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A Rare Localization of Cavernous Hemangioma: Mastoid Bone Involvement

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Abstract: Cavernous hemangioma is a benign vascular tumor that primarily affects the cervicofacial region, while mastoid involvement remains exceptional. Diagnosis is based on imaging, where CT reveals a well-defined osteolytic lesion, and MRI shows a T2 hyperintensity with progressive and heterogeneous enhancement after gadolinium injection. However, histological confirmation is essential to exclude other differential diagnoses, particularly malignant tumors. We report the case of a 53-year-old woman with a right retroauricular swelling evolving over 10 years, with no associated neurological signs. MRI revealed an expansive osteolytic lesion, with cortical rupture and invasion of the sigmoid sinus, suggesting a cavernous hemangioma of the mastoid. Histopathological examination confirmed the benign nature of the lesion, justifying regular radiological surveillance in the absence of progressive complications.

Keywords: cavernous hemangioma, mastoid, CT, MRI

Introduction

Cavernous hemangioma is a benign vascular tumor composed of an extensive network of dilated capillary anastomoses. It is most commonly found in the orbit, liver, or brain, but its occurrence in the mastoid region is extremely rare. This article presents a rare case of cavernous hemangioma of the mastoid, emphasizing its radiological aspects on CT and MRI, which are essential for a precise diagnosis and management plan. This case also highlights the importance of combining imaging modalities with histological analysis to confirm the diagnosis and avoid misinterpretation with other pathologies. However, unusual localizations like the cavernous sinus have also been documented, underlining the diverse presentation of these lesions [10]. Intramuscular localizations such as within the masseter muscle are also documented, highlighting the diagnostic challenge due to their deep and atypical locations [11].

Observation

A 53-year-old woman with no significant medical history presented with a right retroauricular swelling evolving over 10 years. The mass was painless, firm, and well-defined, with no inflammatory signs or associated neurological symptoms. Otolaryngological examination, including clinical and functional assessment, was normal, with preserved hearing and an intact middle and inner ear.

Given this presentation, a cranial CT scan was performed. Axial CT images **(Figure 1)** revealed an osteolytic lesion of the right mastoid, disrupting both the inner and outer cortical bone, with trabecular thickening and a periosteal reaction, but no endocranial extension. A coronal CT scan in bone window mode **(Figure 2)** demonstrated the lesion extending into the ipsilateral temporal bone. The petrous bone CT scan confirmed the integrity of the tympanic cavity and inner ear, with no involvement of adjacent structures.

To better characterize the lesion and assess its extent, an MRI of the temporal bone was performed. Axial and coronal post-contrast sequences **(Figure 3)** confirmed the preserved patency of the adjacent dural venous sinus, with no intracranial extension and an intact dura mater. Thin-section imaging through the right petrous bone **(Figure 4)** revealed a moth-eaten appearance with cortical lysis of the mastoid bone due to the osteolytic process, while sparing the tympanic cavity.

MRI also revealed specific characteristics: the lesion appeared as hypointense on T1, hyperintense on T2 and FLAIR, non-restrictive on diffusion-weighted imaging, and with a flow void signal in T2 **(Figure 5).** After gadolinium administration, T1 post-contrast sequences **(Figure 6)** demonstrated intense and homogeneous enhancement of the right mastoid lesion.

Given these radiological features suggestive of an intraosseous vascular tumor, a surgical biopsy was performed. Histopathological examination confirmed the benign nature of the lesion, consistent with a cavernous hemangioma, characterized by dilated and well-differentiated vascular structures.

Following a multidisciplinary discussion, the decision was made to opt for regular radiological surveillance, in the absence of progressive complications or symptoms requiring invasive treatment.

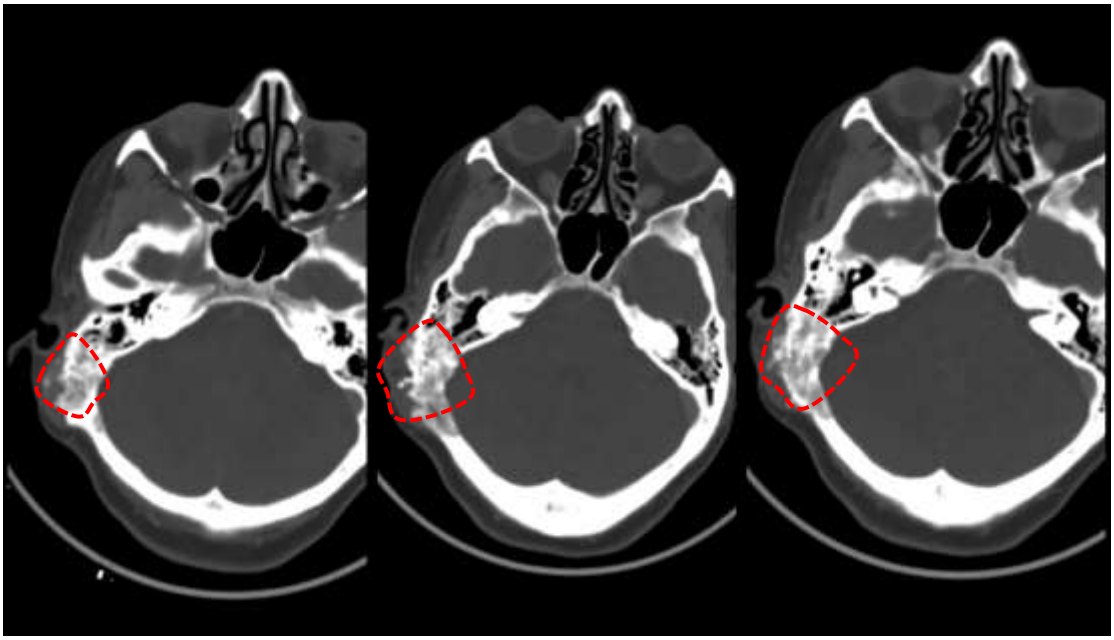

Figure 1: Axial CT slices passing through the base of the skull, revealing an osteolytic lesion of the right mastoid, breaching both the inner and outer cortical layers, with thickening of the bony trabeculae and a periosteal reaction adjacent to the lesion, without intracranial extension

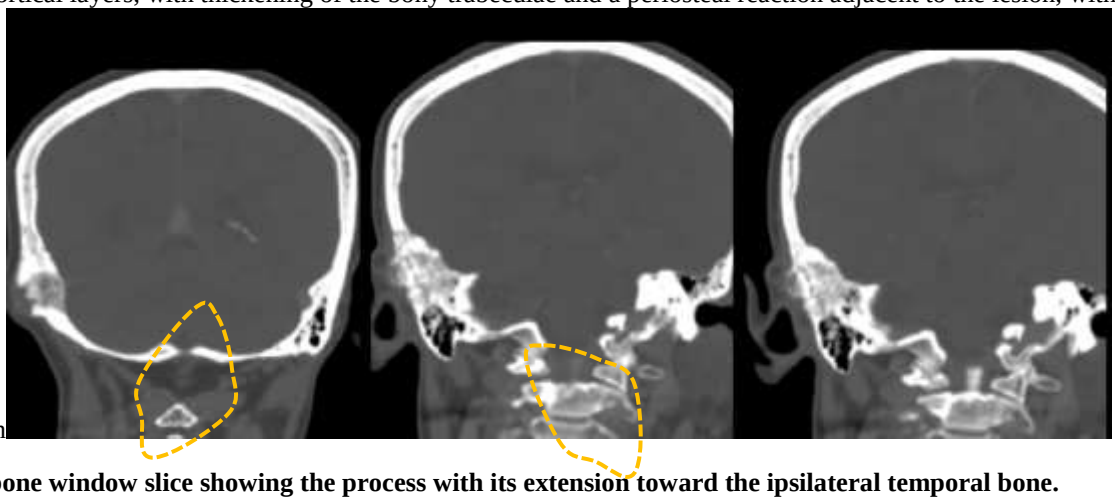

Figure 2: Coronal bone window slice showing the process with its extension toward the ipsilateral temporal bone.

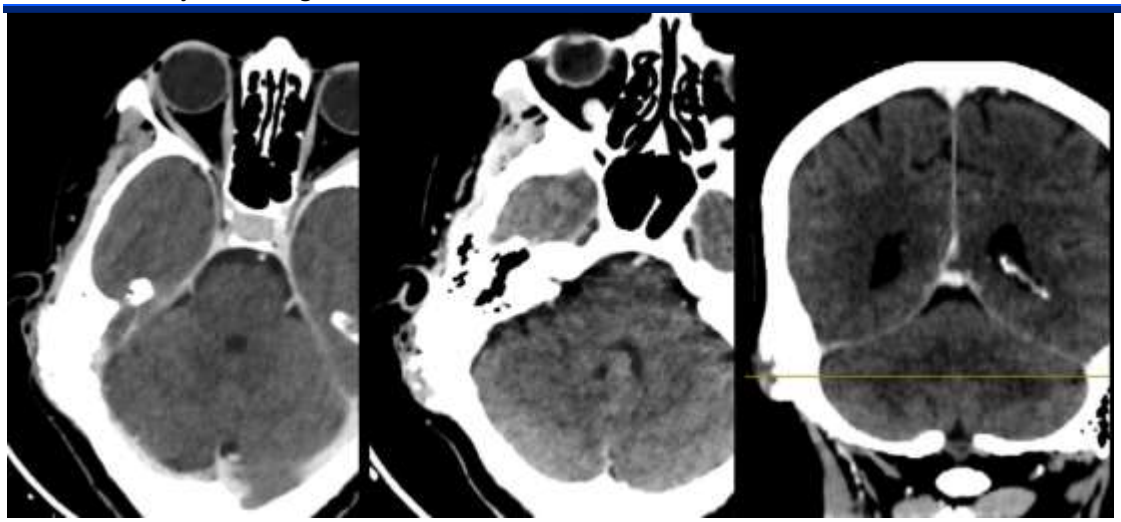

Figure 3: Axial and coronal slices passing through the process after contrast injection in a parenchymal window, confirming the preservation of the dural venous sinus patency and the absence of intracranial extension, with an intact dura mater.

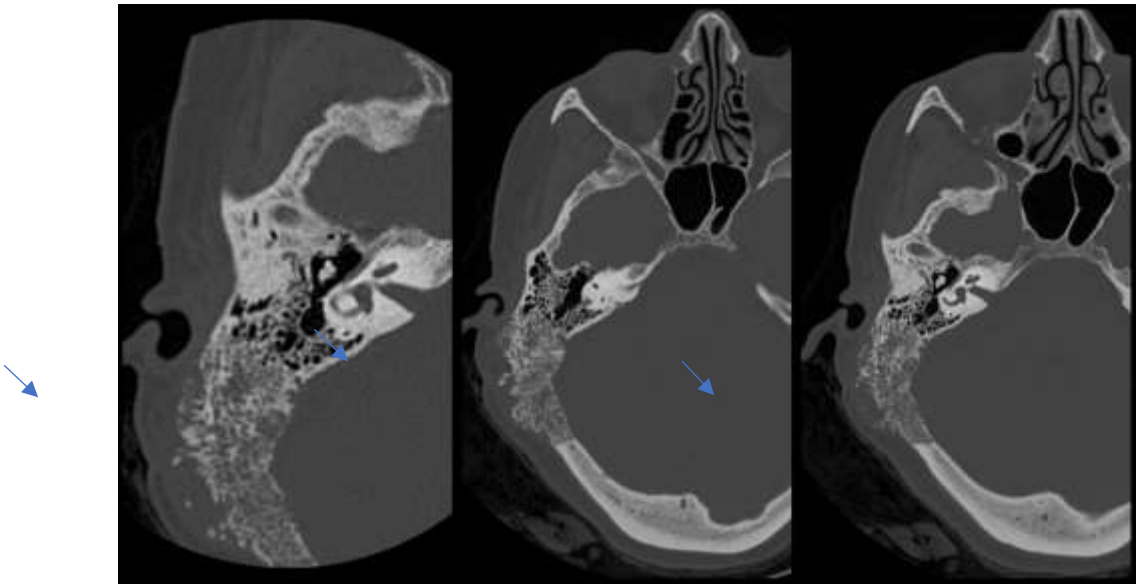

Figure 4: Thin slices passing through the right petrous bone reveal a moth-eaten appearance with cortical lysis of the mastoid bone due to the osteolytic process, while preserving the tympanic cavity.

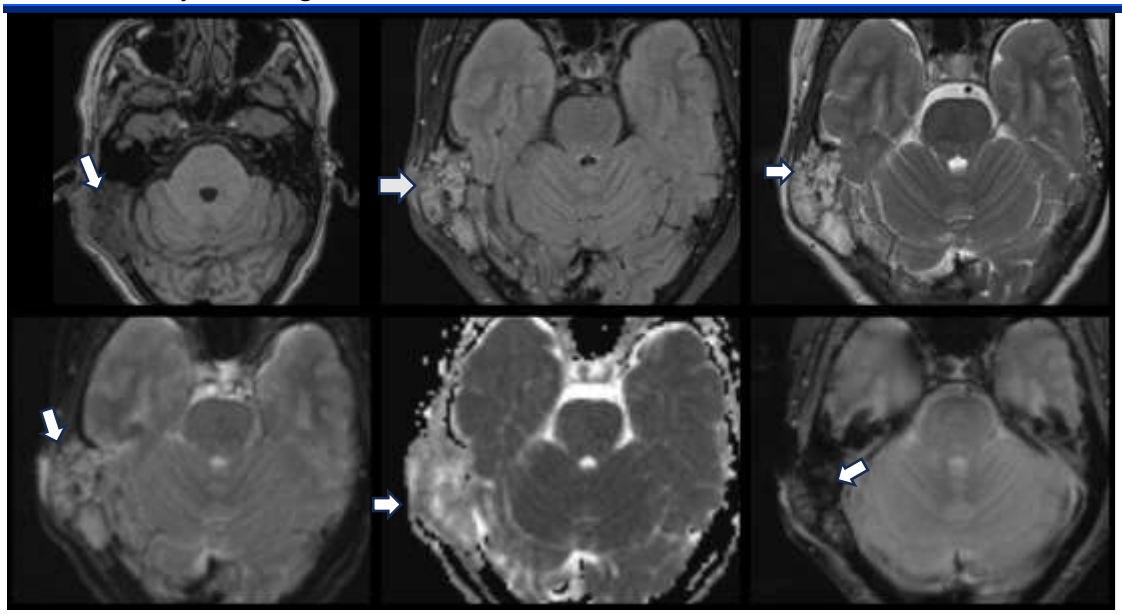

Figure 5: MRI slices show the described lesion appearing as hypointense on T1-weighted images, hyperintense on T2-weighted and FLAIR sequences, non-restrictive on diffusion, and showing no signal on T2* sequences**.**

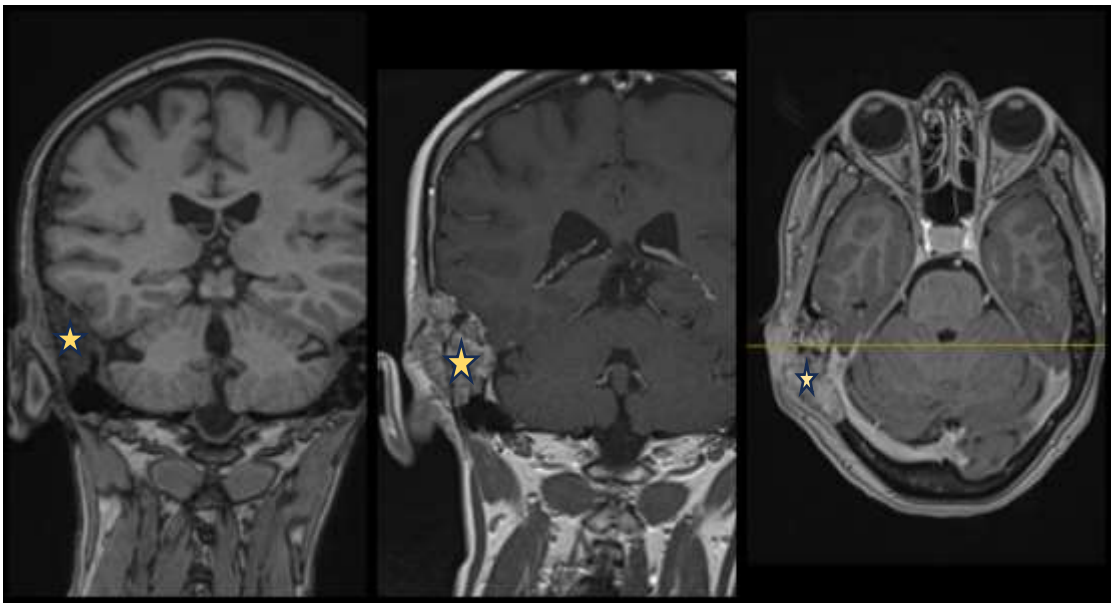

Figure 6: MRI after gadolinium injection in T1-weighted sequences reveals intense and homogeneous enhancement of the right mastoid process.

Discussion

Cavernous hemangiomas are benign vascular tumors resulting from abnormal development of embryonic vascular structures [1]. They are characterized by a multicentric proliferation of endothelial cells and can affect various locations, including the cervicofacial region in 20% of cases [2]. Three histopathological types are described: capillary, cavernous, and mixed types. The cavernous type, observed in our case, is distinguished by the presence of large, dilated vascular structures, more commonly found in adults, with a potential for extension into deep structures [3].

Cavernous hemangiomas often remain asymptomatic for many years, which can delay their diagnosis [4]. They are usually discovered incidentally during a clinical examination or imaging workup conducted for an associated symptomatology. In our case, the patient presented with a retroauricular swelling evolving over 10 years, without associated functional signs, which initially delayed the diagnosis.

Diagnosis primarily relies on imaging, which guides management. CT scans reveal a well-defined osteolytic lesion, sometimes trabeculated, giving a characteristic "honeycomb" appearance of intraosseous hemangiomas [5]. MRI, the reference examination, shows an iso- to hypointense lesion on T1-weighted images and a hyperintense lesion on T2-weighted images, with progressive and heterogeneous enhancement after gadolinium injection, confirming the vascular nature of the process [6]. In our case, MRI also showed signs of aggressiveness, such as cortical rupture, invasion of the sigmoid sinus, and a micronodular meningeal reaction, suggesting an expansive potential of the lesion.

Despite the contribution of imaging, a definitive diagnosis relies on histopathological examination. A surgical biopsy was performed on our patient, confirming the presence of dilated vascular structures consistent with a mastoid cavernous hemangioma and ruling out any malignancy [7].

Treatment depends on the extent and symptomatology. Several options exist, including corticosteroid therapy, embolization, injection of sclerosing agents, and surgical excision [8]. Complete excision remains the treatment of choice, particularly for symptomatic or invasive lesions, but it may be associated with a recurrence risk estimated between 18% and 19% according to some studies [9]. In our case, due to the absence of compressive or neurological signs, regular clinical and radiological monitoring was chosen as the management approach.

Conclusion

Mastoid cavernous hemangiomas are rare and should be included in the differential diagnosis of osteolytic lesions of the petrous bone. MRI is essential for establishing the diagnosis, assessing the extent, and guiding management. The therapeutic approach should be individualized, ranging from surveillance to surgical excision in case of complications.

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