

## Massive subdural empyema secondary to infectious parotitis: a case report



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### ABSTRACT

**Background:** Subdural empyema is an intracranial focal collection of purulent material between the dura and arachnoid mater. The most common causes are purulent meningitis in infants and sinusitis and otitis media in older children through a direct extension of the infection. Although it is very rare, parotitis may also cause subdural empyema. This report presents our case of subdural empyema due to infectious parotitis in a pediatric patient.

**Case report:** A 1-year-old boy was referred from other hospitals for multiple seizure episodes. He also had a complaint of vomit and fever 3 weeks ago. On the neurological examination, we found that he had a GCS of 8, no meningeal sign was found, and with dilated pupil on the right side. A contrast-enhanced head computed tomography (CT) scan revealed multiple hypodense masses with ring enhancement over the right hemisphere, and a severe midline shift suggested as subdural empyema. We then performed a craniotomy to evacuate the empyema. Two weeks after surgery, he was fully alert without any surgical morbidity.

**Conclusion:** Although parotitis is the less likely disease that can cause subdural empyema, we should also include the disease as the possible cause before we examine the patient more thoroughly and exclude them as the disease that can cause subdural empyema.

**Keywords:** infectious parotitis, subdural empyema, surgical evacuation.

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### INTRODUCTION

Subdural empyema is an intracranial focal collection of purulent material between the dura and arachnoid mater. It is also called a subdural abscess, pachymeningitis interna, and circumscribed meningitis. It is usually unilateral and spreads rapidly through the subdural space but is limited to boundaries such as falx cerebri, tentorium cerebelli, skull base, and foramen magnum. Purulent meningitis is the most common cause of subdural empyema in infants, while sinusitis or otitis media causes direct extension that leads to subdural empyema in older children.<sup>1,2</sup> Although it is very rare, direct extension from parotitis or mumps may lead to subdural empyema.<sup>2</sup> Parotitis is an inflammation of parotid glands or salivary glands that may be caused by infection of bacteria or virus, duct obstruction, or immunosuppressive condition.<sup>3</sup> In this case, we report a rare pediatric subdural empyema caused by infectious parotitis.

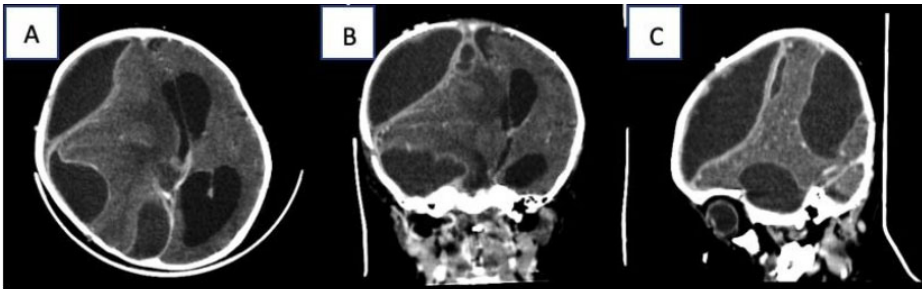
### CASE PRESENTATION

We reported a case of a 1-year-old boy referred from other hospitals with multiple seizure episodes. Seizures occur more than 20 times, about 2 minutes. The patient also complained of vomit and fever for the last 3 weeks. He was hospitalized with mumps and febrile seizures for the last 14 days and administered with ceftriaxone 750 mg per 12 hours, phenobarbital 40 mg per 12 hours, diazepam suppositories if seizure, but the convulsions still remain. On physical examination, we found that he had a fever with tachycardia, which was suggested as an infectious reaction. From the neurological examination, we found that he had a GCS of 8, no meningeal sign was found, dilated pupil on the right side with weakness over the left side of the body, suggesting high intracranial pressure with brain herniation.

A head computed tomography (CT) scan revealed multiple hypodense masses with ring enhancement over the right hemisphere, and severe midline shift

suggested as subdural empyema (Figure 1). Laboratory examination revealed anemia (hemoglobin level 9,40) with leukocytosis (18.470 mg/dl), severe hyperkalemia (10 mmol/L), severe hypocalcemia (2,0 mg/dl), and other blood components within normal limits.

We then planned to perform a craniotomy to evacuate the empyema. The goals are to decompress the brain by evacuating the cystic component and capsule, ensuring the diagnosis and culture of the lesion to give proper treatment to the patient. During surgery, we found very thick capsules all over the brain (Figure 2), with purulent cystic components, and the inner membrane was very thick with some adherence to the Vein of Rolandic and Vein of Labbe. Based on our goals preoperatively, we left several inner membranes that adhere to the vein to prevent complications and surgical morbidity. We then washed the brain parenchyma using normal saline to dilute the remaining pus on the capsule and brain surface. Postoperatively this patient



**Figure 1.** Head CT-Scan in (A) axial, (B) coronal, and (C) sagittal view revealed multiple hypodense masses with ring enhancement over the right hemisphere and severe midline shift.



**Figure 2.** (Left) The postoperative view is shown after the capsule is removed. Be noted that the remainder capsule left that adherence to the Rolandic fissure. (Right) Thick empyema capsule that was successfully removed.

was treated at the pediatric intensive care unit and regained consciousness. No surgical morbidity was mentioned, but unfortunately, we found negative culture from the capsule and pus. Ceftriaxone 685 mg every 12 hours, vancomycin 210 mg every 8 hours and metronidazole 105 mg every 8 hours were used as antibiotics, with phenytoin 35 mg every 12 hours for antiepileptic drugs for 4 weeks. On postoperative day 15, he was fully alert without any surgical morbidity.

## DISCUSSION

Subdural empyema is an intracranial suppuration between the dura and arachnoid mater. The mortality rate

of subdural empyema has decreased tremendously since antibiotics were found. This infection is more common in men with a peak age of over 10 years.<sup>1</sup> Commonly subdural empyema caused by the direct spread of infection (e.g., otitis media, dental infection, mastoiditis, sinusitis), hematogenous spread (subacute bacterial endocarditis, cyanotic congenital heart disease, bronchiectasis, or pulmonary abscess), after a trauma or surgery of the skull, or idiopathic.<sup>4,5</sup> Positive culture in subdural empyema can be obtained from the capsule with a success rate very varies between 54-81%.<sup>6</sup> Common organisms are *Haemophilus influenzae*, *Streptococcus pneumoniae*, and other gram-negative bacilli bacteria.<sup>1</sup>

Parotitis has quite similar organisms to its etiologic agents; *Staphylococcus aureus*, *Streptococci*, and gram-negative bacilli are the most common infecting organisms.<sup>2,3</sup> Thus, parotitis may lead to subdural empyema through the direct extension of its organisms, as in our case. A Head CT scan may show a subdural lesion with contrast enhancement of the wall with a hypodense lesion inside.

Imaging is essential for the early diagnosis of empyema. Non-enhanced CT scans may be normal or show a hypodense extra-axial collection that demonstrates peripheral enhancement on contrast-enhanced CT suggested as empyema capsules. Bone CT should be evaluated for signs of sinusitis and mastoiditis. Magnetic resonance imaging is the procedure of choice to evaluate potential empyema. T1 weighted images may show an extra-axial collection that is mildly hyperintense relative to cerebrospinal fluid (CSF). Subdural empyemas are typically crescent and lie over the cerebral hemisphere. The extracerebral space is widened, and the collection compresses the underlying sulci. Subdural empyema often extends into the interhemispheric fissure but rarely crosses the midline. Empyema shows variable enhancement depending on the amount of granulomatous tissue and inflammation; the encapsulating membranes will have moderate to strong enhancement.<sup>7</sup>

The mechanisms of the direct extension of parotitis were not quietly explained due to the rarity of the case. Romeike *et al.* postulated that partial obstruction of the parotid ductus would lead to ascending infection through transductal inoculation. Other predisposing factors, such as poor oral hygiene, can lead to chronic parotitis. Then, the infectious process of chronic parotitis formed an abscess cavity in the parotid gland, which eventually penetrated the capsule leading to diffuse phlegmonous of the facial soft tissues. This phlegmon causes osteomyelitis and may lead to subdural empyema with its direct extension mechanisms.<sup>2</sup>

Several clinical manifestations of subdural empyema are fever, sinusitis, and neurological deficits, with a fulminant and rapid downhill course. First-time seizures, headache, nausea/vomiting, and mental status changes could also

be other symptoms that can happen.<sup>1,4,5</sup> Unilateral headaches usually manifest as the prominent early symptoms in most patients. As the disease progressed, the headache became more diffuse with the manifestation of a focal neurological deficit. Enlargement of the empyema will lead to significant mass effect and brain herniation. Also, half of the patients have seizures, either focal or generalized.<sup>1</sup> As in this case, he had a history of hospitalization with the mumps and febrile seizures diagnosis. We suggest that the febrile seizure of this patient is related to the subdural empyema.

Intracranial subdural empyema has been termed the most imperative of all neurosurgical emergencies. Surgical management must be the top priority in managing subdural empyema. Antibiotic therapy for subdural empyema is almost invariably an adjunctive therapy to surgical drainage. Furthermore, brain abscess or meningitis abscess may be present, and the antibiotics selected should also reach bactericidal concentrations in both CSF and brain parenchyma.<sup>8</sup> The patient is started on antibiotics based on the gram staining results and the infection's pathogenesis until specific culture is reported. Unfortunately, operative culture results can be negative without any reported microorganisms in up to 7% to 53% of patients; therefore, we should use broad-spectrum antibiotics.<sup>9</sup> Later on, cultured microorganisms will help adjust the desired antibiotic therapy.<sup>10</sup>

Accurate early diagnosis, surgical intervention, and antibiotic therapy are the keys to managing subdural empyema for better clinical outcomes. Surgical evacuation of the pus with an empyema capsule has much better results as it allows systemic antibiotic usage. Later, craniotomy allows partly solidified pus to be washed or lightly diluted off the brain's surface. Apart from early diagnosis, the most important advance must be a

widespread appreciation of the necessity for radical removal of capsule and pus by surgery.<sup>11</sup> There are three main goals of surgical intervention in case of subdural empyema (1) decompress the brain; (2) remove the capsule, especially the outer capsule, with minimal damage to the brain tissue; (3) ensure the diagnosis by capsule culture. As our goal is not to remove all capsules, we left adherence inner capsules, especially those with adherence to the major cerebral veins (Vein of Labbe and Rolandic).<sup>1,4,5</sup> Because we suggest that the source of the infection is parotitis, we should treat it to eradicate the source.

## CONCLUSION

Subdural empyema is one of the very threatening intracranial infections that can lead to death in some cases. This lesion can happen through varying mechanisms such as direct extension, hematogenous spread, trauma or surgery to the skull, after meningitis, or idiopathic. Although parotitis is the less likely disease that can cause subdural empyema through direct extension, we should also include it as the possible cause of subdural empyema. Emergency surgical intervention remains the main treatment, especially for patients with massive mass effects. The concept is to maximally decompress the brain with minimal damage to normal brain tissue.

## CONSENT FOR PUBLICATION

Written informed consent was obtained from the patient to publish this case report and accompanying images.

## AVAILABILITY OF DATA AND MATERIALS

Not applicable.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

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None.

## AUTHOR CONTRIBUTIONS

SM was the first to come up with the idea and was a major contributor to writing the manuscript. SA and ESJ contributed to writing and interpreting patient data. NG contributed to interpreting patient data. All authors read and approved the final manuscript.

## REFERENCES

1. Agrawal A, Timothy J, Pandit L, Shetty L, Shetty JP. A review of subdural empyema and its management. *Infect Dis Clin Pract.* 2007;15(3):149–53.
2. Romeike BFM, Diaz FG, Mathog R, Michael DB. An unusual subdural empyema: Case report. *Neurol Res.* 2000;22(6):597–600.
3. Wilson M, Pandey S. Parotitis. Treasure Island (FL): StatPearls Publishing; 2021.
4. Laban JT, O'Neill K. CNS infection. *Surgery.* 2009;27(3):125–9.
5. Thomas RF, Jesus O De. Subdural empyema. Treasure Island (FL): StatPearls Publishing; 2021.
6. Bruner DI, Littlejohn L, Pritchard A. Subdural empyema presenting with seizure, confusion, and focal weakness. *West J Emerg Med.* 2012 Dec;13(6):509–11. doi: [10.5811/westjem.2012.5.11727](https://doi.org/10.5811/westjem.2012.5.11727). PMID: 23358438; PMCID: PMC3555596.
7. Osborn AG, Hedlund G, Salzman KL. *Osborn's Brain.* Elsevier; 2017.
8. Greenlee JE. Subdural Empyema. *Curr Treat Options Neurol.* 2003;5(1):13–22.
9. Leekha S, Terrell CL, Edson RS. General principles of antimicrobial therapy. *Mayo Clin Proc.* 2011 Feb;86(2):156–67. doi: [10.4065/mcp.2010.0639](https://doi.org/10.4065/mcp.2010.0639). PMID: 21282489; PMCID: PMC3031442.
10. Osborn MK, Steinberg JP. Subdural empyema and other suppurative complications of paranasal sinusitis. *Lancet Infect Dis.* 2007;7(1):62–7.
11. Bannister G, Williams B, Smith S. Treatment of subdural empyema. *J Neurosurg.* 1981;55(1):82–8. Available from: <http://dx.doi.org/10.3171/jns.1981.55.1.0082>



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