A Case of Interhemispheric Subdural Empyema

Clinical History:

A 30 yr old lady complaining of a frontal headache presented to the Emergency Department with evolving neurological signs.

Imaging Findings:

A 30 yr old lady presented to the Emergency Department with symptoms of frontal headache, confusion, temperatures and weakness down her left side. She was taking oral antibiotics for sinusitis and had no other significant medical history. Clinical examination revealed pyrexia and confusion with a GCS of 13. Neurological examination revealed a partial left hemiparesis and left sided neglect. Laboratory investigations revealed a raised WCC of 16.5 and elevated CRP of 240. Clinical concern was of intracranial extension of sinus infection. Urgent CT Brain revealed extensive sinus disease with marked mucosal thickening. No bony erosion was identified. Extra-axial areas of low attenuation were identified deep to the right frontal sinus and right parafalcine region. The basal cisterns were effaced. A contrast enhanced study revealed marked rim enhancement of the right maxillary sinus and peripheral rim enhancement of the two low attenuating collections adjacent to the right frontal lobe. Given the clinical presentation and imaging findings a diagnosis of acute sinusitis complicated by subdural empyema and raised intracranial pressure was made. Urgent neurosurgical assessment was obtained.

The patient’s clinical condition rapidly deteriorated and surgical intervention preceded any further investigations. A decompressive craniectomy was performed and frank pus was drained from the parafalcine collection. The collection was sterile on bacteriological analysis. However initial blood cultures grew streptococcus constellatus the likely causitive organism and intravenous empirical antibiotics ceftazadine and metronidazole were continued. A further interval drainage procedure was required and despite an initial guarded prognosis she made a good clinical recovery.

Discussion:

Subdural Empyema (SDE) is a neurosurgical emergency, defined as an intracranial loculated collection of pus located between the dura mater and the arachnoid mater. It tends to spread rapidly through the subdural space until restricted by specific boundaries (falx cerebri, tentorium cerebelli, foramen magnum and base of the brain). It may occur at any age and there is no gender predominance. SDE is usually unilateral and accounts for 10-15% of all intracranial suppurations. As in our case, SDE may progress to behave like an expanding mass lesion with associated raised intracranial pressure (ICP). Mass effect can cause focal neurological signs or seizures >50% of cases. SDE is commonly associated with a concurrent sinusitis, otitis media, mastoiditis (>75%) or a frontal subgaleal abscess, also known as “Pott’s puffy tumour” (<33%). It often follows a rapidly evolving course and neuroimaging is essential. Complications include cerebritis and brain abscesses (5%); cortical vein, dural sinus thrombosis with secondary venous ischaemia; cerebral oedema; and hydrocephalus (>75% of infratentorial SDE). Mortality occurs in
Cross-sectional neuroimaging has superseded plain radiographs in the diagnosis of SDE. Nevertheless, opacification of paranasal sinuses or mastoid air cells may offer a useful clue to the right diagnosis. CT findings are characteristic but subtle and easily overlooked. Initial CT examination may appear normal with findings only becoming apparent on later imaging. Characteristic CT signs of SDE include a thin rim of fluid, hyperdense to CSF, overlying a convexity or flanking the falx cerebri. Contrast reveals the strong peripheral rim enhancement. Supratentorial SDE is typical with convexity in >50% and parafalcine in 20%. Infratentorial SDE occurs in <10% and is often associated with mastoiditis. Size is variable and crescentic morphology is typical, although may appear lentiform on coronal images. The underlying brain may be swollen, with effacement of the sulci due to raised intracranial pressure. There may be cortical thickening and hyperdensity due to venous stasis and hyperaemia. The underlying cause may also be clearly evident with paranasal disease, obvious neurosurgery or evidence of trauma.

MRI is the imaging study of choice as it is superior to CT in outlining the extent of SDE and in demonstrating convexity and interhemispheric collections, clearly differentiating from chronic subdural haematomas and post-meningitic effusions. Unfortunately this patient was critically ill and diagnosis established by CT, therefore MRI was not performed. The multiplanar capability of MRI facilitates detection of subtemporal and subfrontal SDE which are easily missed on axial CT examination. There is greater contrast between pus collections and the adjacent brain parenchyma with more vivid surrounding enhancement following contrast. Identifying dura mater that gives low signal on both T1 and T2 weighted images facilitates differentiation between SDE and epidural empyemas. Diffusion Weighted Imaging (DWI) has proven to be more sensitive than conventional MRI in detecting SDE as reduced water diffusion can be found at the centre of SDE’s and is shown as increased signal intensity on corresponding apparent diffusion coefficient (ADC) maps. DWI is currently recommended to aid diagnosis and follow-up of inflammatory SDE.

**Differential Diagnosis List:** Subdural Empyema with subsequent neurosurgical evacuation.

**Final Diagnosis:** Subdural Empyema with subsequent neurosurgical evacuation.

**References:**


Description: The subdural interhemispheric parafalcine area of low attenuation shows rim enhancement. In combination with the history and other imaging findings it is highly suggestive of a subdural empyema. Origin:
Figure 2

Description: Post surgical intervention.
Protrusion of brain parenchyma through a fronto-pariental craniectomy. Despite drainage of the empyema it had increased in size. It required a further drainage procedure and a prolonged course of intravenous antibiotics. Origin:
**Description:** Inflammatory changes within the right maxillary and ethmoid sinuses. Interhemispheric area of low attenuation represents a parafalcine subdural fluid collection. A further small collection lies above the superior wall of the orbit. **Origin:**
Description: This image was obtained at the level of the basal cisterns. They are effaced due to raised intracranial pressure.

Note the frontal sinuses are filled with fluid. Origin:
Description: There is a right parafalcine area of low attenuation which lies between the cerebral hemispheres. Origin:
Description: The small collection next to the right frontal bone displays rim enhancement.

The basal cisterns are compressed due to raised intracranial pressure. Origin: