Mixed solid and cystic acoustic neuroma: MR features and differential diagnosis

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Abstract. We present a very rare case of combined cystic and solid acoustic neuroma investigated by magnetic resonance imaging (MRI). This case illustrates the value of MRI in the characterization of tumours in the posterior cranial fossa, particularly acoustic neuromas, and its diagnostic impact in unusual situations. The differential diagnosis of cystic and mixed lesions in the cerebellopontine angle is discussed.

Key words: Acoustic nerve – Neuroma – Magnetic resonance imaging

Introduction

Acoustic neuroma is the most frequent tumour in the posterior fossa [1], and presents a dilemma to neurologists and otolaryngologists. Unfortunately symptoms are often non-specific, particularly early in the evolution of the tumour [2]. Early diagnosis is the most important factor in the preservation of hearing after surgery [3]; furthermore, it decreases the rate of surgical complications [4]. These factors explain the importance of modern imaging techniques in this condition. The magnetic resonance imaging (MRI) appearances of acoustic neuroma are well known and specific [5–7], but unusual features may be encountered (in 2.2% of our cases [8]). We present a rare case of combined cystic and solid acoustic neuroma with MR findings.

Case report

A 51-year-old patient was operated upon in 1982 for a large cystic acoustic neuroma in the left cerebellopontine angle (CPA), which had a small solid component in the internal auditory meatus (IAM). An apparently complete surgical excision was performed, by the suboccipital approach. The facial and cochlear nerves were identified, and preserved. Microscopic study revealed an acoustic neuroma of Antoni type B. Postoperatively complete left hearing loss was noted. Repeat CT in 1984 showed no sign of recurrence. In 1989 the sudden onset of vertigo led to an MR study, performed on a 1.5 T unit (Signa, GE Medical), using a head coil (field of view: 20 cm). T1-weighted spin-echo images were obtained before and after injection of gadolinium (Gd-DOTA) with 3-mm-thick slices, and a 256X256 matrix. Two tumours were demonstrated an 8 x 5-mm enhancing lesion occupied the left IAM which had enlarged slightly since the previous operation, and there was a second mass in the CPA, which had a combined solid and cystic appearance, best seen after injection (Fig.1). T2-weighted images were not obtained, despite the inhomogeneous appearance on the pre-Gd images, because the hypointense component was presumed cystic, given the history of partially cystic acoustic neuroma. This hypointense component was invaginating the brain stem, causing compression of the fourth ventricle. After injection the hypointense component showed a thin enhancing wall, considered as reasonable proof of the cystic nature of this part of the tumour. A translabyrinthine approach was performed, which confirmed the existence of two different tumours. The cystic component, which was removed first, was filled with xanthochromic fluid and was completely excised, as was the solid portion. The second tumour in the IAM was then removed. Microscopy findings were similar to those of the original surgical specimen. Facial nerve function was preserved and postoperative follow up was uneventful.

Discussion

In cases of acoustic neuroma, MRI has proved the best tool for accurate diagnosis, safe anatomical delineation and good specificity [5–7]. Acoustic neuromas are characteristically hypo- or isointense compared with surrounding brain on T1-weighted images and always hyperintense on T2-weighted sequences. However, small
intracanal neurmas can be difficult to differentiate from cerebrospinal fluid (CSF) [9]. Such lesions are easily detected after Gd injection; all acoustic neuromas display marked enhancement [10]. Small tumours are usually homogeneous, whereas large lesions are inhomogeneous due to necrosis within them [8]. Most lesions are located in the IAM, with or without CPA involvement, and entirely extracanal lesions are rare [8]. These MR findings are almost constant, and MRI is highly specific. However, rare atypical forms may occur: neuromas may be calcified and difficult to differentiate from meningioma [11]. A single case of multicystic tumour has also been reported recently [12].

Our case, studied with pre- and post-Gd T1-weighted spin echo images, showed a enhancing and hypointense elements, with a large hypointense component which invaginated the pons; furthermore, a second recurrence was present in the IAM. The antecedent history strongly suggested the diagnosis, despite the unusual findings.

Without the history of previous resection of a partially cystic acoustic neuroma, additional pre-Gd T2-weighted images would have been obtained, in order to better define the nature of the hypointense part of the lesion, and differentiate fluid from a solid, unenhancing lesion; in the circumstances, T2-weighted images were not obtained. Post-Gd images showed a thin enhancing wall around the hypointense part of the tumour, a clue to its probably cystic nature.

We found no data in the literature on the frequency of cystic tumours of the CPA. However, purely cystic lesions (epidermoid, arachnoid and cholesterol cysts) can be separated from mixed cystic and solid lesions (cystic meningioma, ependymoma of the CPA, and extra-axial cystic glioma of the brain stem). Arachnoid cysts may be recognized, by a signal identical to that of CSF and the absence of a definite wall, of bone involvement or of contrast enhancement [12]. Epidermoid tumours have lobulated margins and tend to give low signal on T1-weighted images and high signal, often heterogeneous on T2-weighted images. Cholesterol cysts give high signal intensity, due to chronic and acute haemorrhage on both T1- and T2-weighted images [14]. Some other cystic tumours may also have solid components, and should be included in the differential diagnosis. Meningiomas rarely have cysts [15]; to our knowledge, this was never been described in the posterior cranial fossa. The association of bone involvement with an iso- or hypointense lesion on T2-weighted images often leads to the diagnosis [16]. Brain-stem gliomas may rarely have a lateral extension, and a cystic component [17]; however the enlargement of the brain stem and the site of the tumor do not suggest a primary CPA lesion. Drapkin et al. [12] raised the possibility of purely extra-axial ependymomas and choroid plexus papilloma of the CPA, which are difficult to exclude, as both may have cystic components.

In conclusion, acoustic neuroma is usually easy to diagnose on MRI. Even in unusual cases, such as cystic, or mixed variants, which are very rare, the same observations should lead to the correct diagnosis: thus, intrameatal extension and MRI signal characteristics are the most useful observations in differential diagnosis.

References