Case Report: Subdural Empyema in a 35-Year-Old Immunocompromised Female with HIV Infection

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KEYWORDS

ABSTRACT

Subdural Empyema (SDE) is a rare but life-threatening Intracranial infection characterized by the accumulation of purulent material in the subdural space. It often arises as a complication of sinusitis, otitis media, or trauma. Immunocompromised patients, such as those with HIV infection, are at a heightened risk due to their impaired immune defenses. This report discusses the case of a 35-year-old HIV-positive female who presented with SDE, detailing the clinical presentation, diagnostic challenges, management strategies, and outcomes.

Introduction

Subdural empyema accounts for 15–20% of all intracranial infections and is a neurosurgical emergency due to its rapid progression and associated high mortality. Early diagnosis and treatment are critical to prevent neurological sequelae. Immunocompromised individuals, particularly those with advanced HIV infection, face an increased risk due to the higher prevalence of opportunistic infections and delayed immune response.

This case highlights the diagnostic and therapeutic challenges in managing SDE in an HIV-positive patient, focusing on the interplay between immune status and infection progression.

Case Presentation

Patient Profile and History

A 35-year-old female presented to the emergency department with a 10-day history of progressive headache, fever, and altered mental status. Her past medical history was significant for HIV infection, diagnosed five years earlier. She was nonadherent to antiretroviral therapy (ART) and had a recent CD4 count of 120 cells/µL.

She also reported a two-week history of worsening nasal congestion, facial pain, and purulent nasal discharge, suggestive of sinusitis. There was no history of trauma, recent surgery, or known tuberculosis exposure.

Clinical Examination

On admission, the patient appeared toxic and drowsy, with a Glasgow Coma Scale (GCS) score of 11 (E3V3M5). Vital signs revealed fever (39.5°C), tachycardia (110 bpm), and blood pressure of 100/65 mmHg. Neurological examination showed:

- Nuchal rigidity and photophobia.
- Left-sided hemiparesis (motor strength 3/5).
- Hyperreflexia on the left side with an extensor plantar response (Babinski sign).

Systemic examination was otherwise unremarkable.

Initial Investigations

1. Laboratory Tests:
   - Complete blood count: Leukocytosis (WBC 14,500/µL) with neutrophilia (85%).
   - C-reactive protein (CRP): Elevated (150 mg/L).
   - HIV viral load: 150,000 copies/mL.
   - CD4 count: 120 cells/µL (severely immunocompromised).
2. Blood Cultures:Pending at presentation.
3. Neuroimaging:
   - Non-contrast CT of the head: Demonstrated a crescent-shaped, hypodense collection over the right frontoparietal region causing mass effect and midline shift of 6 mm. Sinus opacification was noted in the frontal and ethmoid sinuses.
   - MRI with gadolinium: Confirmed a subdural collection with peripheral enhancement, consistent with empyema. Diffusion-weighted imaging (DWI) indicated restricted diffusion, suggestive of pus.
4. Lumbar Puncture:

Deferred due to midline shift and risk of brain herniation.

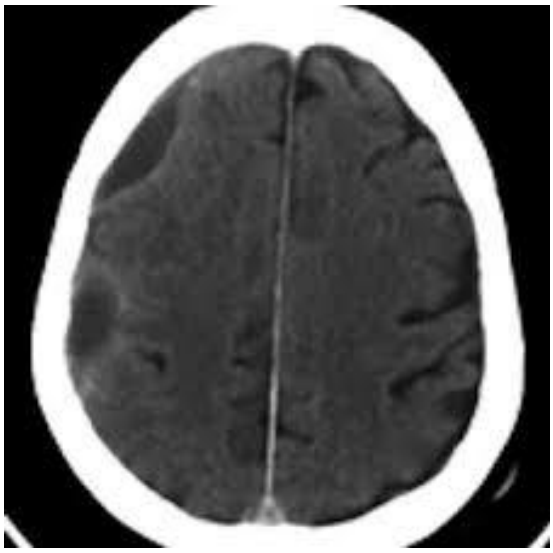

Figure 1: CT Brain Demonstrating Hypodense Lesion , Cresent Shaped At Right FrontoParietal Region.

Diagnosis

Based on clinical, laboratory, and radiological findings, the patient was diagnosed with subdural empyema secondary to frontal sinusitis in the setting of advanced HIV infection.

Management

1. Emergency Surgical Intervention

Given the significant mass effect and neurological deficits, an emergency right-sided craniotomy was performed. Thick purulent material was drained from the subdural space, and samples were sent for microbiological analysis. The affected frontal sinus was also irrigated and debrided to eliminate the primary source of infection.

2. Antimicrobial Therapy

Empiric broad-spectrum antibiotics were initiated immediately after surgical drainage:

- Ceftriaxone (2 g IV every 12 hours) to cover Streptococcus pneumoniae and other common bacterial pathogens.
- Metronidazole (500 mg IV every 8 hours) to cover anaerobes.
- Vancomycin (15 mg/kg IV every 12 hours) to cover Staphylococcus aureus, including methicillin-resistant strains (MRSA).

Antifungal therapy was not started empirically due to the absence of suggestive findings.

3. HIV-Related Management

1. ART Reinitiation:

ART was deferred until stabilization to avoid immune reconstitution inflammatory syndrome (IRIS). The patient was counselled on adherence, and ART reinitiation was planned for two weeks post-surgery.

2. Prophylaxis:

- Trimethoprim-sulfamethoxazole (TMP-SMX) for Pneumocystis jirovecii pneumonia (PJP).
- Fluconazole prophylaxis for cryptococcal infections.

4. Supportive Care

- Intravenous fluids and nutritional support to address malnutrition.
- Antipyretics and analgesics for symptomatic relief.
- Seizure prophylaxis with levetiracetam (500 mg twice daily) due to cortical irritation.

Microbiological Findings

- Subdural Pus Culture: Grew Streptococcus pneumoniae and anaerobic bacteria (Prevotella spp.).
- Blood Cultures: Negative.
- Sinus Aspirate Culture: Confirmed the same pathogens, establishing the sinusitis as the primary source.

Antibiotic therapy was continued based on sensitivity profiles for a total duration of six weeks.

Clinical Course and Follow-Up

Hospital Course

Postoperatively, the patient showed gradual improvement in neurological status. By day 5, her GCS improved to 14 (E4V4M6), and hemiparesis began to resolve. Fever subsided by day 7, and repeat imaging showed a reduction in the subdural collection and resolution of the midline shift.

Complications

The patient developed mild drug-induced neutropenia during the third week of treatment, attributed to TMP-SMX, which was managed with dose adjustment.

Long-Term Management

1. ART was successfully restarted after two weeks without signs of IRIS.
2. The patient was discharged on oral antibiotics (amoxicillin-clavulanate and metronidazole) to complete the 6-week course.
3. She was counseled on ART adherence and infection prevention.

Outcomes

At the 3-month follow-up, the patient had complete resolution of neurological symptoms. Repeat MRI showed no residual empyema. Her CD4 count had improved to 250 cells/μL with ART adherence.

Discussion

Pathophysiology of Subdural Empyema

SDE results from the spread of infection from a contiguous source (e.g., sinusitis, otitis media) or hematogenous seeding. The subdural space provides a poorly vascularized environment, facilitating pus accumulation and rapid bacterial proliferation. Immunocompromised individuals are at greater risk due to impaired phagocytosis and delayed immune response.

HIV-infected patients face unique challenges:

- Higher Susceptibility: Opportunistic pathogens such as fungi and atypical bacteria may contribute to SDE.
- Delayed Presentation: Subtle symptoms and atypical manifestations often delay diagnosis.
- IRIS Risk: Reinitiation of ART can exacerbate inflammation, complicating management.

Management Principles

- Early Diagnosis: Neuroimaging plays a critical role in timely diagnosis. MRI is superior to CT in detecting small subdural collections.
- Surgical Drainage: Immediate drainage is essential to relieve mass effect and prevent further neurological damage.

- Empiric and Targeted Therapy: Broad-spectrum antibiotics tailored to culture results are essential for bacterial eradication.
- Comprehensive HIV Care: Optimizing ART and prophylaxis is vital for long-term recovery.

Conclusion

Subdural empyema in immunocompromised individuals, such as those with HIV, poses significant diagnostic and therapeutic challenges. This case underscores the importance of multidisciplinary care, including prompt surgical intervention, targeted antimicrobial therapy, and meticulous HIV management. Early recognition and aggressive treatment are crucial to improving outcomes in this vulnerable population.

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