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Brain abscess secondary to acute sinusitis in young adult – a case report

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Abstract:

Introduction. Brain abscesses are uncommon, serious, and life-threatening conditions with high morbidity. Signs and symptoms of brain abscesses are variable and non-specific. Common symptoms are headaches, fever, focal neurological symptoms, altered mental state, nausea and vomiting. Seizures are less common. A high clinical suspicion is necessary to confirm the diagnosis. A Computer Tomography (CT) scan of the brain with contrast is a gold standard to diagnose brain abscesses.

Clinical case. A 23-year-old gentleman was found on the floor at home with tonic-clonic seizures. He had a 3-weeks history of headaches, purulent smelly discharge from his nose, symptoms of photophobia, and recent covid infection. The patient was not on any treatment – he was due to see his general practitioner for his symptoms. On the patient's arrival, the emergency team requested a CT of the head which showed 4.5 x 2.3 x 2.4 cm thick-walled gas and fluid containing collection within the left frontal lobe coming from breaches left frontal sinus. The patient had endoscopic sinus surgery and bifrontal decompressive craniectomy followed by admission to the intensive care unit. A brain stem test was done which showed devastating brain injury. The patient died on day 7.

Conclusion. Although there are no acceptable management guidelines, the three most important steps in managing brain abscesses caused by sinusitis are broad-spectrum antibiotics, endoscopic sinus surgery, and decompression and drainage of the abscess. Conservative management can be considered for abscesses smaller than 2.5 cm.

Keywords. Brain,abscess, sinusitis.

Introduction

Brain abscesses are uncommon, serious, and life-threatening conditions that constitute a major source of morbidity. Newly introduced broad-spectrum antibiotics, improving images technologies and intensive care abilities have significantly changed the management and history of central nervous system infections (1,2). A source can often be identified; However, in about 15% of cases, clinicians are not able to locate origins. In some cases, the source can be originated from sinusitis (3). Most frequently, such infections spread from frontal sinusitis, less often from ethmoid, sphenoid, and maxillary sinuses (4)

Patients presenting with signs and symptoms of brain abscess are variable and non-specific. The most common complaints are headaches, fever, focal neurological symptoms, altered mental state, nausea and vomiting. Seizures are less common and can be focal or generalized (5). Nathoo et al (6) report that headaches, fever, and nuchal rigidity were the most common symptoms on clinical presentation. Symptom onset ranged from 1 day to 8 weeks (average 11.4 ± 10 days).

Since the symptoms of brain abscess are not specific, a high clinical suspicion is necessary for prompt diagnosis. The diagnosis should be considered in all patients with a new-onset of progressive headache, signs of increased intracranial pressure, or progressive focal neurological deficit(2, 15).

Brain imaging is a critical investigation for the diagnosis and management of brain abscess in acute clinical settings. A Computer Tomography (CT) scan of the brain with contrast is a gold standard to determine location, number, size, mass effect, shifts of the abscess, and the presence of intraventricular rupture. Magnetic resonance imaging with diffusion weighting is a more sensitive investigation; however, it is not recommended for diagnosis in acutely ill patients with a suspected brain abscess (7).

Initial management for abscesses smaller than 2.5 cm is antibiotic therapy (8). Optimal management of brain abscess larger than 2.5 cm involves surgical drainage and eradication of the primary source along with antibiotic therapy(6,8). The prognosis has improved during the last few decades, but mortality remains high (9).

Case report

A 23-year-old gentleman was found on the floor at home with tonic-clonic seizures by his family. Before the episode, He had a 3-weeks history of headaches, purulent smelly discharge from his nose, symptoms of photophobia, and a recent covid infection. He was otherwise fit and well. The patient was not on any treatment – he was due to see his general practitioner for his symptoms.

When the ambulance arrived, he was not seizing anymore. On Glasgow Coma Scale (GCS), his consciousness was 7/15. An ambulance transferred him to Emergency Department (ED) for further investigations.

On the patient's arrival, the ED team requested a CT of the head which showed 4.5 x 2.3 x 2.4 cm thick-walled gas and fluid containing collection within the left frontal lobe suggested intracranial abscess. He also had significant surrounding oedema within the left frontal lobe and resultant mass effect causing partial effacement of the left lateral ventricle and 14mm of rightward midline shift. There was also a breach of the posterior wall of the left frontal sinus and extensive heterogeneous soft tissue opacification of both frontal sinuses, maxillary sinuses, ethmoidal air cells, and right sphenoidal sinus. The radiologist reported that CT scan appearance was keeping with extensive acute invasive sinusitis affecting almost all of the paranasal sinuses with breach of the left frontal sinus cortex posteriorly and secondary formation of a left frontal lobe abscess which has in turn breached/extended into the ventricular system with a high risk of ventriculitis

(Fig.1, Fig.2). The emergency department immediately announced code black - trauma, neurosurgery, anesthesiology, intensive care, and Ear, Nose, and Throat (ENT) teams arrived to assess the patient in the resuscitation unit.

The patient was haemodynamically unstable – his blood pressure was 80/45 mmHg, heart rate was around 170 beats per minute. His both pupils were dilated and inactive. After discussion with the family, both neurosurgery and ENT teams decided to take the patient to theatre despite the poor prognosis.

After five hours since the presentation, the patient had endoscopic sinus surgery and bifrontal decompressive craniectomy. He had a washout of his sinuses, decompression and abscess drainage of the brain to relieve pressure. After the surgery, Intensive care doctors transferred the patient to the intensive care unit (ICU) for close monitoring.

Following the procedure, the patient was stable on life support equipment but not responsive despite sedation weaning. Four days later, intensive care doctors performed a brain steam test which showed devastating brain injury. After an extensive discussion with the family, both doctors and family agreed that the patient had an unsurvivable brain injury. He died three days later.

Figure 1. Coronal view of CT head. Arrow indicates left frontal sinus breach

Figure 2. Axial view of CT head. Left frontal lobe intracranial abscess extended into the ventricular system with left ventricle rightward midline shift.

Discussion

Sinusitis-induced brain abscess is rarely encountered in clinical practice due to the advanced usage of antibiotics. Although there are no acceptable management guidelines, the three most important steps to manage these infections are broad-spectrum antibiotics, endoscopic sinus surgery for clearing paranasal sinuses, and neurosurgical intervention for decompression and drainage of the abscess (10,11).

Arloti et al (12) in their research suggest that medical treatment should be considered for patients who are in a good medical condition (GCS 12 or above) and have an abscess less than 2.5cm but the choice should be made on an individual basis. Surgery should be considered if the clinical condition is worsening. If the surgery is considered, the sample from the abscess ideally should be taken before starting antibiotic therapy. There is insufficient evidence which antibiotic therapy should be initiated; however, it is suggested to consider the course of antibiotics for 6-8 weeks for medically and 4-6 weeks for surgically treated abscesses. Appropriate antibiotic therapy should be given after positive culture results (15)

In the present case, the following patient received intravenous ceftriaxone and metronidazole antibiotics when he arrived to ED. Pus, swab samples were taken during the surgery and sent to the lab. It showed growth of *Streptococcus constellatus* sensitive to penicillin, *Prevotella sp.* and mixed anaerobes sensitive to metronidazole. *S. constellatus*, *S. anginosus* and *S. intermedius* are classified as members of *Streptococcus anginosus* group. *Streptococcus constellatus* is found in normal oropharyngeal and gastrointestinal flora. Claridge at al (13) reported that *S. constellatus* and *S intermedius* is more frequently associated with abscess formation and polymicrobial infection compared with *S anginosus*. As comparison, brain abscesses caused by *Prevotella species* are very rare and typically are dental origin (14).

As mentioned above, there are no adequate diagnostic-therapeutic management written in literature that would suggest correct pathway in the management of brain abscesses; therefore, multicentric prospective studies should be performed to obtain stronger evidence in diagnosing and treating brain abscess (16).

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