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Emergency Radiology

Frontal sinusitis complicated by a brain abscess and subdural empyema

*Matthew T. Niehaus DO, Kyli N. Krape DO, Shawn M. Quinn DO, Bryan G. Kane MD**

The Department of Emergency Medicine, Lehigh Valley Health Network/USF MCOM, Cedar Crest Boulevard and I-78, Allentown, PA, 18103, USA

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ABSTRACT

A 49-year-old male was brought to the Emergency Department after being found unresponsive. The patient had multiple seizures and was intubated in the prehospital setting. A computed tomography scan showed bilateral paranasal sinus disease, and magnetic resonance imaging showed a right frontal abscess and subdural empyema. Neurosurgery took the patient to the operating room, performed a craniotomy, and drained a large amount of purulent fluid. He was subsequently discharged for acute rehabilitation. Clinicians should consider complicated frontal sinusitis, especially in the undifferentiated patient presenting with neurologic deficits and signs or symptoms of sinus disease.

Introduction

This case demonstrates a subdural empyema and right frontal brain abscess as a result of direct extension of infection from the right frontal sinus. Intracranial extension of acute or chronic sinusitis is a known complication and has a reported incidence of 3.7% to 11% in hospitalized patients [1]. Commonly, intracranial complications are seen in the first 2 decades of life as this age group is most prone to sinus disease [2]. While the clinical incidence is low, physicians must have a high index of suspicion for intracranial infections in the presence of focal neurologic symptoms and sinus disease. Early diagnosis and treatment is essential, as these infections have the potential for devastating neurologic disability. Emergency medicine literature is limited on this topic which was previously referred to as "Pott's Puffy Tumor" [3].

Case Report

A 49-year-old male was brought to the Emergency Department (ED) after being found unresponsive on the bathroom floor by his wife. He was last seen acting normally the previous evening. He arrived at the ED intubated and unresponsive. Emergency Medical Services responders reported that the patient suffered multiple seizures prior to arrival. The wife reports a recent history of upper respiratory symptoms. The patient has no recent or distant history of sinus disease or trauma. He was

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* *Corresponding author.*
E-mail address: Bryan.Kane@lvhn.org (B.G. Kane).
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Fig. 1 – Computed tomography scan of the head without contrast demonstrating vasogenic edema of the right frontal lobe with a leftward midline shift.

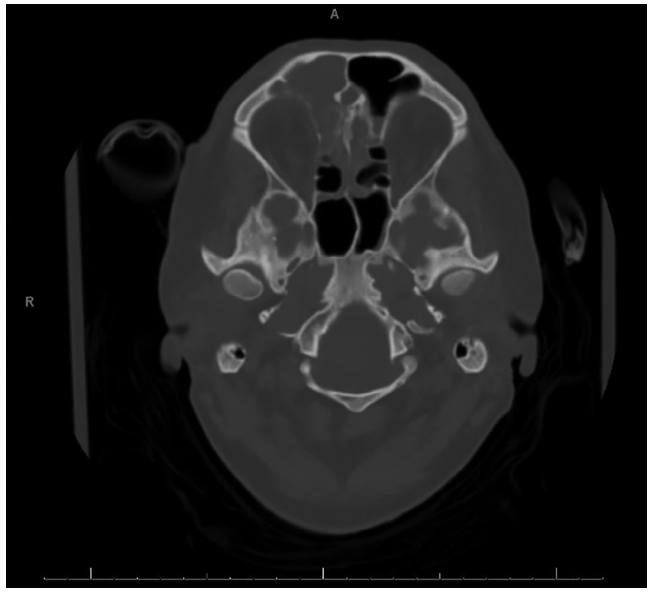

Fig. 2 – Bone windows from computed tomography of head demonstrating sinus disease, right greater than left.

given rocuronium prehospital for intubation. Initial vital signs were BP 166/83 mm Hg, HR 60 bpm, oral temperature 96.7°F, and oxygen saturation 98% on a ventilator; his Glasgow Coma Scale on arrival was 3T. On physical exam the patient was found to have pinpoint pupils. The remainder of the exam was limited due to the prehospital administration of paralytics. Initial laboratory data revealed a white blood count of 20.1 thou/mm^3 (normal, 4.0-10.5 thou/mm^3) with 4% bands, a lactate of 3.0 mmol/L (normal, 0.5-2.2 mmol/L), troponin of 1.69 ng/mL (normal <0.04 ng/mL), arterial blood gas revealed a pH of 7.31, pC02 of 45, pO2 of 77, and HCO3 of 22. His urine drug screen was positive for tetrahydrocannabinol.

An unenhanced computed tomography (CT) scan of the brain with axial 2.5 mm sections was obtained that demonstrated vasogenic edema of the right frontal lobe with a leftward midline shift (Fig. 1). Bilateral paranasal sinus disease was also noted (Fig. 2). A magnetic resonance imaging scan was recommended by radiology. This was ordered with and without contrast and generated T1 and T2 images in multiple planes. The images revealed a multilobulated 4 mm right front lesion communicating with the right frontal sinus consistent with a right frontal abscess and right subdural empyema (Fig. 3). Contrasted images demonstrate the relationship of the abscess to the sinus in the axial (Fig. 4) and sagittal planes (Fig. 5). The patient was subsequently loaded with 750 mg of levetivacetam and 1 g of fosphenytoin, and admitted to the neuroscience intensive care unit for further management.

The Neurosurgery and Infectious Disease departments were consulted on an emergent basis and evaluated the patient. Neurosurgery took the patient to the operating room, performed a craniotomy, and drained a large amount of purulent fluid. The right frontal sinus was exenterated. Antibiotics were not given prior to surgical drainage and a culture was ordered per the request of the Infectious Disease specialist. Cultures were obtained during the operative procedure and the patient was transferred back to the neuroscience intensive care unit. He was started on 2 g of ceftriaxone, 500 mg of metronidazole, and 1.5 g of vancomycin. He remained intubated until hospital day 8 and was transferred to the general medical floor on hospital day 9. Cultures did not grow a predominating organism. His hospital stay was complicated by a left calf deep vein thrombosis, which was treated with systemic anticoagulation. With

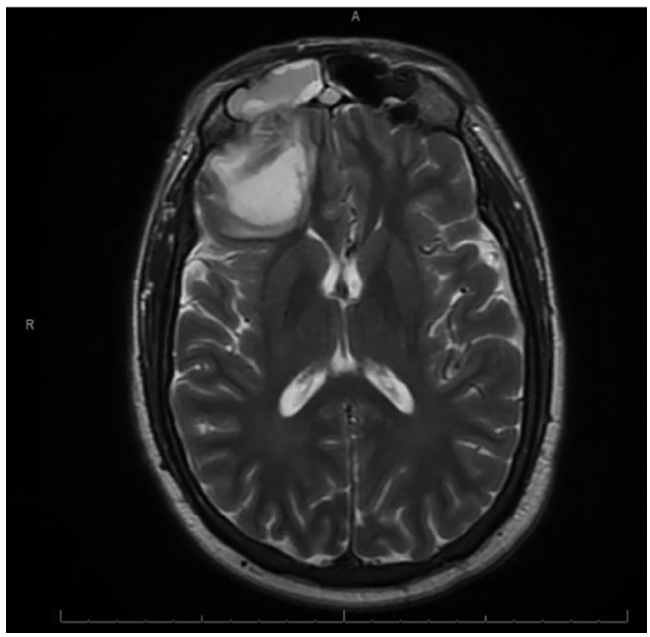

Fig. 3 – Magnetic resonance imaging showing 4 mm right front lesion communicating with the right frontal sinus consistent with a right frontal abscess and right subdural empyema.