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*Case Report*

# Brain abscess mimicking a brain tumor only realized during surgery: A case report in a resource strained environment

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## ABSTRACT

**Background:** Diagnosis of brain tumors increased in sub-Saharan Africa since the advent of computed tomography (CT)-scans and magnetic resonance imaging (MRI) in these regions, enabling easy diagnosis. However, some histological types of brain tumors can be confusing, especially on CT-scan, simulating other pathologies such as inflammatory granulomas or pyogenic abscesses. MRI, in this instance, with its diffusion-weighted imaging, susceptibility weighted imaging, or perfusion imaging, is important to help with accurate diagnosis. The down side of these imaging facilities, however, is that less and less importance is accorded to proper and detailed history taking. Such a care-free attitude to history taking can be costly, especially in resource strained environments.

**Case Description:** We report the case of a 06-year-old child who presented with seizures associated with headaches and vomiting. In this case, proper history taking following the surgical intervention revealed a history of head trauma after a fall with a scalp wound, which was suppurated but later progressed well. The CT scan showed a solid cystic lesion. The first component is a ring enhanced portion (hyperdense ring with the hypodense center, surrounded by edema) with central calcification located in the frontal region, and the second component is a cystic portion located in the temporal region. This lesion with dual component was more suggestive of a tumoral lesion on imaging than an abscess. The child did not benefit from further imaging due to unavailability in the region as well as the socioeconomic status of the family making them incapable of going elsewhere to do it. A decision to surgically excise the lesion was made, and during surgery, we found a well-circumscribed yellowish lesion associated with an arachnoid cyst. The capsule of the lesion was very thick, and after opening it, the content was pus combined with debris. The child did well on antibiotic therapy post-surgery. The follow-up was unremarkable.

**Conclusion:** Brain MRI is essential to differentiate some pyogenic brain abscesses from tumors. However, meticulous history taking is important to gather as much information as possible about any medical pathology, which would then be corroborated with the physical examination findings and imaging to increase diagnostic accuracy and minimize misdiagnosis.

**Keywords:** Abscess, Brain tumor, Magnetic resonance imaging

## INTRODUCTION

Cancers of the central nervous system represent 1.3% of all cancers (NCI2017). In Africa, the incidence and prevalence of cerebral tumors in the entire continent are difficult to estimate due

to a lack of data.[25] However, cerebral tumors are getting more and more diagnosed in Sub-Saharan Africa since the advent of computed tomography (CT) scans and magnetic resonance imaging (MRI), making the diagnosis easier**.** Nonetheless, certain histological types of tumors can easily be confused for inflammatory granulomas or pyogenic abscesses due to their appearance on a CT scan. In such cases, MRI, with its diffusion sequences, susceptibility-weighted imaging, or perfusion sequences, is essential in supporting or excluding the diagnosis. In our region, the principal differential diagnosis of a cerebral abscess based on CT scan findings remains a glioblastoma, but the presence of a portal of entry such as sinusitis or mastoiditis on the CT scan can sometimes make the diagnosis easier. Diagnosis is, however difficult if no entry portal is found and the clinical picture is not suggestive of an abscess.

We report the case of a child who was planned for craniotomy and tumor (solid-cystic lesion) resection that ended up being an abscess with an associated arachnoid cyst.

## CASE DESCRIPTION

This was a 6-year-old child received for generalized tonic-clonic seizures, with headache and episodes of vomiting. There was no history of fever. Their medical history was remarkable for a fall when he was much younger, which did not motivate them to seek care in a specialized health facility.

On examination, GCS was 15/15 with no motor deficits.

The CT scan showed evidence of a lesion with double-composition (solid-cystic). The solid lesion is round with ring enhancement and a hypodense center but also an area of calcification. The solid lesion was located in the frontal lobe, while the cystic lesion was in the temporal lobe. There was perilesional edema and mass effect on the ventricular system. There was also a small frontal bony defect [Figure 1].

We thought that the lesion was either one lesion or two different lesions. The case was discussed with several neurosurgeons; among them was a pediatric neurosurgeon practicing in South America who thought that it was a single lesion with a nodule. The most likely diagnoses were a neuroectodermal tumor or an anaplastic ependymoma. A decision to excise the lesion was maintained.

With the aid of a manual drill and a Gigli saw, a craniotomy was done using four burr holes which were then connected. Following cortectomy, we saw a well-circumscribed yellowish lesion with a cystic portion. The cystic portion was aspirated to relax the brain. The liquid was clearly concordant with that of an arachnoid cyst. We started dissecting the solid portion, which had a well-defined plane in relation to the cortex. The capsule was very thick, and an attempt to puncture was made which failed. Dissection was then continued until complete excision of the lesion was realized [Figures 2 and 3].

After removing the lesion *en bloc* and due to the appearance of the lesion that was strongly in support of a capsule of an abscess, we opened the capsule and the content was frank pus with some debris. We then took a sample that we sent for microscopy, culture, and sensitivity. We then closed the dura mater, replaced the bone flap, and then closed the different layers of the scalp.

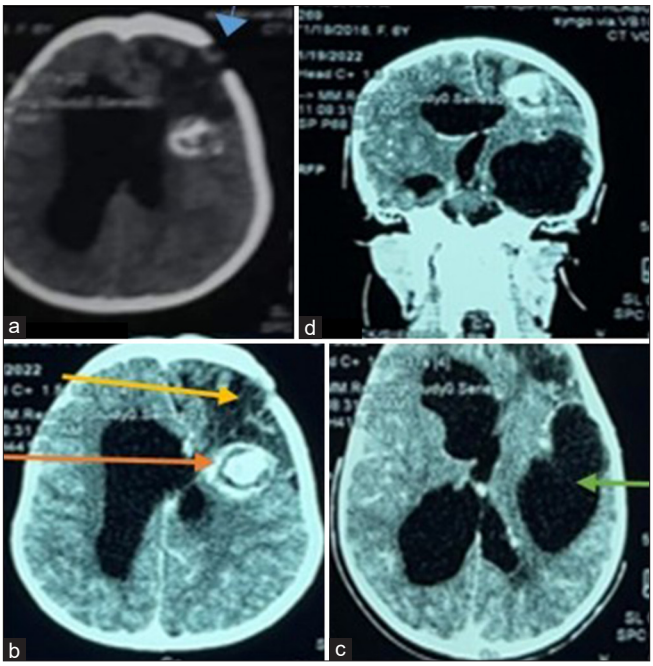


**Figure 1:** Cerebral computed tomography (CT) scan, parenchymal window (a) without contrast and (b-d) with contrast. (a) It is an axial view showing a bony defect (blue arrow). (b) Shows an axial view of a cerebral CT scan showing a round lesion (orange arrow) with ring enhancement, a center with areas of hypodensity as well as hyperdensity (calcification) surrounded by perilesional edema (yellow arrow). (c) It is an axial view but lower than the slices in B, and it shows a cyst in the temporal lobe (green arrow). (d) It is a coronal view showing both lesions.

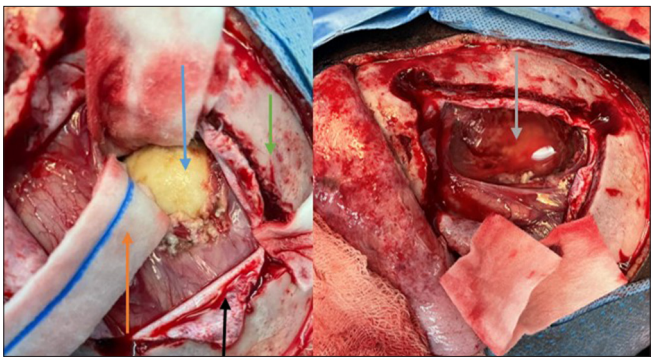

**Figure 2:** Encapsulated yellowish lesion following cortectomy (blue arrow), edge of the bone flap (green arrow), open dura mater (black arrow), cottonoid placed between the normal brain, and the lesion during dissection (orange arrow). The cavity is left behind following complete excision (gray arrow).

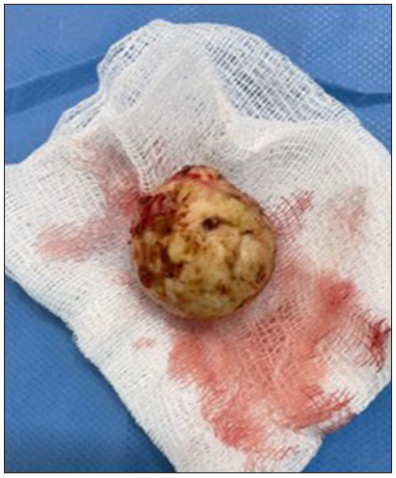

**Figure 3:** Lesion after complete excision.

The child recovered from anesthesia with no deficits. We then requisitioned the mum, and she reported no history of ear discharge, sinusitis, or symptoms suggestive of a cyanotic heart disease; she, however reported a history of a fall when the child was much younger, for which the child was not seen at a specialized center or was any imaging realized. She reported that the child sustained a scalp wound from the fall, which had suppurated but was treated in a health post, and the wound later cicatrized.

Microscopy and culture were negative for bacteria. Broad-spectrum antibiotics, including ceftriaxone and metronidazole, were given over 2 weeks, and the child was then discharged on oral antibiotics with anti-epileptics. He was seen a month after the surgery with good evolution and no symptoms.

## DISCUSSION

This case illustrates once again that pyogenic cerebral abscesses can be confused for cerebral tumors on CT scans. The history of trauma in this patient with a suppurated scalp abscess should have been the cue to make one think of a post traumatic abscess. The latter remains one of the more or less frequent causes of cerebral abscesses.[1,8,15,17] We believe that the head trauma with the scalp wound is the most probable portal of entry for our patient. This underlines the importance of meticulous history taking in each patient, every detail is important. Ones has to give history taking the time it deserves in order to prevent diagnostic errors. Furthermore, the bony defect facing the abscess (on imaging) is suggestive of osteitis or a fracture from the trauma [Figure 1].

The presence of a cyst in association with the lesion made the diagnosis of a cerebral abscess less likely. Such association of a cystic lesion with a solid portion on imaging is suggestive, first and foremost, of a tumoral lesion such as neuroectodermal tumors. Once more, this case shows that every time a round lesion with rim enhancement and central hypodensity is seen on imaging, one needs to consider all the possible differentials such as cerebral metastasis, glial tumors, inflammatory granulomas, radio-necrosis, demyelinating lesion, ischemia, and pyogenic abscesses.[20,22] It is always necessary to rely on both the clinical and paraclinical features to make a diagnosis. This can be a challenge sometimes, like in the case of a patient who benefited from radiotherapy for a cerebral tumor in whom control imaging may suggest a recurrence while the patient is developing a cerebral abscess following the destruction of the blood-brain barrier by the tumor and radiotherapy**.** The incidence of a cerebral abscess, in this case, increases more so, especially if the patient has otitis, mastoiditis, or sinusitis.[4,10,12] In a situation where one is doubtful, an MRI is then necessary to make the most probable diagnosis.

MRI, with its different sequences, helps reduce diagnostic errors by showing the properties of each sequence specific to each pathology. In the case of an abscess, the MRI shows an increased signal on diffusion with restriction on the apparent diffusion coefficient (ADC),[18,19] the susceptibility weighted imaging (SWI) sequence shows a "dual rim sign" specific for pyogenic abscesses.[24] In the case of cerebral tumors, the Spectro sequence shows a peak in choline, which aids in differentiating it from abscesses.[6] Our patient did not do an MRI due to the lack of it in our region. Furthermore, the parents are not financially capable of traveling to another region where an MRI is available, nor do they have the money to pay for the MRI. Such are listed as some of the challenges of neurosurgery in the developing world.[21]

Surgical management of brain abscesses is performed by blind puncture aspiration based on anatomical landmarks or puncture aspiration under stereotaxic or ultrasound guidance or by navigation in countries where it is available.[11,18] Some authors do a craniotomy to excise the abscess, especially in multi-septate or recurring abscesses or if there is the presence of a foreign body.[7,11,15,16] In our context, apart from fairly specific indications such as the existence of a foreign body in the abscess or those that recur, we exceptionally perform an excision by craniotomy, the technique used is puncture aspiration, and this allows us to obtain good results.

In our case report, the hypothesis of a brain tumor in the preoperative period seemed more likely due to the association with a cyst, which motivated a craniotomy for possible excision. Intraoperatively, we encountered a well-encapsulated brain abscess with a thick capsule, which was excised following a failed puncture aspiration. The

evolution was good, and the child benefited from broad-spectrum antibiotic therapy lasting 6 weeks. This duration of antibiotic therapy can be up to 8 weeks, often adapted to the antibiogram if a germ is isolated.[3,8,11,13,14,23] The most common germs are streptococcus, staphylococcus, gram-negative bacilli, and enterobacteria.[2,7,8,15]

Microscopy and culture did not highlight any germ in our patient, this negativity can be explained by the fact that the patient went to other hospitals where they received antibiotic treatment before the surgery. Several authors report negative cultures on brain abscesses; Hirata *et al*. 21% negative culture; Nathoo *et al*. 30%; Dahal *et al*. 34%; Huang *et al*. 46.5%, and others 70%.[2,5,7-9,15]

## CONCLUSION

A thorough history taking is important in order to collect the maximum amount of information in the face of any medical pathology. Brain MRI remains essential in the case of certain abscesses to differentiate them from tumors. The management of abscesses, when well conducted, gives good results.

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