Giant occipital osteoid osteoma mimicking calcified meningioma

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ABSTRACT

Osteoid osteoma is a rarely seen benign osteoblastic bone lesion especially involving the long bones of the lower extremities.1,2 Although cranial involvement is rare, osteoid osteoma is frequently seen at the base of the skull. They may be misdiagnosed as osseous meningiomas. However, osteomas do not have a soft tissue component, do not enhance, and demonstrate signal void on all MRI sequences. Osteomas are solid nodular sclerotic lesions usually arising from the outer table and are usually <1 cm.3,5 In this report, we present a case with giant osteoid osteoma of the occipital bones, compressing the cerebellum and infiltrating the venous sinuses. Our objective in presenting this particular case is to highlight the imaging features and emphasize the importance of imaging in the diagnosis of unusual locations.

Case Report. A 42-year-old female patient presented to our clinic with the complaint of dizziness and imbalance. The patient’s complaints gradually increased over the last 5 years. A palpable swelling was detected under the scalp in the left occipital region. She presented with the clinical signs of raised intracranial pressure, dysmetria, and dysdiadochokinesia were detected on the left side during neurological examination. A giant calcified mass extending into and out of a 7.5 x 7 cm sized calvarium on the left occipital bone was revealed with a CT scan of the brain. The mass was observed to be applying pressure on the left cerebellar hemisphere (Figures 1a & 1b). On cranial MRI, the lesion did not have a soft tissue component and showed a non-contrast enhancing mass spreading into and out of the cranium (Figure 2). The tumor in the left occipital bone was totally resected by surgery. The rupture in the left sigmoid sinus wall where the bone was attached was repaired. Histopathologic examination confirmed the diagnosis of an osteoma (Figure 3). Postoperative MRI did not show residual disease (Figures 4a & 4b). The patient’s vertigo improved in the postoperative period.

Discussion. Osteoid osteoma is a benign osteoblastic bone lesion. It generates 1% of all bone tumors and 11% of benign bone lesions.1,3,4,6 The most common age groups are the second and third decades. It is more common in males.2,3,5 The long bones of the lower limbs and vertebrae are often involved. It usually presents in the epiphyseal region. The most common locations are cortex (85%), spongiosa (13%), and subperiosteal region (2%). Although cranial cases usually spread along the base of the skull, it is quite rare.1,2,6,7 Frontal and ethmoidal sinus involvement have been reported.2,3

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Osteoid osteoma can present with neurological deficits due to mass effect and involvement of nervous structures.\textsuperscript{1,3,5} Patients typically complain of localized, sharp pain especially at night. The radiological diagnosis is established by tomography and isotope bone scan.\textsuperscript{2,4,5} The differential diagnosis is made and the affects of pressure on surrounding tissues can be seen with MRI. A radiopaque lesion and nidus can be seen with direct tomography.\textsuperscript{2,4,5} Patients typically complain of localized, sharp pain especially at night. The radiological diagnosis is established by tomography and isotope bone scan.\textsuperscript{2,4,5} The differential diagnosis is made and the affects of pressure on surrounding tissues can be seen with MRI. A radiopaque lesion and nidus can be seen with direct tomography.\textsuperscript{2,4,5} Patients typically complain of localized, sharp pain especially at night. The radiological diagnosis is established by tomography and isotope bone scan.\textsuperscript{2,4,5} The differential diagnosis is made and the affects of pressure on surrounding tissues can be seen with MRI. A radiopaque lesion and nidus can be seen with direct

\textbf{Figure 1} - Non-contrast axial CT shows a) a calcified mass that is pressing on the cerebellum and, b) spreading out of the calvarium.

\textbf{Figure 2} - A contrast-enhanced axial cranial MRI shows a non-enhancing mass spreading into and out of the cranium.

\textbf{Figure 3} - The appearance of osteocytes in bone matrix (Hematoxylin & Eosin x 40).

\textbf{Figure 4} - A postoperative a) contrast-enhanced cranial MRI and b) CT shows that the mass was totally excised.
The size of the lesion depends on the age of onset and the diagnosis period of the disease. A 10x9x5 cm sized giant occipital osteoma was reported in the literature. In our case, it is a rare osteoma tumor localized in the occipital region. Differential diagnosis of the calvarial lesions is important in order to decide whether biopsy, surgical intervention, or follow-up is essential for further management. Meningiomas are most often located near the coronal suture. Meningiomas usually present in middle-aged women and lead to irregularity in the inner table, whereas in fibrous dysplasia, the inner table is not affected. The first step in radiological evaluation of the calvarium is plain radiography, where lesions might be evaluated as lytic or sclerotic. Calvarial lesions, lytic or sclerotic patterns, contours of the lesions, calcifications, soft tissue components, inner and outer table localizations were evaluated with CT. On MRI, signal characteristics and contrast enhancement of the lesion, relation to brain parenchyma, and soft tissue were evaluated. Well defined borders and sclerotic margins are characteristic of osteoid osteoma. Slow-growing tumors lead to thinning in the neighboring calvarium, whereas aggressive tumors lead to dramatic destruction. On MRI, the inner and outer tables are seen as signal void. Lesions are hypointense on T1-weighted images and hyperintense on T2-weighted images, and they enhance with contrast. Histologically, the nidus is separated from the thick layer of the surrounding bone with sharp boundaries. This structure is formed by osteoids that are a little or largely calcified and surrounded by osteoids within connective tissue stroma that is rich in blood vessels. They usually do not spread into surrounding tissues and transform into malignancy. Treatment usually involves excision of the total tumor. Osteoid osteoma can present with neurological deficit due to mass effect and involvement of vital structures. Radical excision can be performed for evaluation of symptoms and pain. Incompletely excised tumors have a recurrence rate of 10%. If asymptomatic, the patient is managed conservatively with periodic follow-up.

In conclusion, giant osteoid osteoma is rarely seen in the literature. The adhesion of the surrounding brain tissue and vascular structures should be taken into consideration during the radical excision of the large sized tumors. In the differential diagnosis, it may be confused with meningioma due to the radiological similarities and its location. Unlike meningiomas, osteomas do not have a soft tissue component, do not enhance, and demonstrate signal void on all MRI sequences.

References