Introduction

A meningioma en plaque (MEP) is a subtype of meningioma characterized by more diffuse and “sheet-like” pattern of growth than the more common globular form. They are more likely to invade adjacent calvarial bone and may induce significant hyperostosis.1 Temporal bone involvement is rare, though has been reported.2 On CT imaging, MEPs are often confused for primary osseous pathology, most often fibrous dysplasia, as the CT findings that differentiate them can be subtle.

We report a case of an osseous lesion of the temporal bone which was first thought to be fibrous dysplasia based on imaging findings, but after surgery was found to be a hyperostotic MEP. We then review the subtle radiographic findings which differentiate various osseous pathologies of the temporal bone.

Report of a case

A 40 year old female suffered a fall at work, striking her head. She presented to the emergency room where she had a computed tomography (CT) brain scan which showed sclerotic expansion of the right temporal bone with a spiculated peristomal reaction along the outer and inner tables. All portions of the temporal bone were involved, though it appeared to respect suture lines, as there was no involvement of any other bones of the calvarium. The outer table of bone was serrated and spiculated, while the inner table had a more lobular pattern. The initial interpretation by radiology was atypical fibrous dysplasia and this prompted referral to the otology clinic.

There she gave a history of 3-4 months of right pulsatile tinnitus, muffled hearing, intermittent headaches, and aural fullness. Examination revealed narrowing of the right external auditory canal by soft tissue. Audiologic testing showed a mild right conductive hearing loss with a type B, normal volume tympanogram. We elected for observation and follow up CT scan of the temporal bones. After an observation period of 6 months, her canal occlusion persisted. A thin-slice CT scan of the temporal bone at that time showed similar findings to the original CT scan (Figure 1), but in greater detail. We performed right canalplasty and mastoidectomy to improve her canal occlusion, but final pathology revealed it to be a meningioma. A contrast enhanced magnetic resonance imaging (MRI) scan of the brain was performed which showed multiple meningiomas, including a meningioma en plaque (MEP) of the right middle cranial fossa with extension into the temporal bone (Figure 2).

Figure 1. Axial view, non-contrast CT of the right temporal bone
Right mastoid effusion with sclerotic expansion of the temporal bone. The outer and inner table architecture of the bone are lost. The outer table is serrated and spiculated, while the inner table has a lobular pattern.

Discussion

Differentiating MEP from fibrous dysplasia

MEPs can produce several patterns of hyperostosis but indolent growth and sclerotic bony expansion are always present. In addition to sclerosis, there may be permeative or destructive changes in the bone. The presence of a dural tail or line of calcification along the dura is also specific to meningiomas.3-4 In some cases, MEPs produce a peristomal pattern of hyperostosis, where less dense hyperostotic bone extends from clearly defined denser inner and outer tables.3 As fibrous dysplasia does not cause bone formation in this manner, the two should not be confused when this pattern is present. The bone appearance in fibrous dysplasia varies from lucent zones to diffuse sclerosis producing a “ground-glass” appearance with bony expansion but without cortical break.5 Inner table involvement tends to occur more with MEP than fibrous dysplasia, and the surface also tends to be more irregular with MEP and smoother with fibrous dysplasia, though these are not specific findings.3,5,6

<table>
<thead>
<tr>
<th>Osseous lesion/pathology</th>
<th>CT imaging bone characteristics</th>
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<tr>
<td>Osteoma</td>
<td>Does not cross suture lines and almost always involve the outer cortex without extension into the diploe.5</td>
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<tr>
<td>Paget’s disease</td>
<td>Early form: one or more lytic lesions which progress to coarsening trabeculae, bony expansion, widening of the diploe, usually with more inner table than outer.</td>
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<tr>
<td>Osteopetrosis tarda</td>
<td>Diffusely thickened cranial vault, often described as “shaly”.8</td>
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<tr>
<td>Otosclerosis</td>
<td>Decreased mineralization of the fissula ante fenestram. Obliterates the mastoid air cells and a uniform dense appearance. Pericellular luency forming “double halo” sign.9</td>
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<tr>
<td>Osteogenesis imperfecta</td>
<td>Similar demineralization pattern of otosclerosis but more diffuse; hyperattenuated areas around the cochlea and labyrinth; bone apposition in the oval and round window niches.10</td>
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<tr>
<td>Metastatic lesions</td>
<td>Variable appearance most often appear as lytic lesions with significant bone destruction.11</td>
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Table 1: CT characteristics of other temporal bone osseous pathology

Conclusion

In summary, we report a rare case of an MEP of the temporal bone which was initially thought to be fibrous dysplasia, though subtle radiographic findings suggested otherwise. This case emphasizes the importance to the otolaryngologist of understanding the CT imaging findings which differentiate osteodysplastic processes of the temporal bone. It also underscores that though rare, MEP can be considered in the differential diagnosis of temporal bone expansion and that MRI be considered when CT findings are non-specific.

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References