Abstract. – Otitis media (OM) is an infection localized in the middle ear: mastoid, middle ear cavity, Eustachian tube. The classification of OM includes otitis media with effusion, otitis media without effusion, and chronic otitis media. A rare complication of chronic otitis is cholesterol granuloma of the petrous apex. It may develop in any aerated portion of the temporal bone but most commonly develops when a pathologic process obstruct the air cell tracts to the petrous apex preventing normal aeration.

Key Words: Cholesterol crystals, Giant cells.

Introduction

The acute otitis is characterized by a severe congestion of the mucosa of the middle ear and the tympanic membrane. It is not generally realized that congestion of the mucosa is frequently also a marked feature of chronic otitis media. The fluid portion of blood, plasma, may leave a deposit of fibrin in the tissues. A fluid exudate in the middle ear cavity is frequently a prominent component of the inflammatory reaction – a specific form of the disease known as otitis media with effusion. In these cases mucus may be secreted by newly formed glands in the middle ear mucosa and may contribute to the fluid “exudate”. In acute inflammation neutrophils are prevalent. In chronic inflammation histiocytes (derived from monocytes of the blood), lymphocytes and plasma cells (derived from lymphocytes), are the characteristic infiltrate. Organisms are seen very rarely in histological sections of acute or chronic inflammation of the middle ear. In newborn infants an inflammatory reaction may be the result of the contamination of the middle ear by inhaled amniotic squames. In these cases the histiocytes reacting to the foreign material fuse to form giant cells. Haemorrhage is a common result of the congestion of otitis media. It may lead to cholesterol granuloma.

Materials and Methods

We have studied the histopathological changes in temporal bones of a deceased individuals, with concomitant cholesterol granuloma of the left petrous apex.

This patient was a donor and agreed during his life to donate post mortem his temporal bones to the House Ear Institute as a contribution to a better knowledge of temporal bone diseases.

We have removed the temporal bones in our usual way.

Results

Yellow nodules are found in the tympanic cavity and mastoid in many cases of chronic otitis media. These are composed microscopically of cholesterol crystals (dissolved away to leave empty clefts in paraffin-embedded histological sections) surrounded by foreign body type giant cells and other chronic inflammatory cells (Figure 1). Such cholesterol granulomas are almost always found in the midst of haemorrhage in the middle ear mucosa. That haemorrhage is the cause of cholesterol granuloma has been denied by Sadè, who thought that the blood seen in the biop-
The treatment for cholesterol granuloma of the temporal bone is drainage and re-establishment of adequate aeration to the involved area. The cyst wall is composed of fibrous connective tissue. It is free of keratinizing squamous epithelium that characterizes cholesteatoma, and complete removal of the cyst is not necessary.

Infra labyrinthine, infracochlear and trans-sphenoidal approaches are most commonly chosen for drainage of cystic lesions of the petrous apex in an ear with serviceable hearing. These lesions are frequently detected at an asymptomatic stage with today’s imaging techniques. Because the natural history of small benign cystic lesions is not well documented, surgical drainage should be reserved for patients with larger lesions or with symptoms, including pain, visual changes, diplopia, hearing loss, vertigo, or facial nerve weakness. For patients without serviceable hearing, these lesions should be drained through a translabyrinthine approach. Because other vital structures may be affected by enlargement of the cyst, delaying surgery in symptomatic patients provides no advantage. Zini suggests the occipito-temporal approach as a direct access to the anterior and posterior petrous apex without opening the dura, thus preserving the facial and the cochlear-vestibular functions.

Preoperative evaluation of these patients is based upon their symptoms. Patients presenting with hearing loss are evaluated initially with audiometric testing, including air, bone and speech reception thresholds and speech discrimination scores. Electronystagmography is performed in patients who complain of
imbalance or vertigo. In patients with otherwise normal results on physical examination, asymmetric hearing is next evaluated with auditory brainstem response testing. If these results are abnormal, an MRI scan is indicated.

In patients with cranial nerve involvement other than the eight nerve, with asymmetric hearing, auditory brainstem response testing is not performed, and the physician proceeds directly to an MRI scan. The advent of magnetic resonance imaging has helped, showing a high signal in T1 and T2 without enhancement after the administration of intravenous paramagnetic contrast.

Patients who have normal hearing but have other cranial nerve deficits that may be referable to the petrous apex may be screened with either a high-resolution, thin-section CT of the temporal bone or an MRI with gadolinium. If an abnormality is found, all patients undergo air, bone, and speech reception thresholds and speech discrimination audiometric testing before surgery to document hearing levels before a procedure that jeopardizes hearing.

Preoperatively, patients are counseled to expect resolution of pain, if present, and the possibility of improvement in cranial nerve function if it is decreased preoperatively. Cranial nerves that have been affected for shorter periods of time seem to have a better prognosis and fewer long-standing deficits then those affected longer. Patients are reminded this is a drainage procedure whose goal is to decompress the lesion and provide an aerated cavity, if possible. The goal is not the removal of the lesion, and close follow-up may be necessary. Recurrence of the lesion secondary to inadequate drainage is usually heralded by the return of preoperative symptoms. Follow-up MRI frequently reveals a cholesterol granuloma cyst that remains full of fluid, but the T1-weighted image is hypointense, compared with the preoperative hyperintense image on T1 views. A return of hyperintensity on the T1 image suggest inadequate drainage in a symptomatic lesion.

Advances in radiologic imaging during the past decade have made it possible to reliably differentiate lesions of the petrous apex preoperatively; The development of CT scanning was the first major step in imaging the temporal bone since the development of polytomography. CT scanning gives the surgeon the ability to visualize the size of the lesion and its relationship to vital structures, including the internal auditory canal, cochlea, vestibular labyrinth, carotid artery, and jugular bulb. It also helps characterize the border of the lesion as expansive or invasive, which may differenti-

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Computed tomography</th>
<th>T1</th>
<th>T2</th>
<th>Enhancement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retained mucus</td>
<td>Normal bony architecture, nonenhancing</td>
<td>Hypointense</td>
<td>Hyperintense</td>
<td>No</td>
</tr>
<tr>
<td>Mucocele</td>
<td>Hypodense, expansile smooth border, nonenhancing</td>
<td>Hypointense</td>
<td>Hyperintense</td>
<td>No</td>
</tr>
<tr>
<td>Asymmetric</td>
<td>Normal bony architecture, nonenhancing</td>
<td>Hyperintense</td>
<td>Hyperintense</td>
<td>No</td>
</tr>
<tr>
<td>pneumatization</td>
<td></td>
<td>Hypointense</td>
<td>Hyperintense</td>
<td>No</td>
</tr>
<tr>
<td>Cholesteatoma</td>
<td>Loss of normal air cells, nonenhancing, isointense with CSF</td>
<td>Hypointense</td>
<td>Hyperintense</td>
<td>No</td>
</tr>
<tr>
<td>Cholesterol granuloma</td>
<td>Expansile smooth border, occasional rim enhancement, isointense with brain</td>
<td>Hyperintense</td>
<td>Hyperintense</td>
<td>No</td>
</tr>
<tr>
<td>Metastatic lesion</td>
<td>Destructive, indistinct border</td>
<td>Isointense</td>
<td>Hyperintense</td>
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<tr>
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<td>Aggressive bone destruction, calcification</td>
<td>Isointense: 75%</td>
<td>Hyperintense</td>
<td>Yes</td>
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<tr>
<td>Chondroma</td>
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<td>Hypointense to isointense</td>
<td>Hyperintense</td>
<td>Yes</td>
</tr>
<tr>
<td>Chondrosarcoma</td>
<td>Aggressive bone destruction, calcification</td>
<td>Hypointense to isointense</td>
<td>Hyperintense</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 1. Mean values and significativity of variables.
ate between benign lesions and malignant neoplasms. MRI of the temporal bone added the capability of characterizing the substance of the lesion rather than its effect on bony interfaces, allowing the surgeon to distinguish between mucus, fat, cholesterol granuloma, cholesteatoma, and neoplasm. The combination of CT, with its superior bone imaging algorithms, and MRI, with its enhanced tissue imaging capabilities allows the surgeon to differentiate accurately and reliably between benign cystic lesions, normal anatomic variants, and neoplastic lesions of the petrous apex.

References


