



# Spontaneous Subdural Empyema: A Case Report

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## Abstract

### Keywords

- ▶ *E. coli*
- ▶ encephalitis
- ▶ paranasal sinuses
- ▶ purulent
- ▶ subdural empyema

Subdural empyema is the collection of purulent material between the dura mater and arachnoid. Subdural empyema most often occurs due to the direct extension of local infection. But spontaneous subdural empyema is a rare entity. In literature, not many cases of spontaneous subdural empyema by *Escherichia coli* are reported. Here we report a case of spontaneous subdural empyema along with a review of literature who was previously treated on the suspicion of encephalitis with urinary tract infection and then brought to our hospital.

## Introduction

The first subdural empyema operation dates back to 1869 when De La Peyronie operated upon a patient<sup>1</sup> and the terminology of subdural empyema was coined by Kubil and Adams.<sup>2</sup> It constitutes around 13 to 23% of all intracranial infections.<sup>3</sup> The commonest source is the infection from the paranasal sinuses.<sup>4,5</sup> The clinical presentation is dramatic and the majority of the cases present with altered sensorium, features of raised intracranial pressure, headaches, and vomiting.<sup>6,7</sup> Subdural empyema developing after surgery trauma or secondarily infected subdural hemorrhage has a more indolent course. But spontaneous subdural empyema is a very rare entity.<sup>8,9</sup> Aerobic, anaerobic, and microaerophilic organisms are responsible for subdural empyema in case of spread from paranasal sinuses.<sup>6</sup> The most common organism isolated in post-traumatic cases is *Staphylococcus aureus*.<sup>7</sup>

Here we present a case of spontaneous subdural empyema presenting with altered sensorium and being referred to us with a diagnosis of encephalitis.

A 49-year-old female treated elsewhere was referred to our hospital with a diagnosis of encephalitis with urinary tract infection for further management. She is a known case of type 2 diabetes mellitus and hypertension for the past

8 years and is on regular medications. Initially, the patient presented with fever, altered sensorium, and dysuria for the past 7 days. Following this she received injectable antibiotics at a local hospital the details of which the patient party could not furnish. Hemogram showed a total count of 8,170/mm<sup>3</sup>, 89 neutrophils, and elevated C-reactive protein (116 mg/L). A routine examination of urine showed the presence of pus cell 2 to 4/high-power field with 3+ glucose and a urine Culture Sensitivity showed growth of *Escherichia coli* (*E. coli*). A previously done unenhanced computed tomography (CT) brain showed a hypodense left frontotemporoparietal subdural collection. As the patient was referred to us with a diagnosis of suspected encephalitis, magnetic resonance imaging (MRI) was done. It showed left frontotemporoparietal subdural empyema with mass effect. The patient underwent emergency craniotomy and evacuation of the subdural empyema. During the operation, after the dura was incised, abundant purulent material was drained out. Pus was sent for culture sensitivity and gene Xpert Plus. Thorough toileting of the subdural cavity was done and the wound was closed after placement of a subdural drain. Empirical therapy was started with an injection of meropenem+ sulbactam (1.5 g/8 hour), metronidazole (100 mL/8 hour), and vancomycin (2 g/8 hour). The patient

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had multiple episodes of seizure postoperatively that were managed accordingly. As the sugar was very high, Actrapid infusion was started as per the endocrinology opinion. The pus culture report came out to be sterile and the gene Xpert showed no detection of tubercular bacilli. Urine culture and blood culture sent from the emergency ward also showed no growth. CT brain after 3 days showed resolution of collection. The patient improved until complete recovery.

## Review of Literature

In an article by Bakker et al, they described a case of an 88-year-old lady having urinary tract infection with *E. coli* colony count of more than  $10^5$  Colony Count Unit developing subdural empyema. Hematogenous infection of a pre-existing subdural hematoma, however, is a rare cause of subdural empyema. They concluded that chronic subdural hematoma, a secondary infection due to hematogenous spread, should be considered in the differential diagnosis, especially for patients who have recently had an infection.<sup>8</sup>

Another study by Miedema and Kimpen described a 7-year-old child developing subdural empyema where *E. coli* was identified in blood culture and cerebrospinal fluid but her urine was sterile. They said that a pre-existent subdural hematoma in a child can become infected via hematogenous seeding of organisms. But most reported cases of infected subdural hematomas in children are caused by direct extension of the infection from the sinuses or meninges or occur after surgery.<sup>9</sup>

Another interesting case was reported by Lucas et al where a 68-year-old man presented with subdural empyema and received surgery for evacuation was found to have a ruptured mycotic aneurysm (MA) intraoperatively. MAs are rare intracranial pathologies. They are associated with spontaneous rupture, which is often the first presenting sign. Subarachnoid hemorrhage and intraparenchymal hemorrhage are the most common sequelae of ruptured MAs, with subdural hematoma being an atypical presentation. The presentation of an MA as a subdural empyema has not yet been reported in the literature.<sup>10</sup>

Kaminogo et al in a 76-year-old female patient in a semicomatose state and with left-side hemiparesis found subdural empyema at operation. Both cultures of subdural fluid and urine yielded *E. coli*. Her neurological deficits cleared after the operation and subsequent antibiotic therapy. They speculated that infection of the urinary tract produced an *E. coli* bacteremia and subsequently infected subdural hematoma occurred by this microorganism.<sup>11</sup>

In another case report of subdural abscess following chronic subdural hematoma, an 86-year-old male was admitted with drowsiness and left hemiparesis and had spikes of fever that originated during chronic cholecystitis and cholelithiasis and which had continued for 2 years prior to admission. Emergency removal of the right hematoma was carried. Intraoperatively they found that the old hematoma was accompanied by a yellow-white abscess in the subdural space. Culture revealed growth of *E. coli*. It was considered that the formation of the subdural abscess might have developed through the deteriora-

tion of the immunological function under the influence of senility.<sup>12</sup>

Nishi et al reported a case of intracranial subdural empyema from renal cyst infection of a 76-year-old woman was admitted for sudden onset of fever and altered mental status. The patient had trace amounts of *E. coli* that were isolated in urine culture. As CT scan revealed an enlargement of the intracranial fluid collection with mass effect, she underwent urgent surgery, and a brownish-yellow fluid was drained from the subdural space. The fluid on the culture showed colonies of gram-negative rods phagocytosed by large amounts of leucocytes, and *E. coli* were isolated from the drained pus culture. They concluded by saying that the need for adequate control of urinary tract infections in Autosomal Dominant polycystic kidney disease patients is very essential to avoid fatal metastatic infection.<sup>13</sup>

Surgical evacuation and adjusting the intravenous antibiotics for a period of 4 to 6 weeks is the treatment opted for by the majority.<sup>14,15</sup> But the debate still continues on the most appropriate surgical approach. Some authors argue that the burr holes are sufficient for evacuation; others suggest craniotomy is more effective.<sup>16</sup> In cases with multiloculated collections, parafalcine location, and recurrences, it is better to carry out a wide craniotomy.<sup>14</sup> Whichever technique is used, thorough toileting of the subdural space is to be done until the fluid is clear and it is wise to keep a subdural drain for a period of 48 to 72 hours.<sup>14</sup>

In our case, the drain was removed after 48 hours, and we converted injectable antibiotics to oral antibiotics on the 14th day postoperatively and the patient was discharged with advice for follow-up.

In conclusion, spontaneous subdural empyema should be suspected in patients presenting with fever, altered sensorium, and hypodense subdural collections in the head CT, and the use of MRI in such patients increases its sensitivity. In these group of patients, immediate craniotomy and evacuation of subdural empyema followed by injectable antibiotics, antiepileptics, and close monitoring help us in achieving a favorable outcome.

## Conflict of Interest

None declared.

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