

Symptomatic Calvarial Cavernous Hemangioma: Presurgical Confirmation by Scintigraphy

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ABSTRACT

Hemangiomas are rare tumors in the calvarium and represent 2% of osseous calvarial lesions. Dynamic Tc-99m RBC blood pool scintigraphy has a high positive predictive value for cavernous hemangiomas of the liver. This scintigraphic technique can be used for identifying cavernous hemangiomas at other anatomic sites. We present a case in which a tagged RBC blood pool scan was used for further characterizing a symptomatic calvarial lesion as a cavernous hemangioma. This avoided an unnecessary workup for metastatic disease and was valuable in surgical planning for anticipated increased intra-operative blood loss. Histological confirmation of a cavernous hemangioma was made after surgical resection.

CASE REPORT

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A 49 yr old female presented with a two month history of intermittent left frontal headaches. She denied associated nausea, vomiting or visual disturbance. On physical examination a bony sessile mass in the left supraorbital region was noted. The patient had no other significant co-morbid conditions. A head CT, represented in bone algorithm, demonstrated an expansile intra-diploic circumscribed mass with coarse internal trabeculation in the superolateral margin of the left orbito-frontal wall (Fig 1). The lesion measured 16 x 23 x 22 mm in widest axial dimension and demonstrated intermediate T1 and T2 signal with avid gadolinium enhancement by MRI imaging (Fig. 2 and 3). Dynamic Tc-99m RBC blood pool scintigraphy revealed delayed radiotracer uptake (Fig. 4, 5 and 6), that is characteristic for cavernous hemangiomas. The patient underwent total surgical excision of the lesion. Histological confirmation of a cavernous hemangioma was made (Fig. 7).

DISCUSSION

Primary intraosseous hemangiomas are benign slow growing neoplasms. More than 50% occur in the vertebrae and skull (1). They are rare tumors in the calvarium and represent 2% of osseous calvarial lesions and 0.2 percent of all bone neoplasms (2). The parietal and frontal bones are the most common locations, but may occur in any skull bone. In very rare instances multifocal hemangiomas may occur. They are found more frequently in females (1, 2).

The majority of calvarial hemangiomas are asymptomatic. Symptomatic patients present with headaches, often with focal scalp pain or swelling. A palpable bony sessile mass may or may not be present (2). In symptomatic patients with CT and MRI imaging that is suggestive of a cavernous hemangioma, pre-surgical confirmation can be obtained with tagged RBC scintigraphy. This may assist in addressing intra-operative

bleeding concerns and can avoid unnecessary additional investigation of malignant conditions within the differential.

The differential diagnosis of a solitary circumscribed expansile intradiploic cranial lesion includes an osteoma, aneurysmal bone cyst, giant cell tumor, fibrous dysplasia, Langerhans' cell histiocytosis, sarcoma, meningioma, metastatic disease and dermoid tumor (1, 5).

Computerized tomography (CT), magnetic resonance imaging (MRI) and scintigraphic imaging can narrow the differential. A well defined intradiploic lesion with a sunray pattern of radiating trabeculation without reactive sclerotic margins is suggestive of a hemangioma by CT evaluation. Scattered foci of hyper and hypointense T1 signal with predominant intermediate T1 signal is seen on MRI imaging. Hyperintense signal on T2 weighted images correlates with intralesional fat content. Hemangiomas demonstrate avid enhancement after gadolinium administration (1), as do many other lesions within the differential. A tagged RBC scan was performed to confirm an imaging diagnosis of a hemangioma, as the MRI and CT imaging were suggestive, but not specific..

Dynamic scintigraphic imaging in the diagnosis of hepatic hemangiomas is characterized by increased accumulation of a red blood cell (RBC) tracer on delayed blood pool images. This criterion has been used in the diagnosis of calvarial hemangiomas; however detection is limited in lesions less than 10 mm (3, 4).

Hemangiomas are classified into cavernous, venous and capillary. The cavernous hemangioma is the most common pathologic variety in the skull. An abnormal capillary bed is consequent to faulty differentiation of primordial vessels. Variable sized sinusoidal channels are interposed between an artery and a vein. In the cavernous type, enlargement occurs as these blood filled sinusoidal channels erode through or remodel contiguous tissues. Microscopically, dilated capillary spaces lined by endothelial cells in conjunction with scattered bony trabeculae are seen. Necrotic changes are present when larger tumors out grow their blood supply (2). Growth occurs by expansion of the outer table and rarely is there intracranial penetration (1). Total surgical removal is the recommended treatment and is determinant of a definitive diagnosis.

TEACHING POINT

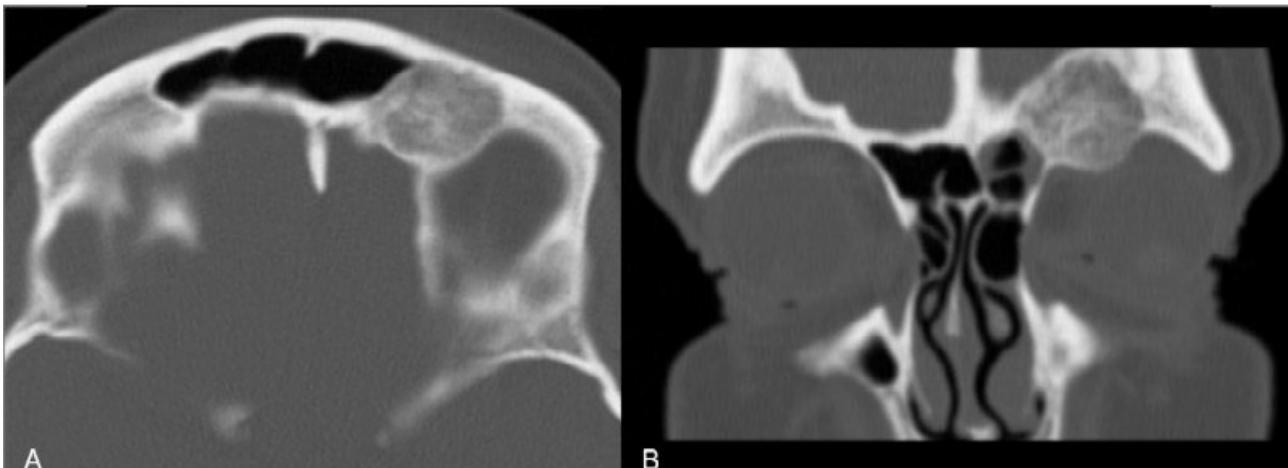
The differential diagnosis for expansile circumscribed calvarial lesions is wide. If an imaging pattern by CT or MRI is suggestive of a calvarial hemangioma in a symptomatic patient, more specific characterization can be achieved with tagged RBC blood pool scintigraphy.

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FIGURES

Figure 1: 49 year old female with a left calvarial cavernous hemangioma. Axial (A) and coronal (B) non-contrast CT (bone algorithm) demonstrates a left orbito-frontal intradiploic expansile circumscribed lesion with a coarse internal trabeculation pattern without a well defined sclerotic margin.



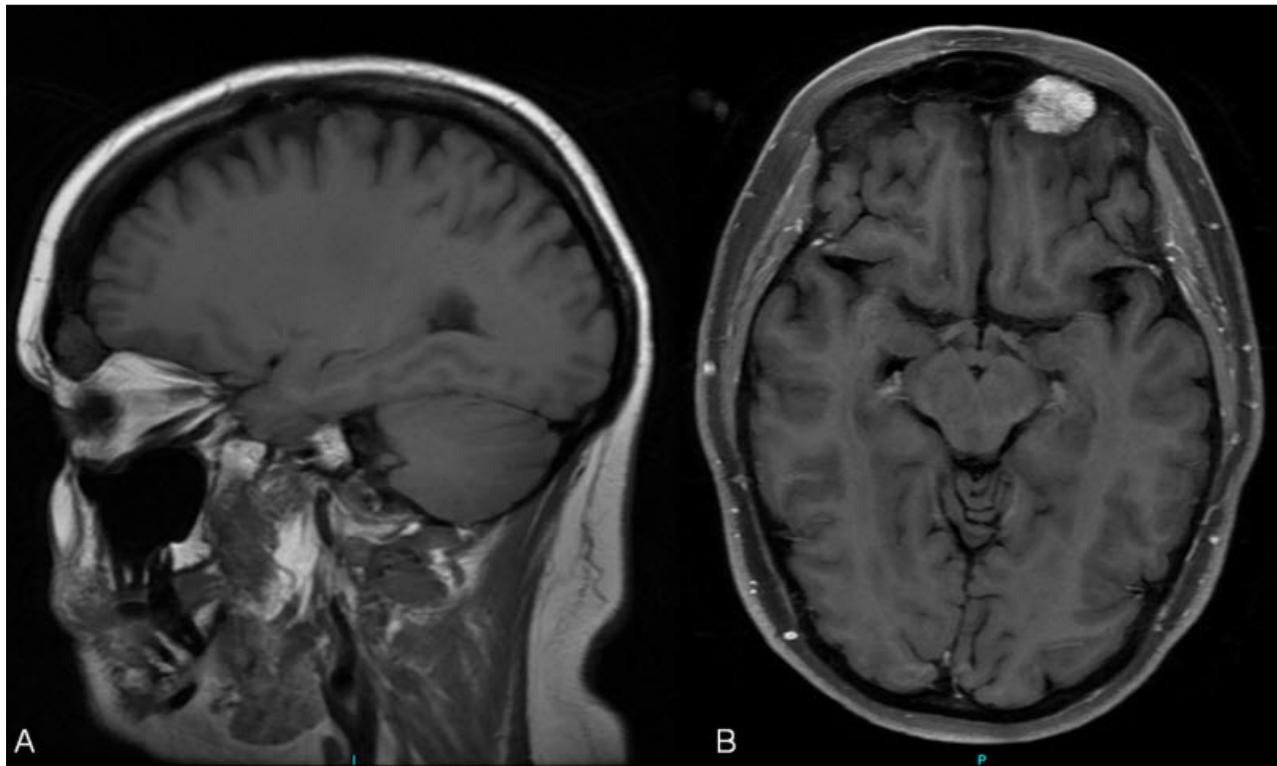


Figure 2: 49 year old female with a left calvarial cavernous hemangioma. Sagittal T1 pre-contrast (A) and axial T1 post gadolinium contrast (B) images demonstrating the intra-osseous orbito-frontal mass with intermediate T1 signal (A) and avid post-contrast enhancement (B).

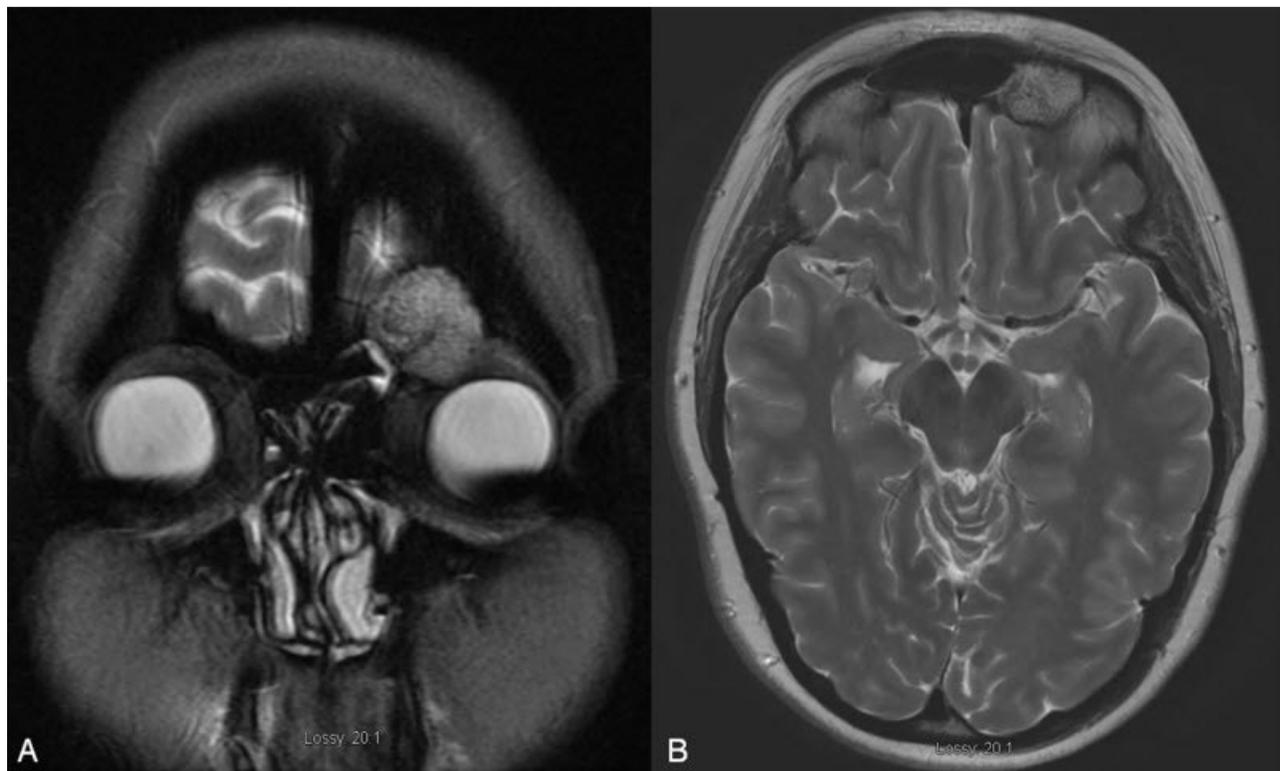


Figure 3: 49 year old female with a left calvarial cavernous hemangioma. Coronal T2 (A) and axial T2 (B) weighted MRI demonstrating intermediate T2 signal within the lesion.

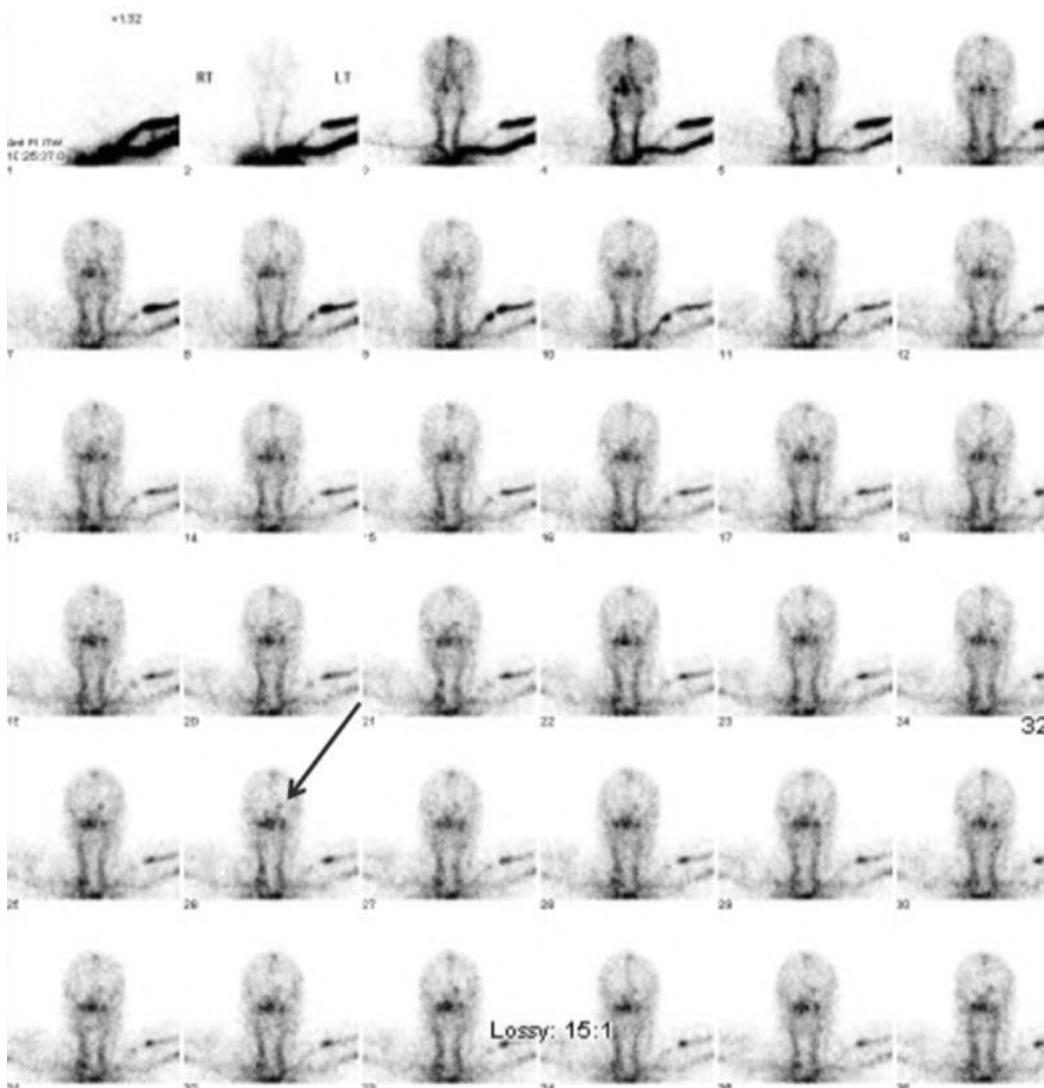


Figure 4 (top): 49 year old female with a left calvarial hemangioma. Scintigraphic imaging of head and neck after injection of 26.9 mCi of Tc99m RBC. Planar blood flow images revealing increased uptake within the left orbito-frontal lesion (arrow).



Figure 5 (right): 49 year old female with a left calvarial cavernous hemangioma. Scintigraphic imaging of head and neck after injection of 26.9 mCi of Tc99m RBC. Immediate blood flow image revealing increased uptake by the left orbito-frontal lesion (arrow).

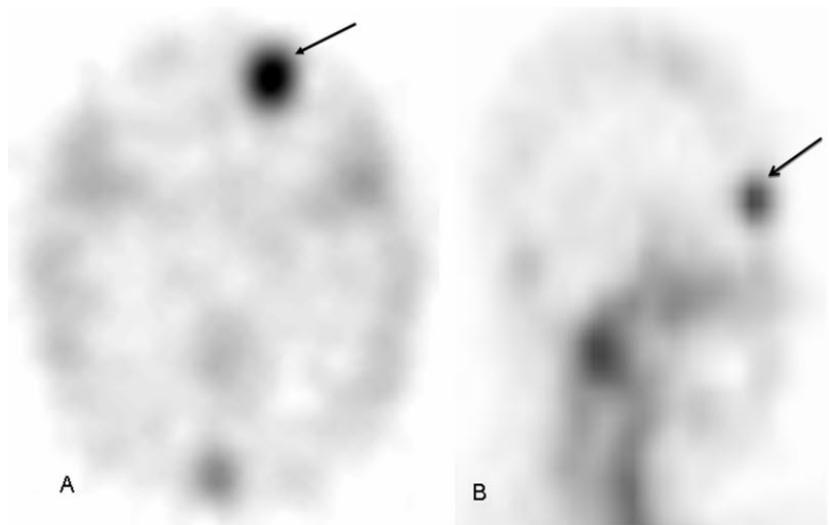


Figure 6: 49 year old female with a left calvarial hemangioma. Scintigraphic imaging of head and neck with injection of 26.9 mCi of Tc99m RBC. SPECT axial (A) and sagittal (B) images reveal intense uptake within the left orbito-frontal lesion after a forty five minute delay (arrows).

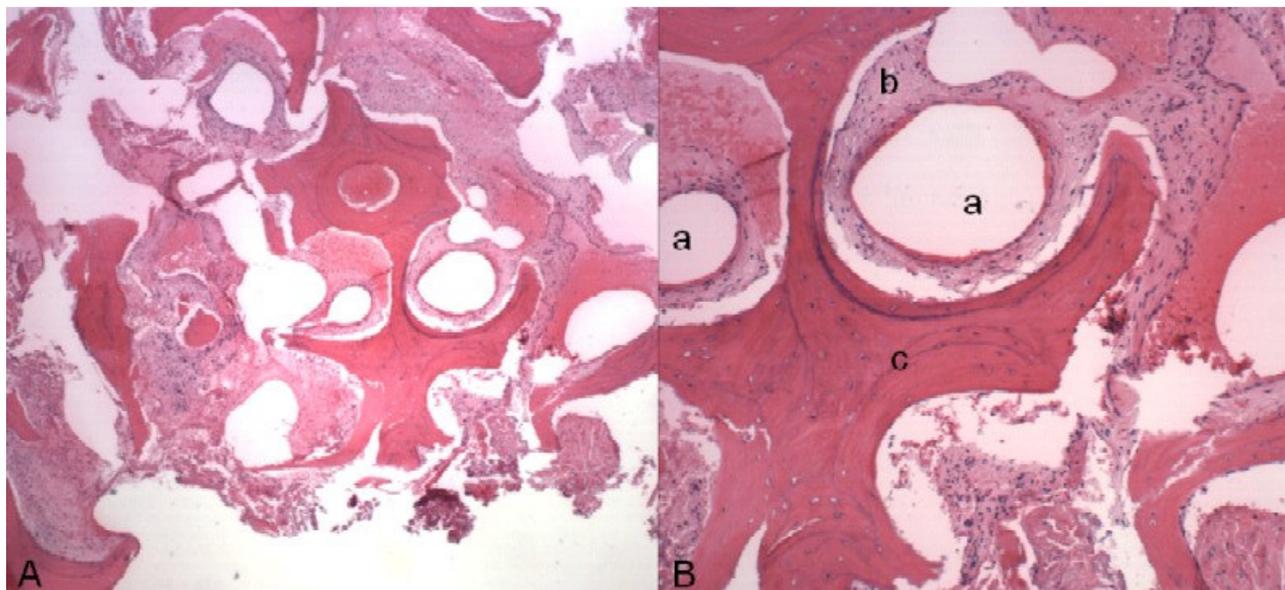


Figure 7: 49 year old female with a left calvarial hemangioma. H & E stain with 4X (A) and 10X (B) magnification: Histologic findings of a cavernous hemangioma characterized by thin walled sinusoidal vascular channels (a), lined with flat endothelial stroma (b) and surrounded by trabecular bone (c).

ABBREVIATIONS

RBC = red blood cell
 CT = computed tomography
 MRI = magnetic resonance imaging
 SPECT = Single photon emission computed tomography
 Tc99m = Technetium 99m
 mCi = millicuries

KEYWORDS

Calvarial cavernous hemangioma, tagged RBC scintigraphy

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