Subdural Empyema

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A 69-year-old woman on long-term immunosuppressive therapy (tacrolimus) for liver transplantation presented to the hospital with headache, nausea and vomiting 2 weeks after a minor closed head injury. Neurological examination was normal but CT imaging was consistent with a 6-mm left frontoparietal subdural collection with minimal mass effect. On the following day, she developed slowed dysarthric speech, word-finding difficulty and paraphasic errors with intact comprehension. She also had a right facial droop and mild pronator drift of the right arm. Her white blood cell count and C-reactive peptide were elevated at 12.2×10^9/L and 121 mg/dl, respectively. Investigations for seizure and stroke were negative. On day 3 of her presentation, her language deficit progressed to mutism and she became febrile.

Clinically, this case posed several challenges. The phenomenology suggested localization ipsilateral to the subdural collection, which was unchanged in size on follow-up non-contrast CT head. There was, however, an increase in local mass effect, reflected by increased sulcal effacement adjacent to the collection. Contrast-enhanced imaging was contraindicated owing to acute-on-chronic renal dysfunction from a urinary tract infection (UTI). There was hyperintensity of the fluid collection on diffusion-weighted MRI, corresponding to restricted diffusion on the apparent diffusion coefficient map. Susceptibility-weighted MRI demonstrated heterogeneity within the collection, without marked signal drop, as would be typical of a collection dominated by evolving blood products (Figure 1).

Although the patient's language dysfunction was progressive, she did not become febrile until the third day of presentation. A subdural empyema (SDE) was suspected, she was treated with intravenous antibiotics and craniotomy was performed for evacuation of the subdural collection, with frank pus identified (Figure 2). The origin of the SDE was thought to be due to infection of a presumed subdural hematoma (SDH) acquired with the fall and minor head injury 2 weeks earlier, and subsequent infectious spread from a UTI on the background of immunosuppression. Both intraoperative cultures and initial urine cultures were remarkable for heavy growth of *Escherichia coli*. The patient recovered postoperatively with no recurrence and was discharged to a rehabilitation facility on oral antibiotics to complete an 8-week course.

Subdural empyema is typically caused by a preceding neurosurgical procedure, sinusitis, otitis media, mastoiditis or meningitis.[1] Secondary infection of a chronic SDH is an uncommon phenomenon. Previous literature has indicated that this condition is more common in older adults with comorbid disease, including immunologic dysfunction. *E. coli* is commonly the causative organism of infected SDH, as may have occurred in our patient with a concurrent UTI.[2] Imaging characteristics of SDE may be subtle compared with the clinical severity, requiring a high index of suspicion for diagnosis. Both contrast-enhanced CT and MRI may show peripheral enhancement. Diffusion-weighted imaging can be helpful in the diagnosis of SDE,[3,4] and in our patient susceptibility-weighted sequences were also useful in differentiating empyema from hematoma. Once identified, SDE is treated with antibiotic therapy and source control by surgical evacuation. Both burr hole washout and craniotomy have been used, with evidence for lower recurrence and mortality rates after craniotomy.[2,3,5] Although SDE is rare, a high index of suspicion must be maintained for prompt diagnosis and early surgical intervention, especially in patients with a clinical presentation out of proportion with imaging findings.

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Disclosures

All authors have nothing to disclose.

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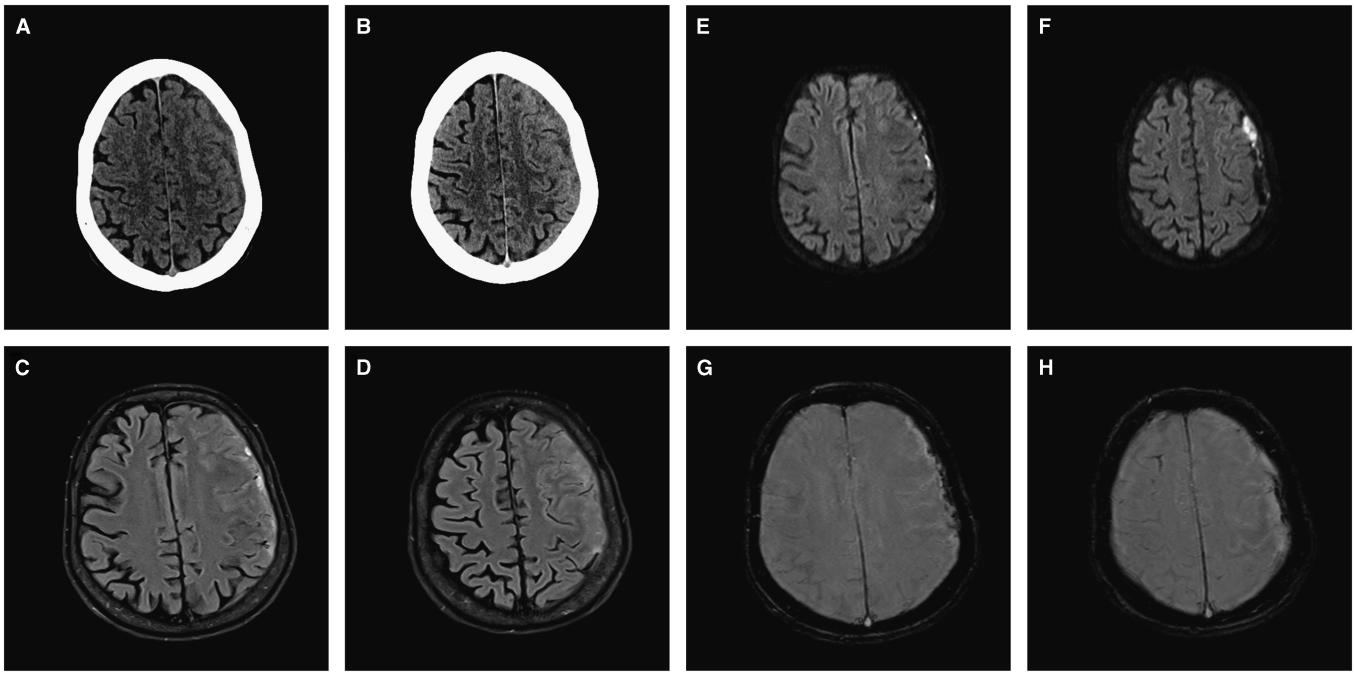

Figure 1: *Representative axial images of the subdural collection on non-contrast CT: (A) day 1 of presentation, (B) on day 2 of presentation, FLAIR (C,D), diffusion-weighted MRI (E,F) and susceptibility-weighted MRI (G,H) on day 2 of presentation.*

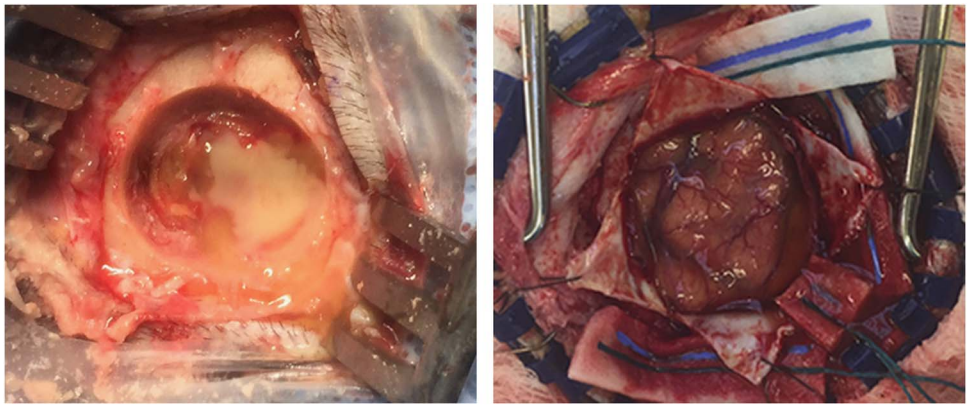

Figure 2: *Intraoperative photographs of burr hole (left) converted to craniotomy (right), with frank pus evacuated from the subdural fluid collection.*

Statement of Authorship

JG, NR and SA-C were involved in study concept and design. JG, NR, DM, CRH, MKSH and SA-C contributed to data acquisition. JG drafted the manuscript. JG, NR, DM, CRH, MKSH and SA-C performed critical revision of the manuscript for important intellectual content. SA-C supervised the study.

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