

5. Internal Auditory Canal Neoplasms

Schwannomas are the most common mass of the internal auditory canal (IAC) (Fig. 5.1 A, B). They arise most frequently from the vestibular portion of cranial nerve (CN) 8, although they can arise from CN 7. Risk factors include long-term exposure to loud noises, previous head or neck irradiation, and neurofibromatosis type 2. Bilateral vestibular schwannomas are pathognomonic for the latter. Symptoms are most frequently cochlear in nature— hearing loss and tinnitus—although vestibular nerve compression may result in an unsteady gait. MRI is vastly superior to CT and older invasive methods at diagnosing schwannomas as the lack of signal from adjacent bone allows cranial nerves 7 and 8 to be directly visualized. Most tumors are large enough to be well-seen on precontrast scans with slice sections less than 3 mm. Schwannomas demonstrate moderate to low SI on T1 and T2WI. SI on T2WI may, however, vary with tumor pathology: densely packed palisades of neural tissue (Antoni A areas) appear slightly hypointense while more loosely packed neural tissue (Antoni B areas) appears slightly hyperintense. About 10% of schwannomas are accompanied by an arachnoid cyst, the latter of high SI on T2WI. T2WI may also help predict recovery of auditory capacity post-operatively. Specifically if there is a substantial amount of CSF between the schwannoma and the fundus of the auditory canal and if this, along with intralabyrinthine fluid, is of normal SI, then the likelihood of post-surgical hearing preservation is higher (due to implications for the operative approach). T2WI allow visualization of disease processes that can clinically mimic a schwannoma, such as multiple

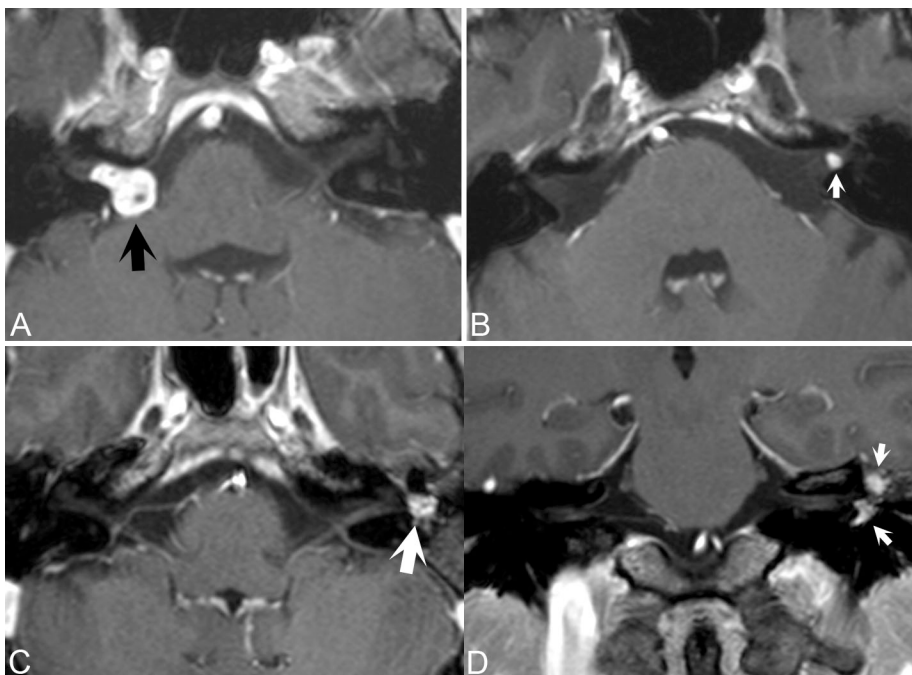


Fig. 5.1

sclerosis, mastoiditis, and vascular brainstem compression. Many schwannomas extend from the IAC to the cerebellopontine angle cistern (CPA), however purely intracanalicular lesions occur. IV contrast administration improves substantially differential diagnosis and is essential for the detection of tumors less than 3 mm in diameter (white arrow, Fig. 5.1 B). Contrast is also useful for pre-operative evaluation of schwannomas and may demonstrate extension of tumor that is not otherwise seen. Enhancement of schwannomas is most frequently homogenous, but may be heterogenous (black arrow, Fig. 5.1 A). Enhancement involving CN 7 can represent either a schwannoma (typically seen as a mass lesion) or neuritis (the latter with a linear pattern of enhancement). Inflammatory (i.e. sarcoid) and neoplastic conditions, which demonstrate meningeal enhancement, may be confused with neural origin lesions in the IAC. In this case, the diagnosis rests on clinical correlation and followup MRI. Glomus tympanicum (white arrows, Fig. 5.1 C, D), a type of paraganglioma, may also be confused for a schwannoma. This lesion presents with pulsatile tinnitus and is the most common neoplasm of the inferior part of the middle ear, often at the cochlear promontory or semicircular canals. The location of this enhancing lesion, along with the classic presence of intra-tumoral flow voids, helps distinguish it from a schwannoma. Translabyrinthine approaches to the resection of schwannomas may complicate the MR evaluation of recurrence. This approach involves resection of the mastoid and packing with autologous graft containing fat which may be superimposed over CN 8 in axial scans. Coronal imaging helps to separate this high SI graft from recurrent tumor.

Differentiation on MR of a CPA schwannoma from a meningioma, the latter being much less common, can be challenging. Nearly 80% of CPA schwannomas contain an intracanalicular component (Fig 5.1 A); however meningiomas may extend into the IAC as well. The latter, however, do not enlarge the IAC. Though both may follow the contour of nerves, meningiomas frequently demonstrate a dural tail (see chapter 4) and make an obtuse, rather than acute, angle with the petrous bone. Features favoring a schwannoma include areas of low SI on post-contrast T1WI (Fig. 5.1 A) and high SI on T2WI correlating with cystic or necrotic changes as well as the presence of a concomitant arachnoid cyst. Schwannomas tend to enhance more heterogeneously and hemorrhage more frequently than meningiomas. Epidermoids (cholesteatomas) and dermoids are additional diagnostic considerations at both the CPA and IAC. Epidermoids result from incomplete cleavage of neural from cutaneous ectoderm, with inclusion of ectodermal elements at the time of neural groove closure. Dermoids contain additional dermal elements, such as skin appendages and sebaceous cysts. Both can occur at suprasellar or intraventricular locations

Essentials of Clinical MR, 2nd edition

as well as at the CPA. Dermoids are more frequently midline and, due to the oil from intrinsic sebaceous glands, appear with high SI on T1WI. Both dermoids and epidermoids exhibit high SI on DWI (but less so with dermoids). Epidermoids, however have SI like that of CSF or an arachnoid cyst (low SI on T1WI and high SI on T2WI). Unlike the latter, epidermoids demonstrate slightly higher SI on FLAIR. Epidermoids, dermoids, and arachnoid cysts do not enhance, thus easily differentiating them from schwannomas and meningiomas.