVS when they encounter one during surgery. It is also desirable to inform the patient about the possibility of a facial nerve schwannoma when diagnosing a VS.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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