Osteoblastoma of the Temporal Bone in a Young Child

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ABSTRACT

Objective: To present a unique case of osteoblastoma of the temporal bone found in an asymptomatic pediatric patient. Design: Case report and literature review. Methods: Case report and literature review. Results: Osteoblastic examination during a well-child visit was incidental. The patient was asymptomatic and the lesion was discovered on otometric examination. The lesion was resected in a straightforward manner, and the patient did well postoperatively. Conclusion: Osteoblastomas of the temporal bone are rare. This case report is notable for the presence of osteoblastoma discovered incidentally on a well-child visit in an asymptomatic patient, describing the importance of these exams.

INTRODUCTION

Primary malignancies of the external auditory canal (EAC) are extremely rare and are usually benign conditions. However, osteoblastomas are a type of benign bone tumor that can be challenging to diagnose and treat. In this paper, we present a case of an osteoblastoma of the temporal bone in an asymptomatic pediatric patient. We also review the literature on osteoblastomas to provide a comprehensive understanding of this rare condition.

CASE REPORT

An otherwise healthy 8-year-old girl underwent a routine annual well-child exam performed by her local pediatrician. The patient was asymptomatic without complaints of hearing loss, tinnitus, dizziness, or otitis media. Her parents did not report any noticeable hearing loss. Past medical, surgical, family, and social histories were noncontributory. Osteoblastoma of the tympanic canalicul found a polypoid mass behind the tympanic membrane. The remaining physical exam was unremarkable, and the patient was referred for further workup.

An audiogram revealed a mild conductive hearing loss in low frequencies in the right ear with an air-bone gap of approximately 20 decibels at 500 hertz. A computed tomography (CT) scan revealed an expansible temporal bone lesion above the right ear canal with extension into the middle ear space and epiphragmatic space. The tumor surrounded the ossicular chain. The posterior margin abutted the labyrinthine and tympanic segments of the right facial nerve canal. The tumor was located in the squamous and petrous portions of the temporal bone and osseous mastoid pan. The cochlea and semicircular canals were shown to be intact. Magnetic resonance imaging (MRI) displayed a brightly enhancing lesion corresponding to the bony mass found on CT scan.

The brain was otherwise uninvolved by the lesion.

The initial working diagnosis was Langerhans Cell Histiocytosis, and the consulting otolaryngologist recommended a thin-section panoramic CT of the temporal bone. A transoral approach was used to lift the tympanic membrane, and the surgeon removed as much of the mass as possible, noting that the mass was easily removed from the ossicles. The histology was interpreted as osteoblastoma, and the patient was then referred to a tertiary cancer center for definitive surgical treatment.

At our facility, physical exam revealed a well-healed tympanic membrane, with only a small portion of the tumor visible in the anterior-superior quadrant. A CT angiogram (CTA) revealed bilaterally patent common and internal carotid arteries and codominant vertebral arteries. The tumor was likely supplied by the right middle meningeal artery and extending pharyngeal artery.

A gross total tumor resection was achieved through a transantral approach to the temporal bone. The carotid canal, middle ear, and middle fossa were found to be involved by tumor. The facial nerve was not involved by tumor. The incus was eroded by tumor. The middle ear was reconstructed with a cartilage graft. The ossicles were reconstructed with a Karthaus incus strut. She made a completely uncomplicated recovery and was discharged 2 days later.

DISCUSSION

Osteoblastomas are rare benign bone-forming tumors that most commonly occur in the mediastinum and diaphysis of long bones and the vertebral column, accounting for approximately 3% of all benign bone tumors. The temporal bone is the site of only 1% of all osteoblastomas. This case report describes a primary osteoblastoma of the temporal bone in a pediatric patient. These tumors can involve the cranial bone and be rare, and their occurrence in the temporal bone is even more unusual. According to a meta-analysis performed by Tsai et al., the average age of patients with temporal bone osteoblastomas is 25 years. These tumors most commonly present with localized pain, headache, swelling, and tenderness. They can also present with hearing loss, tinnitus, and facial palsy. The report presented is the only case in the literature of an osteoblastoma of the temporal bone incidentally found in an asymptomatic pediatric patient.

The differential diagnosis for temporal bone neoplasms is broad and includes a wide range of benign and malignant pathologies, as shown in Table 1. Osteoblastomas and osteoid osteomas exhibit extremely similar histologic appearances and are primarily distinguished according to age. Osteoblastomas are classified as lesions less than 1.5 cm and osteoid osteomas are greater than 2 cm.

On microscopic examination, osteoblastomas are composed of anastomosing irregular trabeculae of woven bone with intervening cellular fibrovascular stroma, and variable peripheral sclerosis (Figure 4). A single layer of osteoblasts line the trabecular and these trabecular bone with the normal bone at the tumor edge. Benign osteoblastomas are generally confined to the bone and well-marginated, however rare cases with permeative growth have been described, and focal cortical destruction can be seen. There is a variant termed “aggressive osteoblastoma” with more locally aggressive behavior without potential for distant metastasis.

Aggressive osteoblastomas histologically exhibit clusters of epitheloid osteoblasts much larger than those seen in benign osteoblastomas. Osteosarcoma can be differentiated from osteoblastoma histologically by the presence of prominent lacelike osteoid deposition, greater cellularity and nuclear atypia, and permissive growth. Osteosarcoma also exhibit higher mitotic activity, including atypical forms, and can generate malignant cartilage.

The imaging study of choice for osteoblastoma is CT. On imaging, osteoblastomas usually exhibit sharply demarcated margins with a rim of sclerotic bone, and most tumors fail to penetrate the bony cortex. Osteoblastomas exhibiting an expansive appearance may be mistaken as aneurysmal bone cysts. Of note, younger osteoblastomas are more likely to appear lucent and to ossify with age. MRI is most useful in evaluating extension into soft tissues, the brain, or spinal cord. Osteoblastomas generally appear as low or intermediate intensity on T1-weighted images and as high intensity on T2-weighted images. Osteoblastomas exhibit enhanced uptake of technetium because of elevated osteoblastic activity, and this can more efficiently display the boundary of new bone growth. Angiography is useful to determine the blood supply of osteoblastomas and in making the decision to use preoperative embolization.

The standard treatment is surgical resection. However, in many cases curative resection is not always possible due to proximity to important structures. Recurrence rates of up to 25% have been reported.[7] There is no role for radiation as there are reports that it may induce malignant degeneration of these benign tumors.

CONCLUSIONS

A wide variety of possible neoplasms can present in the temporal bone, and osteoblastomas are rare, primary bone-forming tumors that rarely present in the craniofacial skeleton. Although temporal bone osteoblastomas most commonly present with facial or vestibulocochlear nerve deficits, this is the first case reported of a temporal bone osteoblastoma incidentally found in an asymptomatic pediatric patient. Proper initial imaging consists of CT which typically exhibits sharply demarcated margins. Surgical resection is the standard treatment, and radiation plays no role in therapy as there are reports that it may induce malignant degeneration of these tumors.

Table 1: Temporal Bone Neoplasms Differential Diagnosis

<table>
<thead>
<tr>
<th>Primary Benign Tumors</th>
<th>Metastatic Tumors</th>
<th>Primary Malignant Tumors</th>
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<tbody>
<tr>
<td>Paraganglioma</td>
<td>Proteus</td>
<td>Squamous Cell Carcinoma</td>
</tr>
<tr>
<td>Neurofibroma</td>
<td>Neuroblastoma</td>
<td>Multiple Myeloma</td>
</tr>
<tr>
<td>Meningoangial</td>
<td>Meningioma</td>
<td>Adrenal Cortical Carcinoma</td>
</tr>
<tr>
<td>Adenoma</td>
<td>Adenoma</td>
<td>Chondrosarcoma</td>
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<tr>
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<td>Chondroma</td>
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</tr>
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<td>Liposarcoma</td>
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<tr>
<td>Lipoma</td>
<td>Liposarcoma</td>
<td>Gastrointestinal Sarcoma</td>
</tr>
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<td>Myxoma</td>
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</tr>
<tr>
<td>Anomalous Bone Cyst</td>
<td>Anomalous Bone Cyst</td>
<td>Osteosarcoma</td>
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| Osteoblastoma, Osteoid Osteoma |

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REFERENCES

Available on request.