Clinical History:

A 13 year old female presented to Medicine Department with chronic headache. There was no other associated complaint. There was no precipitating factor. Neurological examination was completely normal. Considered young age of patient, a MRI of brain with MR venography was advised.

Imaging Findings:

MRI brain revealed small herniation of left temporal lobe parenchyma with surrounding cerebrospinal fluid rim into the left transverse sinus which was isointense to brain parenchyma on all sequences. The herniating material was contiguous with the left temporal lobe on all images. T2 weighted images showed loss of normal signal void in the sinus. No abnormal meningeal enhancement was seen. On MR venography, focal stenosis of the left transverse sinus was seen without any obvious venous sinus thrombosis. A diagnosis of brain herniation causing focal stenosis of sinus was made.

Discussion:

Herniation of brain parenchyma into the dural venous sinus is a rare entity [1]. These are different from classical encephaloceles where herniation of brain parenchyma alongwith meninges occurs outside the skull. However, these are associated with calvarial defects unlike brain parenchyma herniation into sinuses [2].

Herniation of the brain parenchyma into dural sinuses may cause headache, syncope, dizziness and imbalance although the exact etiopathogenesis is unclear [3]. In literature, Battal et al. and Karatag et al. have also reported cases with parenchymal herniations into the sinuses who complained of headache [1, 4]. It is thought that elevated CSF pressure, inflammation, aging, and erosive arachnoid granulations may cause dural thinning resulting in herniation [3].

On MRI, they present as a filling defect within the sinus simulating pathologies like arachnoid granulations, sinus thrombosis, tumours, intrasinus septa (fibrotic bands) and hypoplasia or aplasia of dural sinus. Herniations are isointense to brain parenchyma on all MR sequences and are surrounded by a cerebrospinal fluid rim. A continuity between the herniated material and brain tissue can be seen [5]. Arachnoid granulations are normal anatomical variants and resemble CSF signal on all sequences [6]. They usually enter or protrude into a blood vessel [7]. Giant arachnoid granulations may fill the lumen of a sinus and appear as a filling defect [8]. Sinus thrombosis can be acute, subacute or chronic and MR signal of blood clot varies according to the age of the clot. Acute thrombus...
appears isointense on T1, hypointense on T2 and hyperintense on T2*-weighted images. Subacute thrombus appears hyperintense on T1, T2 as well as T2*-weighted images. Chronic thrombus appears isointense on T1-weighted images and slightly hyperintense on T2-weighted images. Hypoplasia/aplasia of the transverse sinus is a common finding. It is therefore mandatory to compare source images, post contrast T1 weighted images and phase contrast images to conclude sinus hypoplasia. Tumors can grow into the adjacent sinuses or cause mass effect and can cause filling defects within the sinus. However parenchymal involvement, perilesional edema and post contrast images help in formulating a diagnosis.

It is concluded that herniation of the brain parenchyma into the dural venous sinus can result in headache and cause filling defect in the sinus simulating sinus thrombosis. Therefore it should be considered as an imaging differential of filling defects within the sinus. MRI with MR venography is the imaging modality of choice to confirm the diagnosis.

'Differential Diagnosis List: Temporal lobe herniation into the left transverse sinus, Transverse sinus thrombosis, Arachnoid granulations

Final Diagnosis: Temporal lobe herniation into the left transverse sinus

References:

Figure 1

**Description:** MRI BRAIN (axial section) T1W image shows a small herniation of left temporal lobe parenchyma with surrounding CSF rim into the left transverse sinus which appears isointense to brain parenchyma.

**Origin:** Department of Radiology, W Pratiksha hospital, India
Description: MRI BRAIN (axial section) T1W image shows continuity between the herniated brain parenchyma and left temporal lobe parenchyma. 

Origin: Department of Radiology, W Pratiksha hospital, India.
Figure 2

Description: MRI BRAIN (axial section) T2W image shows a small herniation of left temporal lobe parenchyma with surrounding CSF rim into the left transverse sinus which appears isointense to brain parenchyma. Origin: Department of Radiology, W Pratiksha hospital, India
Description: MRI BRAIN (axial section) T2W image shows continuity between the herniated brain parenchyma and left temporal lobe parenchyma. Origin: Department of Radiology, W Pratiksha hospital, India.
Description: MRI BRAIN (axial section) FLAIR image shows a small herniation of left temporal lobe parenchyma with surrounding CSF rim into the left transverse sinus which appears isointense to brain parenchyma. Origin: Department of Radiology, W Pratiksha hospital, India
Description: MRI BRAIN (axial section) FLAIR image shows continuity between the herniated brain parenchyma and left temporal lobe parenchyma. Origin: Department of Radiology, W Pratiksha hospital, India.
Figure 4

Description: MRI BRAIN (sagittal section) Post contrast T1W gradient image shows a small herniation of left temporal lobe parenchyma into the left transverse sinus which appears isointense to brain parenchyma. Origin: Department of Radiology, W Pratiksha hospital, India
Description: CONTRAST ENHANCED MR VENOGRAPHY image showing normal contrast filling of superior sagittal, right transverse and bilateral sigmoid sinuses. Hypoplastic left transverse sinus with focal filling defect due to temporal parenchymal herniation is seen.

Origin: Department of Radiology, W Pratiksha hospital, India