

Subdural Empyema After Depressed Frontal Sinus Fracture

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A 28-year-old unrestrained male driver sustained panfacial fractures (depression of the anterior and posterior walls of the frontal sinus, subarachnoid hemorrhage, small left subdural hematoma, and right frontal hemorrhagic contusion) in a high-speed motor vehicle collision (Figs. 1A and 1B). Ipsilateral right nasal-orbital-ethmoid and orbital-zygomatic fractures and bilateral Lefort III fractures were surgically reduced and internally fixed. The posterior wall of the frontal sinus was removed, the frontal sinus duct was obliterated, the subdural hematoma was drained, and the dura was repaired at bifrontal craniotomy. Gram-negative bacillary meningitis was treated with IV antibiotics for 2 weeks. Symptoms persisted, and CT of the head showed left frontal and posterior parietal subdural empyemas (Fig. 1C).

Discussion

Victims of head trauma sustaining compound head wounds, CSF fistulas, and craniotomy (including placement of intracranial pressure monitors) are predisposed to intracranial infection, including meningitis (~5%) [1, 2], epidural abscess (<0.05%) [3], subdural empyema, and brain abscess. Brain abscess has a 40–60% mortality rate [1].

Subdural empyema is an uncommon complication of head trauma (<1%) [3]. Trauma is the predisposing factor in up to 10% of subdural empyemas [1, 4]. More common predisposing conditions are paranasal sinusitis (>50%), otitis and mastoiditis (15–20%), and infection after craniotomy (<30%) [5].

Skull fractures depressed more than 10 mm or pneumocranium on CT of the head are presumptive evidence for dural tear. Compound dural tears allow direct contamination of calvarial contents, and prevention of infection generally requires thorough operative debridement and irrigation. Subdural empyemas, which form in the subdural space as a complication of meningitis, tend to spread over the cerebral convexity, sylvian fissure, and interhemispheric fissure. Untreated subdural empyema rapidly progresses, often complicated by cortical vein thrombosis and infarction, cerebritis, or parenchymal brain abscess [1]. Use of prophylactic antibiotics after depressed skull fracture remains controversial; many neurosurgeons rely on serial clinical and imaging findings to identify infection before instituting treatment.

Contrast-enhanced CT of subdural empyema shows lentiform low-density extraaxial fluid collections with intense peripheral rim

enhancement. On MR imaging, fluid collections are mildly hyperintense compared with CSF on T2-weighted images. Contrast-enhanced T1-weighted images after IV gadolinium administration show distinct enhancing capsules. Dural thickening adjacent to subdural empyema, not seen with epidural empyema, can help distinguish these two entities [6]. Prompt diagnosis is important, and nascent subdural empyema may be subtle on CT. MR imaging may permit diagnosis when CT of the head is equivocal [6].

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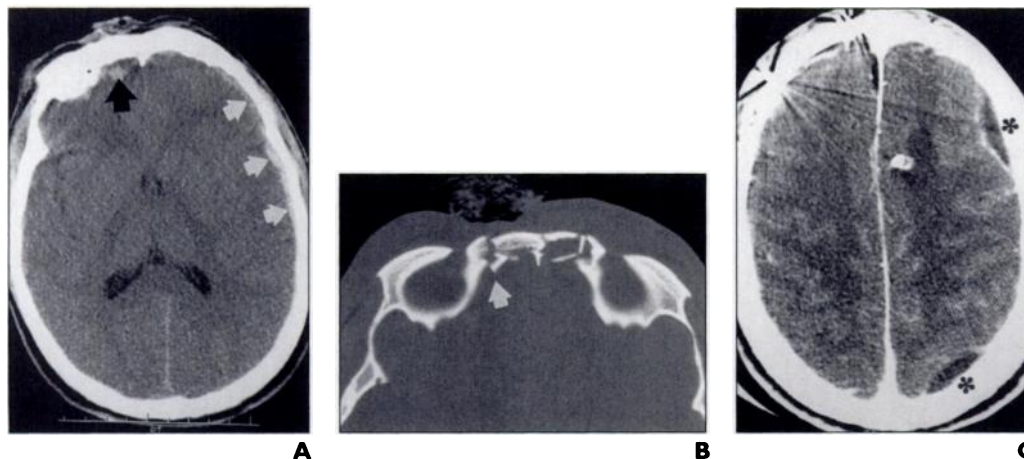


Fig. 1.—28-year-old man with head injury from motor vehicle collision. **A**, Unenhanced CT scan of head on day of admission shows right frontal hemorrhagic contusion (black arrow) small left frontoparietal hematoma (white arrows). **B**, Unenhanced axial CT scan through frontal sinus using bone algorithm and smaller field of view than in **A** shows depressed bone fragments (arrow) but no pneumocranium. **C**, Enhanced CT scan of head on hospital day 23 shows left frontal and parietal lentiform fluid collections with distinct enhancing capsules (asterisks) consistent with subdural empyemas.

This is another in the continuing series on radiology in trauma cases from the Harborview Medical Center. Editors: Fred A. Mann, Eric J. Stern, and Lee B. Talner.

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