Case Reports and Technical Notes
Preservation of Vestibular, Cochlear, and Facial Nerves during Microsurgical Removal of Acoustic Tumors
Report of Two Cases

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Acoustic tumors limited to the confines of the internal auditory canal have been found at autopsy, and histological studies demonstrated that these small tumors arose in most instances from the sheath of the superior or inferior vestibular nerve. Thus, the possibility exists of preserving the non-involved facial, cochlear, and vestibular nerves during removal of small acoustic tumors confined to the canal or even protruding a short distance into the cerebellopontine angle.1,2,7,8

Since April, 1964, we have used the posterior fossa transmeatal approach in 12 cases of acoustic tumor. It became apparent, particularly in small tumors (less than 2 cm) arising from one of the vestibular nerves, that under the binocular surgical microscope the other cranial nerves within the internal auditory canal can be separated from the capsule of the intrameatal portion of the neoplasm if they are not directly involved in the tumor growth. Consequently, when operating upon a small acoustic tumor in which partial function of the noninvolved cochlear and vestibular nerves is present preoperatively, the neurosurgeon should make every effort to preserve their residual function. The same applies to the facial nerve, which is rarely involved directly by the small acoustic tumor.

Case Reports

The first patient, a 45-year-old woman, had developed tinnitus (a buzzing “seashell” sound) in the left ear 3 years before admission to UCLA Hospital on December 18, 1965. At about the same time she had noticed decreasing hearing in the left ear, especially when using the telephone. Eighteen months later the patient had several episodes of severe vertigo of sudden onset causing her to veer to the left. They were partially relieved by rest and further controlled with appropriate drugs. Recently, the patient had had slight pain in the left ear without headache. She was examined by Dr. Richard Barton, an otolaryngologist, who performed otologic and vestibular tests and diagnosed a left acoustic neurinoma.

Examination. The patient had transient nystagmus on horizontal gaze, especially to the left, and slight fine intention tremor of both outstretched hands, which was apparently due to nervousness.

Hearing and vestibular functions on the right were normal. There was left sensorineural hypoacusis with loss of perception of whispered voice, and a mild-to-severe sloping loss of high frequency hearing, tested with puretone air conduction lateralized to the right at 500 and 250 cps. Speech discrimination was 78% on the left, 100% on the right. The Bekesy test showed separation of “C” from “P” at fixed frequency tracings at 4,000, 2,000, and 1,000 cps, but no separation at 500 and 250 cps. The Short Increment Sensitivity Index showed high scores at 4,000, 2,000, and 1,000 cps; low score at 250 cps. The Alternate Binaural Loudness Balance Test demonstrated complete recruitment at 4,000, 2,000, and 1,000 cps.

It was concluded that the special diagnostic tests were consistent with a hearing loss secondary to a cochlear lesion of the left ear. The findings were normal on the right.

The Hallpike caloric test was normal on the right, but nystagmus reaction to both warm and cool water was decreased on the left side. Skull series, including polytime laminograms of the petrous bones, demonstrated moderate erosion of the superior wall of the left internal auditory canal consistent with acoustic neurinoma. A subsequent posterior fossa myelogram demonstrated an 8 to 10 mm tumor pro-
truding from the left internal auditory canal into the cerebellopontine angle (Fig. 1). All other laboratory tests were normal including cerebrospinal fluid protein.

Operation. A suboccipital craniectomy was performed on December 20, 1965, via the transmeatal approach previously described by the authors.\textsuperscript{10,11} The internal auditory canal on the left was widely opened lateral to the origin of the acoustic tumor by diamond drill microdissection. The tumor arose from the left inferior vestibular nerve. The superior vestibular nerve and cochlear nerves were compressed and stretched over the intrameatal portion of the tumor. These nerves, as well as the facial nerve which lay anteriorly and superiorly, were separated and carefully kept aside from the tumor as it was removed in two portions (Fig. 2). As far as could be seen, the internal auditory artery was not destroyed. The wound was then closed without drainage. At the completion, the retracted cerebellar hemisphere did not appear to have been traumatized. The pathological diagnosis on microscopic examination was acoustic neurilemma.

Postoperative Course. The facial movements

\begin{figure}[h]
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\includegraphics[width=\textwidth]{fig1.png}
\caption{Posterior fossa myelogram demonstrating a small acoustic tumor protruding from the enlarged left internal auditory canal (arrow).}
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\begin{figure}[h]
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\includegraphics[width=\textwidth]{fig2.png}
\caption{Left: Small acoustic tumor (arrows) protruding from the left porus acusticus. Right: The left internal auditory canal widely opened after diamond drill dissection. The acoustic tumor originating from the inferior vestibular nerve has been removed from the canal (arrows). The superior vestibular nerve (SVN), cochlear nerve (CN), and facial nerve (FN) remain anatomically intact.}
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