Neuroradiology Nuggets - 7

Siderosis and spinal CSF leaks

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Abstract

Background: A 39-year-old male presenting with syncope was found to have superficial siderosis on initial imaging, prompting a comprehensive repeat MRI to rule out vascular causes, as spinal CSF leaks are a recognized cause of this condition. The evaluation, including non-contrast MRA/MRV and ASL, was initiated after initial images were unavailable, highlighting the need for thorough investigation to identify potential underlying dural defects

Key words: Syncope; Siderosis; SLEC

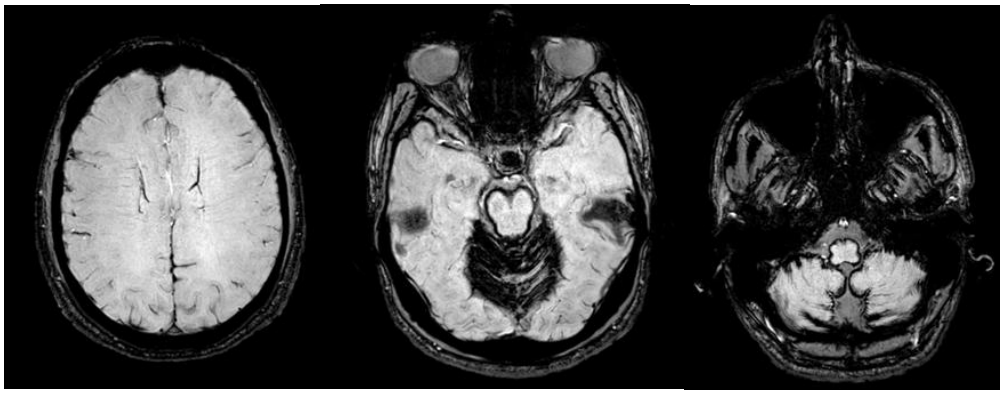
1. Case Presentation

A 39-year-old male presented with syncopal event while at work. MRI of the brain performed outside revealed siderosis and was advised DSA (digital subtraction angiography).

Images were unavailable at presentation to the radiology OPD for specialist neuro-radiologist consultation.

Hence it was decided to repeat the complete MRI protocol additionally with non-contrast MR angiography and venography (MRA and MRV) as well as arterial spin labelling (ASL) to complete the imaging for exclusion of underlying occult cerebrovascular causes.

MRI brain diffuses superficial siderosis, predominantly involving the posterior fossa



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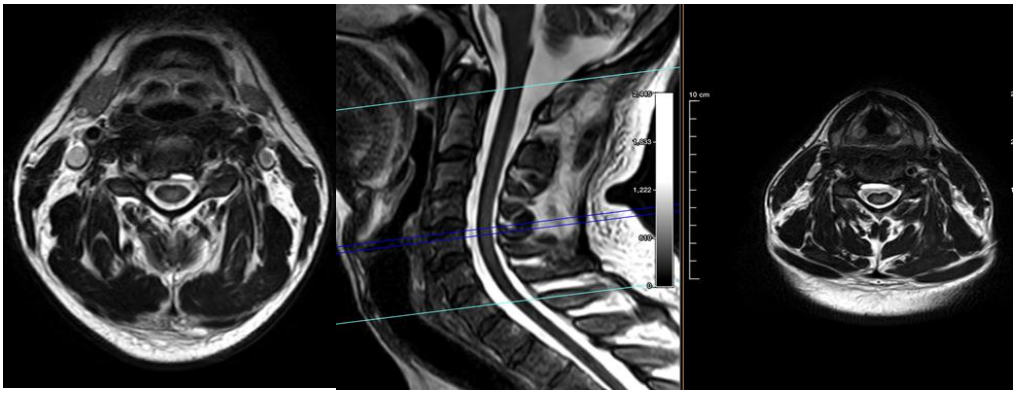
2. Clinico-Radiological Profile - Contextual Review of History

- MRI repeated here showed diffuse superficial siderosis of the posterior fossa extending to the cervical spinal cord on limited sagittal images of the brain.
- On review of further history, the patient had recurrent headaches for 10 years diagnosed as migraine outside, which was positional in nature with recent worsening of symptoms with radiculopathy. Hence it was decided to proceed with complete screening of the spine.
- Spinal longitudinal epidural collection (SLEC) was noted along the anterior epidural space at C2-5 levels with sacral blood fluid levels. Provisional diagnosis of SLEC +ve, likely due to type 1 ventral dural leak with acute on chronic sequelae of intracranial hypotension was made.
- Dynamic CT myelogram (done elsewhere) confirmed the diagnosis of type 1a CSF leak at C3/4.



(a) **(b)** **(c)**

Fig (1): Axial (a and c) and Sagittal T2W (b) images show prominent disc osteophyte complex at C3/4 level and linear T2 hyperintense signals along the anterior epidural space and posterior margins of cervical spine (C2-5 levels) with dural displacement sign, s/o spinal longitudinal extradural collection (SLEC).

3. Discussion

- SLEC: A Spinal Longitudinal Extradural Cerebrospinal Fluid Collection is a key radiological marker of a spinal CSF leak (often a Type 1 ventral leak).
- Treatment options include epidural blood patching (2 types - targeted, if given at the specific site of leak and blinded, if done at lumbar level irrespective of the level of leak)
- Superficial Siderosis: Superficial siderosis is a rare, insidious neurological condition caused by chronic, low-volume bleeding into the subarachnoid space. It results in secondary hemosiderin (iron) deposition in the subpial layers of the brain and spinal cord.
- The classic clinical trial of superficial siderosis includes slowly progressive bilateral sensorineural hearing loss, cerebellar ataxia, and myelopathy (however not seen in this pt).

Classification types of CSF leak

Types	Etiopathogenesis	Radiological features
Type 1	Intervertebral disc spur and ventral dural defect	SLEC positive
Type 2	Proximal dural dehiscence	SLEC positive
Type 3	CSF venous fistula arising from a dural tear	SLEC negative
Type 4	Distal nerve root sleeve dural tear	SLEC negative

Certain rare types of CSF leaks require additional specific investigations such as dynamic subtraction myelography (DSM) done in specialized positions including the decubitus and prone positions for diagnosis

4. Neuro-radiological - Learning points

While often overlooked, intracranial hypotension is a significant cause of persistent headaches, often postural, being worse in the upright position and relieved by lying down. Symptoms like ataxia may often occur and are linked to superficial siderosis, the chronic deposition of hemosiderin on the brain's surface.

- Finding superficial siderosis, especially within the posterior fossa, is a critical indicator.
- It should immediately trigger an investigation for a spinal CSF leak or a Spinal Longitudinal Extradural Cerebrospinal Fluid Collection (SLEC).
- When a spinal leak is suspected, specifically evaluate imaging for the dural displacement sign to help pinpoint the site of the breach.
- Preventing irreversible neurological decline depends on identifying and sealing the dural defect. This is most effectively achieved through targeted epidural patching, which halts the underlying pathology. Chronic localized leaks might need surgical repair of the dural defect for permanent cure.

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