

# Post shunt meningeal fibrosis: Role of contrast enhanced MRI in differentiation from chronic subdural hematoma

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## ABSTRACT

Post shunt meningeal fibrosis is an uncommon complication following VP shunt insertion and it presents with a diagnostic dilemma. It is a rare post shunt entity that may mimic chronic subdural hematoma on unenhanced CT and MR. Thus it is important to recognize it before any therapeutic intervention is being considered. We present a case of 47 year male who underwent VP shunt insertion for tubercular hydrocephalus 4 years ago. He presented with chronic headache for 6 months for which MRI brain was done. MRI finding revealed post shunt meningeal fibrosis thus differentiating from chronic subdural hematoma and hence obviated surgical drainage.

**Key words:** Contrast-enhanced MRI, meningeal callus, post shunt meningeal fibrosis

## INTRODUCTION

Meningeal fibrosis also known as meningeal callus is a rare post shunt phenomenon simulating chronic subdural hematoma on unenhanced CT and MRI. It is important to recognize the entity and differentiate it from chronic subdural hematoma. Therefore, an enhanced CT or enhanced brain MRI scan should be obtained in chronically shunted patients to differentiate between a chronic subdural hematoma and meningeal fibrosis because the former usually requires drainage procedure and the latter is managed conservatively.

## CASE REPORT

A 47-year old male patient who was a known case of tubercular meningitis with shunt placement 4 years back presented with chief complaint of chronic headache for 6 month. It was dull in nature and intermittent. No significant diurnal or postural variation was seen. There was no history of any trauma, vomiting or altered sensorium. His CNS examination was normal and there were no signs of meningitis or hydrocephalus. MRI brain

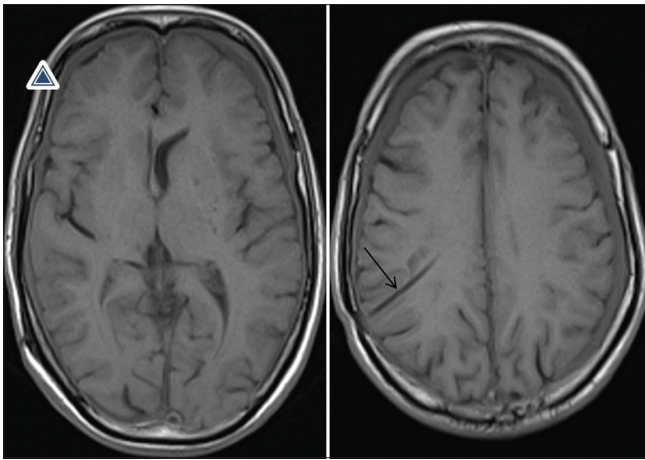
was done to rule out any shunt-related complication. On MRI there was evidence of bilateral subdural altered signal intensity areas which were hypointense on T1w images [Figure 1] and hyperintense on T2w image [Figure 2], mimicking CSF signal intensity. No evidence of any hydrocephalus or parenchymal abnormality was seen. There were no signs of brain sagging or pituitary enlargement. VP shunt was seen in right lateral ventricle [Figure 1]. On injecting 10 ml of gadolinium, there was intense enhancement of the pachymeninges surrounding the bilateral cerebral hemispheres extending into sylvian and parafalcine regions [Figure 3]. No evidence of any fluid collection was seen. Based on these findings, diagnosis of post shunt meningeal fibrosis was kept and obviated the need for surgical drainage as subdural hematoma was ruled out. The patient was managed conservatively with analgesics advised to be taken at the onset of headache. At two week follow-up, he showed symptomatic relief; however, no follow-up MRI was obtained.

## DISCUSSION

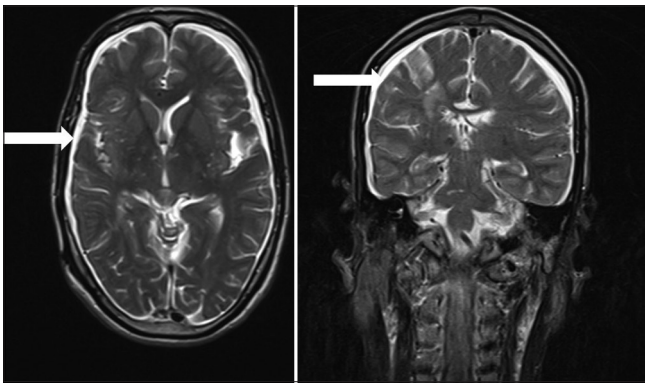
Meningeal callus or post shunt meningeal fibrosis is a rare phenomenon seen in patients treated with shunt insertion that may mimic chronic subdural hematoma on unenhanced CT and MRI. Histologic examination of biopsies from these patients demonstrate fibrosis of the meninges which is characterized by granulation tissue and collagen deposition.<sup>[1]</sup> It has been believed to occur as a result of long-standing subdural hematoma.<sup>[2]</sup> Meningeal

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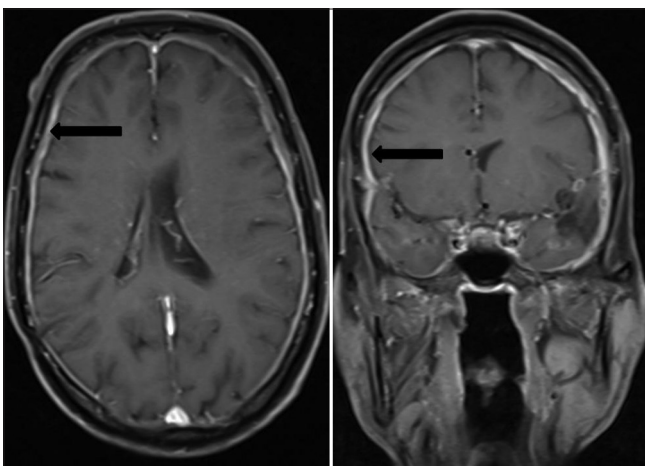
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**Figure 1:** T1-weighted images showing hypointense areas in bilateral subdural region (arrow head ) and VP shunt in right lateral ventricle (black thin arrow)



**Figure 2:** T2-weighted images showing same areas as hyperintense (thick white arrows)



**Figure 3:** Post contrast axial and coronal images showing thick intense pachymeningeal enhancement surrounding the bilateral cerebral hemispheres (thick black arrows)

fibrosis may occur as a reaction to chronic subdural hygromas which can be the consequence of shunt insertion.<sup>[3]</sup> Meningeal fibrosis is a noninflammatory pathologic process characterized by hypertrophy of the dural and arachnoid membranes of the brain. It has

been previously described in association with chronic subdural hematomas or subarachnoid hemorrhage, with ventricular shunt placement, and with rheumatoid arthritis.<sup>[4]</sup> Meningeal fibrosis can appear at variable time interval after the shunt placement. It can appear within days after ventricular shunting.<sup>[5]</sup> CT in these patients with long-standing ventricular shunts demonstrate bilateral low-density extra-axial collections that are indistinguishable from chronic subdural hematomas. MR imaging, performed in these patients, demonstrate the extent and location of the collections better than CT but the collections cannot be distinguished from chronic subdural hematomas.<sup>[1]</sup> Contrast-enhanced CT and MRI performed in these patients can easily distinguish meningeal fibrosis from chronic subdural hematoma. The liquid portion of subdural hematoma will not enhance but the fibrosis enhances avidly.<sup>[2]</sup> Recognition of this uncommon entity is important for proper therapeutic intervention. An enhanced CT or enhanced MR scan should be obtained in chronically shunted patients to differentiate between a drainable chronic subdural hematoma from meningeal fibrosis.<sup>[1]</sup> Meningeal enhancement is not an alarming finding in shunted patients but probably reflects only the sequela of many operations, effusions, and infections.<sup>[6]</sup> In case of subdural hematoma, evacuation of the hematoma by conventional neurosurgical methods with the implantation of a higher pressure valve system is the most common option adopted.<sup>[7]</sup> One differential diagnosis that can be seen in post surgery, post lumbar puncture and also spontaneously in some patients is intracranial hypotension that can also result in diffuse pachymeningeal enhancement similar to post shunt meningeal fibrosis. When the cerebrospinal fluid pressure drops, there may be secondary fluid shifts that increase the volume of capacitance veins in the subarachnoid space. Prolonged intracranial hypotension may lead to vasocongestion and interstitial edema in the dura mater. Lumbar puncture shows CSF opening pressure <60 mm H<sub>2</sub>O in sitting position.<sup>[8,9]</sup> The classic MRI findings and clinical features include headache that is orthostatic and worse when upright, thick linear enhancement of the pachymeninges. Other findings include no enhancement of the sulci or brain surface, enlargement of the pituitary gland, descent of the brain (low cerebellar tonsils, sagging brain with distorted anterior margins of pons and medulla, decreased vertical dimensions of suprasellar cistern) and subdural effusions or hemorrhage in some patients.<sup>[8]</sup>

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