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From Sinus To Skull - Frontal Sinusitis Leading To Subdural Empyema: A Case Report

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Abstract

Subdural empyema is a rare but life-threatening complication of frontal sinusitis. It can occur through direct contiguous spread or hematogenous dissemination or thrombophlebitis of the draining veins. The incidence of intracranial complications secondary to frontal sinusitis have decreased drastically since last two decades, owing to the widespread usage of antibiotics. The symptoms of subdural empyema often mimic frontal sinusitis but can progress to include fever, headache, focal neurological deficits, seizures and altered mental status and has the potential for rapid neurological deterioration and mortality. Hence, high index of suspicion and early diagnosis is crucial. Imaging plays a pivotal role in diagnosis. A prompt intervention by craniotomy with empyema drainage and sinus debridement along with broad spectrum antibiotic coverage is the cornerstone for successful management.

Keywords: Frontal sinusitis, subdural empyema, intracranial complications

Introduction

Subdural empyema is the collection of infection/ pus between the meningeal layers i.e., the dura and arachnoid mater. The subdural space being continuous and spreading over the convexity of the brain, hence allowing the empyema to spread easily involving both cerebral hemispheres. Subdural empyema within the confined bony cavity of the skull could result in rapid compression of the brain, resulting in a medical and surgical emergency. The development of subdural empyema leading to coma and death could be so rapid even before the clinical evidence of papilledema or other signs of deterioration (1). The patients usually have history of symptoms and signs of frontal sinusitis like nasal obstruction and headache. In certain circumstances, the presentation may be silent with no significant symptoms until it progresses to serious neurological deficit.

Owing to the significant morbidity and mortality associated with subdural empyema, and the capacity for rapid deterioration of the neurological status, it is extremely important for the clinicians to be aware of the possible complications to promptly identify and address the condition.

Case Report:

A 62-year-old male was brought to the Emergency Department with complaints of altered sensorium. The patient had a history of upper respiratory tract infection along with fever 2 days back. Initial vital signs were BP 170/90 mm Hg, HR 90 bpm, oral temperature 96.7o F, and oxygen saturation 100% on room air, with Glasgow Coma Scale of 13/15. On

physical examination, the patient was found to have a near-normal CNS examination. Initial laboratory investigations are within normal limits, except glycated hemoglobin was elevated to be 14%. His cerebrospinal fluid examination showed lymphocytes 60%, Neutrophils 40% with cell count 2/HPF. He had three episodes of focal seizures each lasting for 10-15. The neurosurgeon has started him on antiepileptic treatment including leviteracetam and oxcarbazepine.

A contrast enhanced magnetic resonance imaging scan was ordered and T1 and T2 images were generated in multiple planes, which revealed a left frontal subdural, epidural empyema with leptomeningitis with left acute pansinusitis (Figure 1 and 2). A craniotomy was performed and drainage of the empyema was done. Antibiotic coverage was given as per the meningitis protocol. Culture and sensitivity report of pus came positive for enterococcus faecium, sensitive to vancomycin and linezolid. Repeated episodes of focal seizures persisted till postoperative craniotomy day 3 which later subsided slowly by day 5. After his general condition has improved, CT scan of the brain and paranasal sinuses was obtained that demonstrated, left pansinusitis, erosion of the lower part of the posterior table of the frontal sinus extending onto the roof of the left ethmoidal sinus with communication to subdural space with left frontal cerebritis and subdural empyema (Figure 3). There was no evidence of extension of inflammation into the orbit. Chronic mucosal thickening was noted within the sphenoidal sinus and right maxillary sinus. An endoscopic Draf 2 procedure was performed on the left side to expose the defect in the Basi-frontal region and a 3*2 mm defect was identified near the posterior table of the frontal sinus and ethmoidal roof. Fascia Lata was harvested from the lateral aspect of the right thigh along with part of vastus lateralis muscle and the muscle is tucked into the defect which is covered with fascia Lata by bath plug technique. Proper sealing of the defect was confirmed by the Valsalva maneuver. The left nasal cavity was packed with merocele and the anterior nasal dressing was done. Merocele in nasal cavity was removed on postoperative day 2 and the patient was under observation till day 5 and was uneventful.The patient was discharged on the 6th post-operative day. The patient is under regular follow up and is doing well.

Figure 1- MRI BRAIN showing left pansinusitis with spread into subdural space with cerebritis.

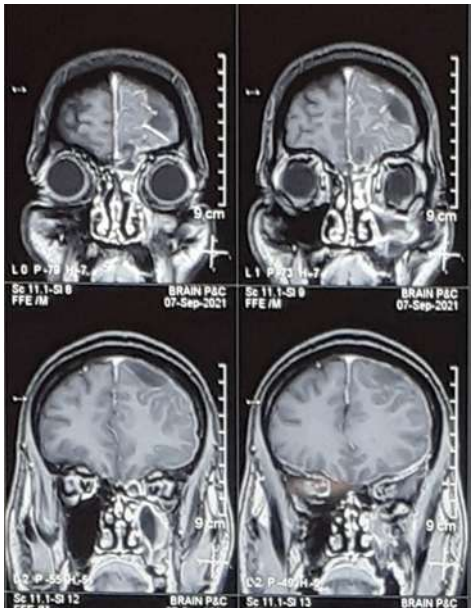

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Figure 2- MRI BRAIN DWI showing subdural empyema

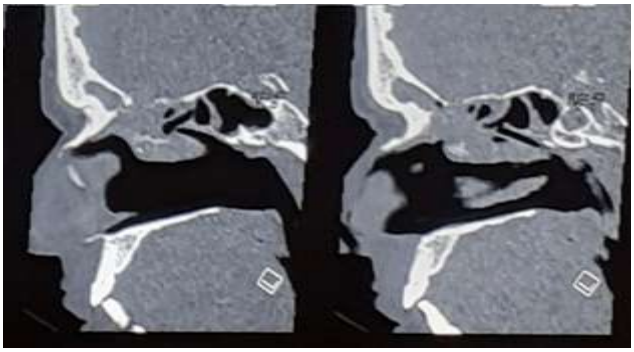
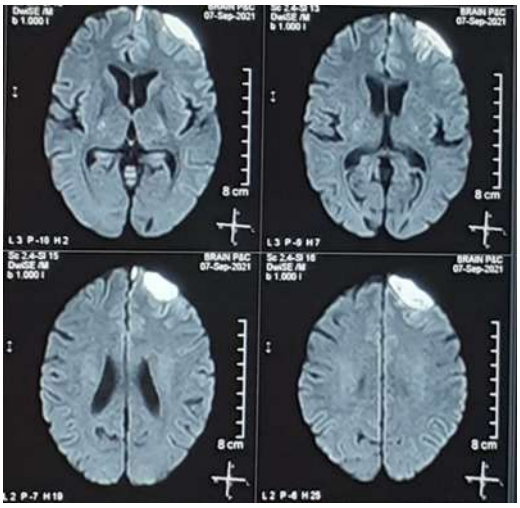


Figure 3- CT PNS showing defect at posterior frontal table and ethmoidal roof.



Discussion:

Frontal sinusitis is a mild clinical condition which is self resolving or manage with anti microbial treatment. The intracranial complications of rhinosinusitis are rare with most common source of infection being frontal sinus followed by ethmoid, sphenoid and maxillary sinuses (2).

The routes of spread of infection from the frontal sinus include

1. Direct contiguous spread
2. Dissemination of bacteria by the bloodstream through the veins of breschet
3. Retrograde thrombophlebitis (3).

And result in dangerous life threatening intracranial complications like meningitis, intracerebral abscess, subdural empyema and cavernous sinus thrombosis. The intracranial secondary to frontal sinusitis have become less common in this antibiotic era. Regardless, there are few cases reported occasionally. While the exact incidence is difficult to pinpoint, it's crucial to be aware of this potential complication of frontal sinusitis, especially for healthcare professionals dealing with ear, nose, and throat (ENT) issues. Usually, all these complications are preceded by signs and symptoms suggestive of sinusitis. Fairbanks et al. stated that either superior longitudinal sinus thrombosis or subdural empyema precedes a rhinogenic abscess (4). Very rarely they do present directly with symptoms of intracranial complications and pose a challenge -

causing misdiagnosis, delayed detection at an advanced stage leading to increased complexity for intervention and poorer prognosis.

MRI is considered the gold standard in diagnosing intracranial infections (5). Lumbar puncture is contraindicated in cases of suspected or confirmed

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any form of brain abscess as it can lead to tentorial herniation and sometimes even death (6). The most common organisms implicated in the causation of subdural empyema are microaerophilic streptococci and anaerobic organisms (7). Hence, broad spectrum antibiotic coverage is also necessary.

Ideally, it is advised that the intracranial component and the frontal sinus disease should be addressed at the same sitting to prevent further seepage of infection from sinus into the skull. In our case, as the patient was not stable and had repeated seizure episodes, once the subdural empyema were treated by craniotomy and drainage, he was stabilized, and then the frontal sinus is addresed using endoscopic draf 2 procedure with complete disease clearance and the defect is closed with a muscle graft. Defects in the posteroinferior wall of frontal sinus always possess a challenge in surgical exposure being the narrowest area. Draff procedures do provide excellent exposure which helps us in maneuvering the area with straight instruments.

Conclusion:

Even with the advent and widespread use of antibiotics, the fatal complications of frontal sinusitis still develop. It is important to diagnose and manage the complications as soon as possible. Endoscopic Draf procedure does provide very good exposure as far as the posterior table of frontal sinus. A multidisciplinary approach involving a rhinosurgeon along with neurosurgeon with aggressive management with broad spectrum antibiotics and surgical intervention is the cornerstone for successful outcomes.

Conflict of interest: The authors declare there are no conflicts of interest.

Ethical statement: I testify on behalf of all co-authors that our article submitted to indian journal of otolaryngology and head and neck surgery.

1. This material has not been published in whole or in part elsewhere.

2. The manuscript is not currently being considered for publication in another journal.

3. All authors have been personally and actively involved in the substantive work to the manuscript, and will hold themselves jointly and individually responsible for its content.

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