



Importance of Differential Diagnosis in Suspected Venous Sinus Thrombosis: Arachnoid Granulation

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Abstract

A 69-year-old woman was recently diagnosed with DLBCL within the Haematology department. Her diagnosis was discussed at MDM and decision to start chemotherapy was made.

After the usual pre-chemo investigations, she developed a new parieto-occipital headache. She underwent a CT brain, which showed a filling defect in the right transverse sinus suspicious for venous sinus thrombosis. While waiting for an MRI, she started treatment with low molecular weight heparin.

A subsequent MRI brain confirmed an 8 mm well defined filling defect in the right transverse sinus in keeping with an arachnoid granulation. Therefore, heparin was stopped; patient received supportive treatment and subsequently started chemotherapy.

The aim of this report is to illustrate the importance of a differential diagnosis in the context of sudden onset headache and CT findings suspicious of venous thrombosis.

Avoiding anticoagulation therapy when not needed and considering MRI brain as soon as possible are key steps to take into account especially in frail haematological patients.

Introduction

Arachnoid Granulations (AGs) are protrusions of arachnoid membrane invaginated into the dural sinuses through which Cerebrospinal Fluid (CSF) enters the venous system. The lesions are primarily located in the parasagittal region and the superior sagittal sinus [1]. They range from a few millimeters to more than 1 cm (giant arachnoid granulations) [2]. They consequently may grow to fill and dilate the dural sinuses or expand the inner table of the skull.

Arachnoid granulations are present in a variable percentage of the population (0.3 B 24%) and very rarely they produce any symptoms [3]. They are usually incidental findings. Despite their function is not wholly understood, cerebrospinal fluid resorption seems the most likely [4].

Lesions within the transverse sinus could be responsible for diagnostic confusion, and sometimes represent a diagnostic challenge.

Case Presentation

A 69-year-old woman presented to the haematology department with two weeks of increased fatigue and pyrexia. Blood tests showed anemia, thrombocytopenia and increased white cell count. Coagulation screen showed increased prothrombin time (12.3 s) and reduced fibrinogen levels (1.3 g/L). On examination she showed signs of splenomegaly and lymphadenopathy, subsequently investigated and confirmed with a CT chest, abdomen and pelvis.

Core lymph node biopsy confirmed DLBCL and following discussion at MDM, she was for RCHOP and CNS prophylaxis.

Before commencing her chemotherapy regimen, she developed increasing headache and a CT brain was performed. The scan showed a filling defect within the right transverse sinus suspicious for venous sinus thrombosis (Figure 1).

Based on radiological findings and symptoms she was started on reduced dose low molecular weight heparin considering her low platelet count (<75 e9/L) and an MRI venogram was requested to confirm diagnosis.

MRI showed 8 mm well defined filling defect in the right transverse sinus, which corresponded

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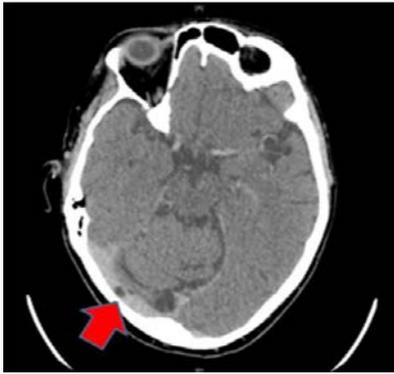


Figure 1: Filling defect within the right transverse sinus suspicious for venous sinus thrombosis.

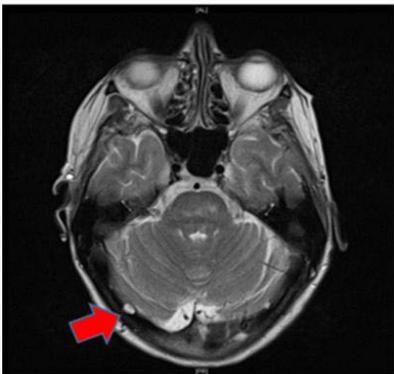


Figure 2: Pre-gadolinium MRI venogram shows 8mm well defined filling defect in the right transverse sinus.

to the findings of previous CT (Figure 2). Nevertheless, lesion had high signal at the T2W images, signal suppression at the FLAIR images and low/intermediate signal at the T1W images, which did not enhance following IV gadolinium (Figure 3 and 4). Appearances were suggestive of arachnoid granulation in the right transverse sinus.

Therefore, heparin was stopped and patient was treated conservatively.

Discussion

AGs are growths of arachnoid membrane into the dural sinuses which have a wide variability in the site, number, size and morphology [5]. The most common site for AGs is at the superior sagittal sinus. The occipital and temporal bone defects caused by AGs in the transverse sinus and sigmoid sinus, respectively, are usually rare [6].

In this patient, a filling defect within the transverse sinus resembled the presence of a thrombosis. Furthermore, in such patients it is imperative to exclude presence of intra-cranial disease or metastases. Radiographically, primarily dural lymphomas present as dural-based lesions with variable signal intensity on T1 and long-TR sequences, with a usually homogeneous, intense pattern of contrast enhancement on T1 post-gadolinium sequences. The diffusion may be restricted, reflecting compact cellularity. Such findings are undistinguishable from other dural-based lesions such as dural-based metastasis, meningiomas and hemangiopericytomas [7-9].

The imaging characteristics of normal and giant AG are well-known and can be considered typical. On skull radiography, they

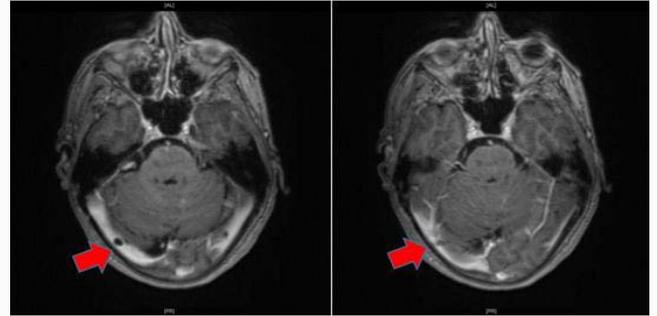


Figure 3, 4: Post-gadolinium MRI venogram shows signal suppression at the FLAIR images and low/intermediate signal at the T1W images, which did not enhance following IV gadolinium.

can be visible as radiolucent zones or they can cause impressions on the inner table of the calvaria. The CT density of granulations in the literature varies from hypodense to isodense with the brain parenchyma [2]. On MR imaging, the arachnoid granulations are iso- to hypointense relative to brain parenchyma on T1-weighted images. They all show a hyperintense signal on T2-weighted images. The fluid in the granulations is mostly not attenuated on a FLAIR sequence, but remains hyperintense, most likely due to pulsation artifacts from the adjacent sinus and differing CSF flow characteristics within the AG [10]. FLAIR is the most reliable technique, differing in signal intensity with CSF in 100% of cases [2].

Conclusion

In conclusion, differential diagnosis of venous sinus lesions is imperative for both a correct diagnosis and treatment. MRI venogram is particularly beneficial and should be performed in early stages of clinical suspicion occurs. This could lead to avoiding unnecessary anticoagulation in frail haematological patients and immediate appropriate management.

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