



Late Cerebral Traumatic Abscess in a 31-Year-Old Male Patient Presenting with Seizures: A Case Report and Literature Review

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Abstract

Brain abscess is a focal area of necrosis with a surrounding membrane within the brain parenchyma, may arise from hematogenous spread, contiguous spread, or direct trauma.

This case report presents the clinical course, diagnostic evaluation, and surgical management of a 31-year-old male patient who was admitted to our hospital with a history of seizures for the first time. Computed tomography (CT) and magnetic resonance imaging (MRI) revealed a left frontal abscess, which necessitated immediate surgical intervention. This report highlights the challenges associated with late cerebral traumatic abscess and emphasizes the importance of prompt diagnosis and intervention to achieve favorable outcomes. Additionally, we conduct a review of relevant literature to enhance our understanding of this uncommon condition.

Keywords: *brain abscess, traumatic brain injury, surgical intervention, MRI spectroscopy*

Introduction

Brain abscess is a focal area of necrosis with a surrounding membrane within the brain parenchyma, usually resulting from an infectious process or rarely from a traumatic process. (1)(2)(3)

Symptoms are similar to any other mass lesions but tend to progress rapidly to be potentially life-threatening conditions that possibly lead to permanent injuries even after sufficient healing has taken place. (1)

With improvements in medical technology and expertise, outcomes have improved tremendously (3)

The late cerebral traumatic abscess is a rare but serious complication of traumatic brain injury (TBI).

An abscess following penetrating trauma cannot be treated by simple aspiration as with other abscesses, open surgical debridement to remove foreign matter and devitalized tissue is required.

The pathogen of post traumatic is usually due to *Staphylococcus aureus* or *Enterobacteriaceae* (2)

We present a case with successful outcome of a 31-year-old male patient with a late cerebral traumatic abscess, discussing the clinical presentation, imaging findings, surgical management, and literature findings related to this condition.

Case Presentation

A 31-year-old male patient was admitted to our emergency department at Sheikh Khalifa Medical City, Ajman. The patient has a history of entering an elevator when witnesses reported that he experienced a seizure lasting for approximately 2-3 minutes. There was no urine incontinence or tongue biting observed. Upon arrival, the patient was found to be in a post-ictal state, displaying confusion for approximately 30 minutes following the seizure. He had no recollection of the events that occurred during the seizure episode, except for the fact that he was in an elevator. The patient mentioned that he had a history of head trauma, specifically a left frontal wound, which occurred one year ago in his home country, and recovered completely without being on any long-term medication.

On Examination

The patient is fully Conscious, Alert and Oriented GCS 15/15 pupils equal and reactive to light, afebrile with stable other vitals no neurological deficit. No sign of previous surgical incision just small old scars on LT frontal area Initial labs showed normal CBC count, CRP was 6.87 mg/l, procalcitonin was 0.025 nanogram /ML, had normal liver and renal function.

He underwent plane Computed Tomography (CT) scan in emergency, it was reported as:” A fairly well-defined hypo-dense lesion with thick walls noted in the left high frontal region with moderate amount of perilesional edema and mass effect. The lesion measures 3x 2.8 cm. Previous bony defects noted in the adjacent bilateral frontal region with thickening of the skull, mild compression of bilateral lateral ventricles noted.” see Figure 1.

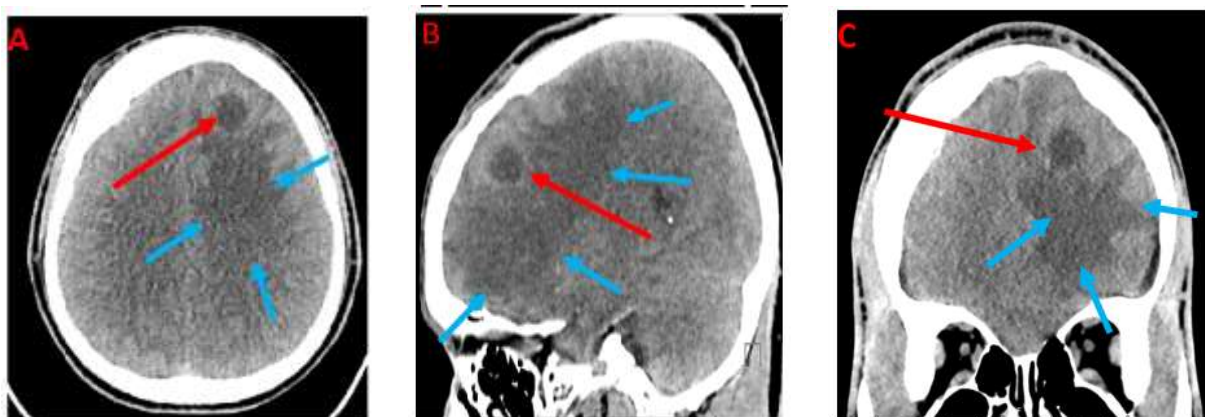


Fig (1) Computed Tomography (CT) scan (A axial cuts, B sagittal cuts, C coronal cuts) revealed: Space-occupying lesion in the left high frontal region (red arrows) with moderate amount of perilesional edema

and mass effect (blue arrows).

He was admitted to ICU for close monitoring, and was started on dexamethasone 4 mg IV QID, continued on IV phenytoin 100 mg TID. He did not have any further convulsion. Magnetic Resonance Imaging (MRI) / Magnetic resonance spectroscopy (MRS) was arranged on the second day, It revealed Well defined enhanced wall lesion seen at Lt frontal lobe associated with moderate perilesional edema causing effacement of sulci & 6mm midline shift to Rt side, lesion shows restricted diffusion, measuring 30x23x22 mm , see figure 2. And MRS revealed Lesion shows high lactate peak on spectroscopy, see figure 3.

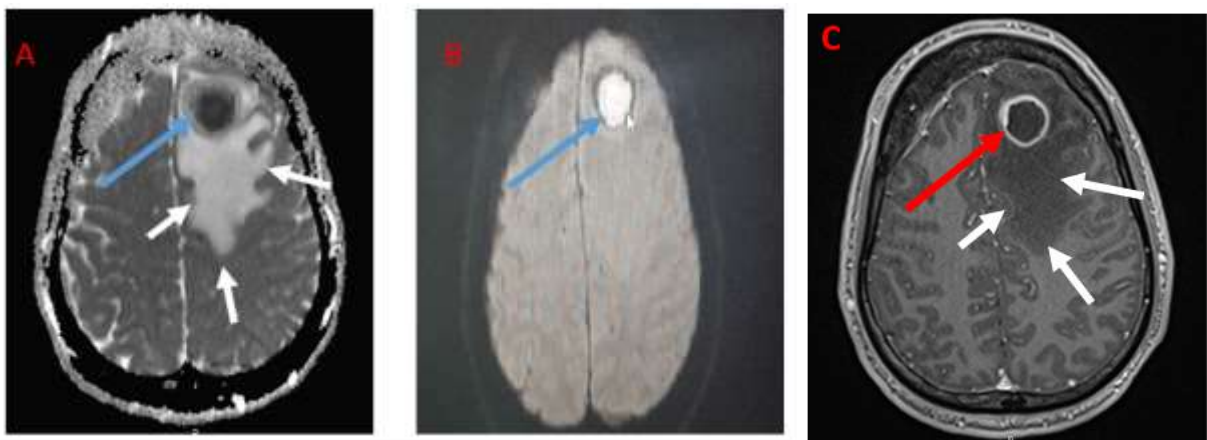


Fig (2) Magnetic Resonance Imaging (MRI) (A) Axial section of ADC weighted magnetic. And (B) DWI -weighted magnetic resonance imaging showing: diffusion restriction (blue arrows) (C) Axial section of T1- weighted magnetic resonance imaging with gadolinium contrast showing complete ring enhancement of the lesion wall (red arrow) with surrounding edema (whit arrows)

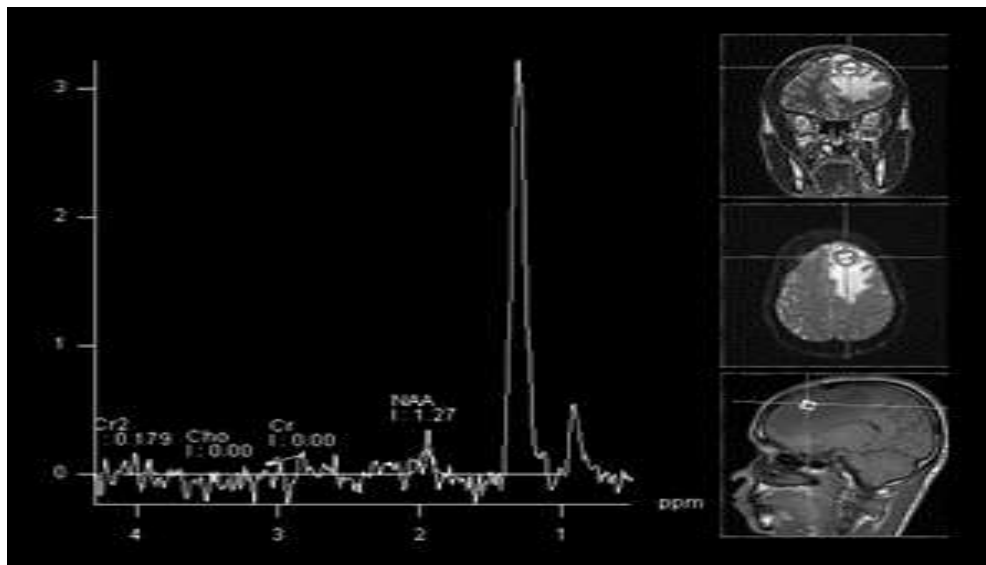


Fig (3) Magnetic Resonance Spectroscopy (MRS) high lactate peak (whit arrow), and low NAA

It was decided to take the patient for surgical exploration, because he was afebrile and stable, no empirical antibiotic was started, hoping to get a better microbiological diagnosis.

After informed consent, on day 3 he underwent craniotomy, he was given preoperative Ceftriaxone as part of hospital perioperative prophylaxis

Surgical technique: A small craniotomy, measuring 3x4 cm, was performed over the left frontal lobe, anterior to the coronal suture. Some adhesions to the dura mater are encountered and gently dissected. The dura mater was opened in a half-circle fashion, aided by a microscope. Trans-sulci was conducted close to the midline, and after penetrating 2-3 mm, a very thick capsule of a suspected abscess was encountered. Upon aspiration, thick pus is appreciated. The dissection and excision of the abscess are carried out en-bloc (Fig 4) by cleaving around the capsule.

A specimen was sent for both culture and histopathology analyses. Hemostasis is meticulously ensured. The dura mater is sutured and reinforced with Dura-Gen. The bone flap was repositioned and secured using 3 plates and 6 screws. Interrupted subgaleal Vicryl sutures were utilized, followed by the application of clips to close the skin wound , the patient was extubated successfully and sent back to ICU for close monitoring, continued in IV ceftriaxone 2000 mg once per day, later follow up CT scan was done (figure 5)



Fig (4) the abscess after opening the capsule

Postsurgical Computed Tomography (CT) scan Fig (5) revealed:

LT frontal Craniotomy, the abscess surgically removed. The surgical bed contain mild hemorrhage seen medially & around the surgical bed.

The surrounded edema still seen with no significant changes in compare o previous CT.

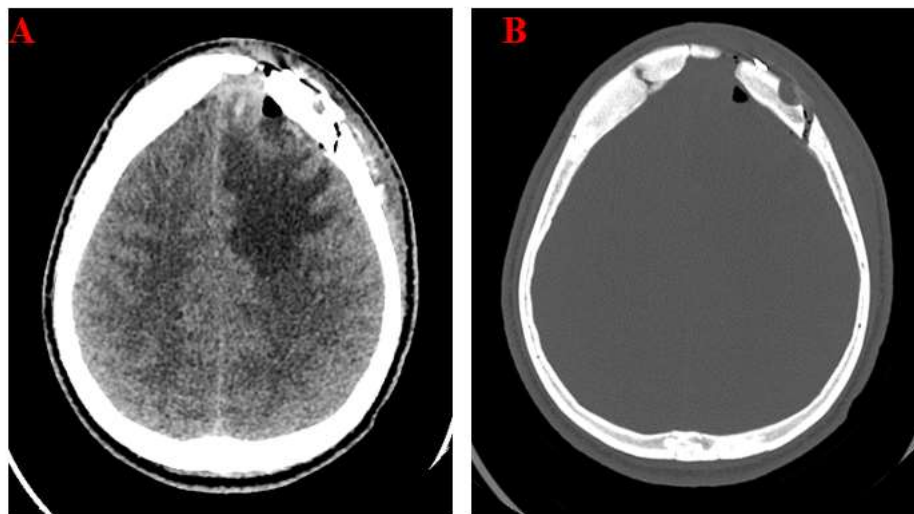


Fig (5) postsurgical Computed Tomography (CT) scan: (A) brain window showing postoperative changes with removal of the abscess, (B) bone window showing LT frontal craniotomy.

Hospital course

The patient had smooth post ICU course and was transferred to medical ward , on fourth day the purulent material grew staphylococcus aureus , it was MSSA (see figure 6) . Infectious Disease (ID) Physician was consulted and antibiotics was changed to cefazolin 2000 mg IV TID, dexamethasone was tapered off , the craniotomy wound healed very well, Histopathology result : fibrotic tissue forming a pseudo-cyst showing chronic active inflammation, granulation tissue and collection of foamy histiocytic, and no malignant cells.

He was asking for earlier discharge because of financial reason , was discharged in healthy condition on lower dose phenytoin , and IV cefazolin was changed to oral doxycycline 100mg BID x 14 days , was a devised to be seen in the clinic . After one year he came to emergency department with mild head injury, a CT brain was done, as shown in Fig (7), revealed Evidence of a previous left frontal craniotomy. Hypo dense areas representing gliotic changes were observed in the left high frontal region. And no evidence of any abscess or collections. He was discharged home from emergency department and was not referred to neurosurgery.

Pus culture:

Revealed of heavy growth Staphylococcus aureus isolated Fig (6)

Tissue Culture - Accession: 000012022059001892
Result Status - Auth (Verified)

Micro Reports	Susceptibilities	Specimen	Action List
	A		B
1	Staphylococcus aureus		
2			MIC Interp
3	Clindamycin		S
4	Erythromycin		S
5	Oxacillin		S
6	Penicillin		R
7	Rifampin		S
8	Teicoplanin		S
9	Tetracycline		R
10	Trimethoprim/Sulfamethoxazole		S
11	Vancomycin		S

Fig (6) PUS and Tissue culture result

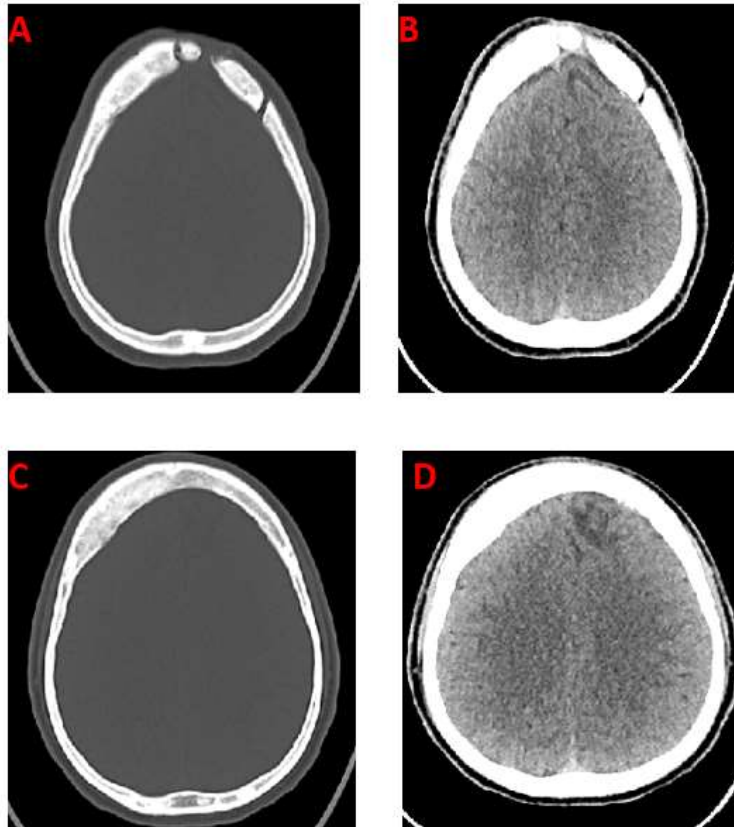


Fig (7) Computed Tomography (CT) showing: Gliotic changes in the left frontal region one year after the initial surgery

Discussion

Brain abscesses can be caused by several different conditions. Only a minority of cases result from direct trauma or neurosurgery. Approximately 40% of cases result from contiguous spread, including direct extension from infections of the paranasal sinuses, middle ear, mastoid cells and teeth.(7)

Late cerebral traumatic abscess is a rare but potentially life-threatening complication that can arise weeks to months after a traumatic brain injury (TBI).

This case report highlights the challenges in diagnosing and managing such abscesses and provides valuable insights into the clinical presentation, imaging findings, and surgical intervention in a 31-year-old male patient with a left frontal abscess following head trauma one year ago.

The delayed presentation of a cerebral traumatic abscess poses diagnostic challenges, as the initial symptoms may resemble other post-TBI complications or unrelated medical conditions. In this case, the patient had been asymptomatic for one year following the traumatic brain injury until the onset of seizures. However, his new episode of symptoms prompted further imaging, which revealed a well-defined hypodense lesion in the left frontal lobe on CT scan, consistent with an abscess. This finding highlights the importance of considering late cerebral traumatic abscess in the differential diagnosis of patients with a history of head trauma who present with neurological deterioration.

Martínez-Pérez I et al. (4) reported that magnetic resonance spectroscopy (MRS) complemented the information provided by MR imaging to achieve a correct diagnosis of brain abscesses and could be added to routine MR examinations with only a small increase in cost and time. In Infection, N-acetyl aspartate (NAA) is absent. Within bacterial abscess cavities, lactate, alanine, cytosolic acid and acetate are elevated. Our case had high lactate.

Early identification of such abscesses is crucial, as they can rapidly progress and lead to severe neurological deficits or even mortality. Therefore, prompt diagnostic evaluation, including CT and MRI, is warranted in patients with a history of head trauma who present with unexplained neurological symptoms.

In his study Muccio CF et al.(5) stat that the differential diagnosis from other brain lesions, such as non-pyogenic abscesses or necrotic tumors (high-grade gliomas and metastases) is often only possible through the use of functional sequences, as the measurement of diffusion with apparent diffusion coefficient (DWI-ADC), proton magnetic resonance spectroscopy ((1)H-MRS) and perfusion weighted imaging (PWI), which complement the morphological sequences and provide essential information on structural, metabolic and hemodynamic characteristics allowing greater neuro-radiological confidence

The surgical management of late cerebral traumatic abscess is essential for better outcomes. (8)(9)(10)

And two methods are used: aspiration and excision. Antibiotics and computed tomographic (CT) scanning play important roles in the surgical treatment of a brain abscess (11)

In this case, a craniotomy was done to excision the abscess. Surgical intervention helps reduce the mass effect, alleviate raised intracranial pressure, and provide material for culture and sensitivity testing to guide appropriate antibiotic therapy.

Cobo F et al. (6) in his systematic review mentioned that Surgical treatment was performed in 48 % of patients and the percentage of patients in whom antibiotic treatment was applied range 88.8% to 100%.

In systematic review and meta-analysis, Brouwer MC et al. (13) report that the most common causative microorganisms were Streptococcus and Staphylococcus species, comprising 2,000 (34%) and 1,076 (18%) of 5,894 cultured bacteria.

Widdrington JD et al. (2) reported that the microbiological diagnosis was confirmed in 86%, with streptococci, staphylococci, and anaerobes most frequently isolated.

The choice of antibiotics should be based on the culture results, as illustrated by the identification of Staphylococcus aureus in this case. The importance of a targeted antibiotic regimen in treating cerebral traumatic abscess has been emphasized in the literature.

Conclusion

This case is very interesting because of late presentation of pyogenic brain abscess, without any systemic infection, but with one single episode of convulsion. Late cerebral traumatic abscess is a rare but serious complication following a traumatic brain injury. This case report underscores the importance of early recognition, benefit of MR spectroscopy diagnostic evaluation, and prompt surgical source control, which made him to respond to total 4 weeks of antibiotics. Targeted antibiotic therapy guided by culture results is essential for successful management. The literature review supports the significance of these strategies in achieving favorable outcomes for patients with late cerebral traumatic abscess.

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