CASE REPORT

Bilateral Subtentorial Empyema Complicated With Nosocomial Acinectobacter Ventriculitis: A Case Report

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SUMMARY

Subtentorial subdural empyema is a rare and life threatening intracranial suppuration. It is usually an intracranial complication of otogenic infections. Early diagnosis and surgical drainage are the most important factors determining prognosis. The high mortality reported in the literature reflects the severity of subtentorial subdural empyema if proper management is delayed. Intracranial infections usually require between 4 to 6 weeks of intravenous antibiotics therapy. However, the prolonged duration of hospitalization as well as requirement for neurosurgically inserted indwelling devices may predispose these patients to new nosocomial infections.

KEY WORDS:
Subdural Empyema; Subtentorial Empyema; Intracranial Infection; Acinectobacter Ventriculitis

INTRODUCTION

Intracranial subdural empyema is a neurological emergency and an unusual condition which carries a high incidence of mortality and morbidity if untreated. Subdural empyema may develop from a variety of infective loci of which the paranasal sinuses, the ear and mastoid air cells predominate[1,2]. Subtentorial subdural empyema is rare and usually originates from otogenic intracranial complication. These patients may present with malaise, headache, altered mental status, cranial nerve palsy or cerebellar signs secondary to mass effect of the empyema at the posterior fossa[2]. Seizures were uncommon in subtentorial subdural empyema. Early diagnosis and surgical drainage are the most important factors determining prognosis. Here, we present a case of subtentorial subdural empyema as a consequence of chronic suppurative otitis media and mastoiditis. The patient was initially treated with empirical antibiotics and cerebrospinal fluid (CSF) diversion. He subsequently underwent a delayed suboccipital craniectomy and drainage of the empyema. Despite the drainage, the empyema recurred after few weeks and then he also developed *Acinetobacter* ventriculitis related to the ventricular drain. The child was successfully treated with aggressive antibiotics therapy and recovered well with no neurological deficits.

CASE REPORT

A 12 year-old boy, known case of right chronic suppurative otitis media presented with 2 weeks history of right ear pain, neck pain and an episode of generalised tonic clonic seizure. Clinically patient appeared drowsy with neck stiffness (Glasgow Coma Score E3 V3 M5). High grade temperature was documented. Otoscopy revealed a swollen external auditory canal with mucopurulent discharge. Contrasted computed tomography (CT) scan of brain showed bilateral multiloculated infratentorial subdural empyema with obstructive hydrocephalus (Figure 1A). No basal cistern effacement. There was opacity at the right mastoid air cells which suggestive of mastoiditis (Figure 1B). Following the CT scan study, an MRI of his brain was performed additionally to delineate more clearly the extent of the intracranial infective collection (Figure 1C & 1D). Intravenous ceftriaxone and vancomycin were initiated empirically to treat the intracranial infection. However, the parents refused to give consent for surgical drainage of subtentorial subdural empyema. Thus only a right frontal external ventricular drainage (EVD) was placed to relieve the obstructive hydrocephalus. The pus discharge from the right ear grew *Pseudomanas* while CSF taken during ventriculostomy did not yield any growth. In view of the culture findings, intravenous ceftazidine was then prescribed to replace the initial empirical antibiotics. Patient did not show signs of improvement after CSF diversion and thus following obtaining consent from the family a posterior fossa craniectomy and drainage of the empyema was performed. The Pus cultured during this surgery also did not yield any growth. After completing 2 weeks of intravenous ceftazidine a repeat CT scan was done and demonstrated recollection of the left infratentorial subdural empyema (Figure 2A). In view of the absence pyrexia or signs of worsening neurology (Glasgow Coma Score E4 V5 M6), the patient was continued on with intravenous antibiotic therapy. The EVD was continued to drain at the level of 10cm height from the tragus. The status of the hydrocephalus was assessed radiologically with serial CT scan of the brain, and clinically by monitoring the patient's symptoms as well as charting on the amount of daily CSF drainage. In the subsequent week, the patient was noted to develop spiking temperature and cultures taken from his blood and CSF at the time grew multidrug resistant *Acinetobacter baumani*. Based on the culture sensitivity intravenous polymycin B and sulperazone were added to treat *Acinectobacter* ventriculitis. Clinically the

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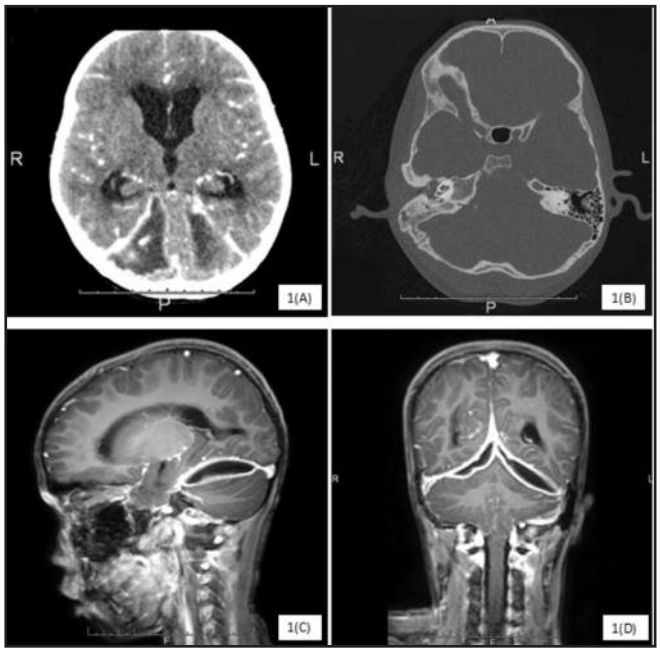

Fig. 1 : Subtentorial empyema. (A) Contrasted CT scan brain, axial view, showed bilateral multiloculated subtentorium collection with dural enhancement and obstructive hydrocephalus; (B) CT scan bone window demonstrated opacity at the right mastoid air cells which suggestive of mastoiditis. MRI brain was then performed additionally to delineate more clearly the extent of the intracranial infective collection. (C) MRI brain sagittal view & (D) MRI brain coronal view.

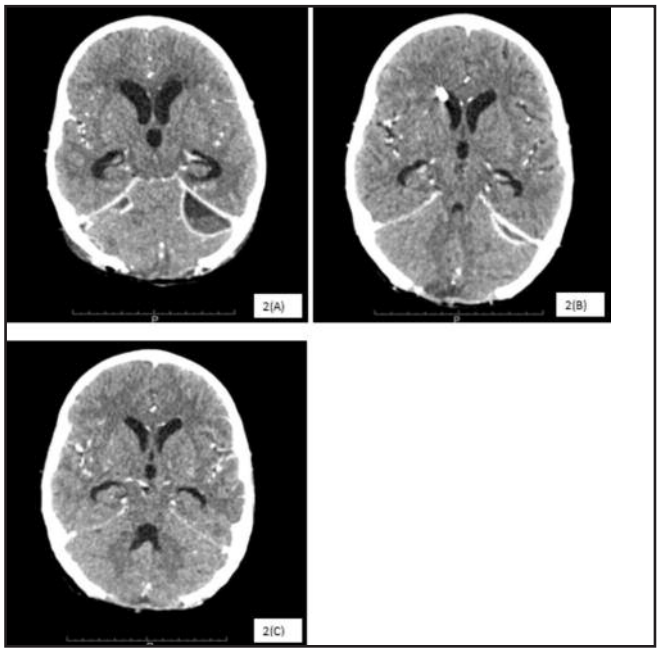

Fig. 2 : Serial contrasted CT scan of the patient's brain. (A) Re-collection of left subtentorial empyema at 2-week post drainage; (B) Resolution of left subtentorial empyema at 5-week post drainage; (C) Subtentorial empyema fully resolved at 7-week post drainage.

patient responded well with the antibiotics treatment. The repeated CT scan at 5 weeks (Figure 2B) and 7 weeks (Figure 2C) post-drainage showed resolution of both infratentorial subdural empyema as well as the obstructive hydrocephalus, and the repeated CSF did not grow any organism. His C-reactive protein (CRP) was reduced from 160 to negative throughout the course of treatment. The polymycin B was given for 2-week duration, whereas sulperazone and ceftazidine were continued to complete 8-week treatment and after that he underwent a modified radical mastoidectomy with tympanoplasty. At 6 months post-surgery the patient has recovered well with no evidence of residual infection but suffers from moderate conductive hearing loss over the right side.

DISCUSSION

Subtentorial subdural empyema is associated with significant morbidity and mortality with only few cases reported in the literatures[3]. The largest series published so far represents patients from India and South Africa where intracranial suppuration remains a common neurosurgical problem[3,4]. It mainly arises as a consequence of poor socioeconomic condition for large proportions of the population. About 77.3% and 64.3% of the patients in the Nathoo *et al.*[3] and Venkatesh et al.4 series respectively were male. This marked male predominance may be attributed to larger sinuses and more marked nose-blowing habits in male[3]. Our patient previously has history of recurrent chronic otitis media with multiple admissions to the district hospital. However, most of the course of antibiotics treatment were not completed due to poor compliant. For this current admission he was diagnosed to have acute mastoditis as well.

Acute mastoiditis has been identified as one of the cause of posterior fossa empyema due to the contiguity following bony destruction. Although it spreads to the middle cranial fossa, the infratentorial location is more common due to osseous destruction in the Trautmann triangle over the sigmoid sinus plate or in the posterior cortex of the petrous pyramid[5].

Emergent surgical evacuation, simultaneous management of the primary source of infection and intravenous long course of appropriate antibiotics are all recommended[2,3]. The conservative treatment carries the disadvantage of not knowing the nature of the microorganism, requiring close monitoring of neurologically critical patient and the need for prolonged courses of empirical antibiotics and the possibility of infection relapse[2]. However, the surgical evacuation of empyema was delayed in the initial management of our patient. The parents refused for the surgery despite the

urgency of empyema drainage has been emphasized and explained to them. They only consented for the placement of EVD to relieve the hydrocephalus with empirical antibiotics treatment. After re-counselling, consent was only given by parents to undergo posterior fossa craniectomy and drainage of subtentorial subdural empyema few days later after the CSF diversion when the child was not improved clinically. However, at post-surgical drainage 2 weeks, patient had recollection of left subtentorial subdural empyema as revealed in the repeated CT scan. The possible reasons for the recollection could be due to poor penetration of the antibiotic to the subdural space as well as the primary source of infection were not eradicated yet. Usually mastoidectomy is not done during the acute phase of mastoiditis due to technical difficulty (unable to identify the margin of infected and non-infected bony structures). Although there was recollection of the left subtentorial subdural empyema, the general condition of the patient had markedly improved. He was fully conscious, comprehend, and obeying commands without any neurological symptoms. Thus repeat surgery was not performed and the antibiotic treatment continued.

Subtentorial empyema usually carries a dismal prognosis. Nathoo *et al.*[3] reported 23% mortality rate in their 13 patients at South Africa with subtentorial empyema. All their patients with cerebellopontine angle extension of purulent material died.

This high mortality rate compared to 9% in the supratentorial empyema may be attributed to the (a) critical location of the purulent material in the posterior fossa which may lead to rapid deterioration of patient's condition, (b) the delayed or incorrect diagnosis which may lead to delayed treatment, (c) thrombobophlebitis of vital brainstem perforators with subsequent infarction and (d) the high incidence of associated hydrocephalus[2,3].

Hydrocephalus was present in 92.5% of 14 pediatric patients in the case series published by Venkatesh *et al.,*[4] and 36% of the patients required EVD during surgery or postoperatively. Shunt placement was only required in 21% of their patients. In our patient, an emergency placement of EVD was done in view of his poor consciousness on admission secondary to obstructive hydrocephalus. Despite antimicrobial EVD was used for CSF diversion in this patient, he developed nosocomial *Acinectobacter* ventriculitis at 3-week post drainage. Aggressive antibiotics treatment were commenced, including combination of intravenous polymycin B and sulperazone to treat the *Acinectobacter* ventriculitis as well as intravenous ceftazidine to treat the source of empyema (otitis media and mastoditis). Clinically patient responded well with the course of antibiotics therapy given. At 7-week post drainage his subtentorial subdural empyema had resolved completely with a negative CRP. Besides, his obstructive hydrocephalus was subsided and was able to wean off the EVD without any shunt placement.

In conclusion, subtentorial subdural empyema is a rare and life threatening intracranial suppuration. The diagnosis may be confused with meningitis and delayed in initial treatment if a CT scan is not obtained promptly. MRI with contrast is more sensitive for early detection of subtentorial empyema, and to avoid the streak artifact caused by complex bony structures in the posterior fossa as seen in CT scan. The high mortality reported in the literature reflects the severity of infratentorial empyema if proper management is delayed. Furthermore, the prolonged stay in the ward may further expose these patients to the risk of hospital acquired infections. Thus, early surgical drainage is recommended to identify the source of microorganisms and to prevent prolonged usage of empirical antibiotics treatment.

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