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Case Report

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Meningioma with Intratumoral Abscess: Review of Literature

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Abstract

Intracranial intratumoral abscess formation is a very rare process, most of the previously reported cases are sellar and parasellar lesions where infection directly extends from infected sinuses. Other reported lesions involving intratumoral abscess are metastasis and glioblastoma. Meningiomas are known for their rich blood supply, their proximity to dural venous sinuses increases their propensity to seed by blood-borne metastasis. Numerous cases of metastasis within a meningioma have been reported but infectious pathology is unusual. Bacterial seeding of a meningioma with resultant intratumoral abscess formation is a rare event; here we review reported cases and provide a unique case report of deep-seated intraventricular meningioma associated with intratumoral abscess mimicking necrosis that expands the differential diagnosis of a tumor with central cavitation that clinicians should be cognizant especially in the presence of an external source of infection.

Keywords: Abscess; Intratumoral Abscess; Meningioma; Metastasis

Introduction

Intratumoral abscess is an unusual presentation specifically in intracranial tumors with exception to pituitary and parasellar lesions, where the infection commonly seeds through direct extension from sinuses. Here, we present a rare case of a meningioma with central abscess that was failed to reveal on magnetic resonance spectroscopy.

As meningiomas are in common association with large blood supply from dural arteries and association with venous sinuses, they are more prone to blood borne infiltration. Bacterial seeding of a meningioma associated with intratumoral abscess formation has been reported previously in patients with convexity meningioma but deep-seat intraventricular lesions with intratumoral abscess has not been reported and expands the differential of an enhancing cavitary mass.

Case Report

This 35-year-old woman presented to the emergency department with insidious onset, gradually progressive headache for 3 months along with 2 episodes of vomiting. A Computerized Tomography (CT) scan performed with and without contrast revealed a hyperdense periphery with hypodense center mass lesion in the right lateral ventricle with peripheral enhancement and hyperdensity (Figure 1).

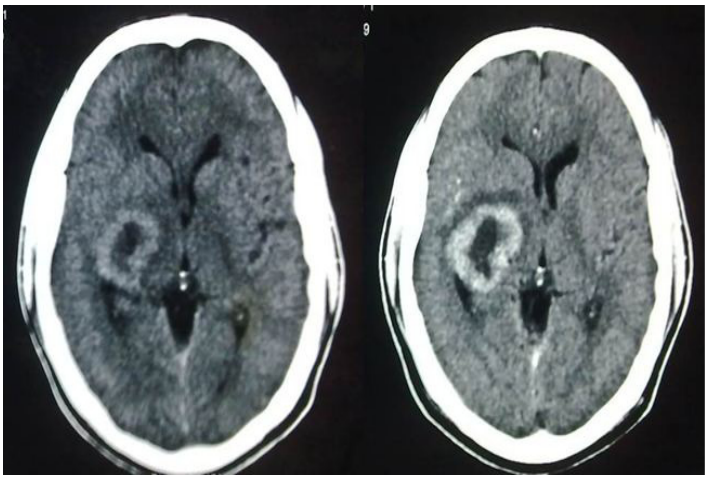

Figure 1: Computerized Tomogram plain and contrast showing hyperdense peripheral solid region which is enhancing with contrast and central non-enhancing region.

A magnetic resonance image with and without contrast showed an enhancing periphery isointense border and nonenhancing central compartment (Figure 2).

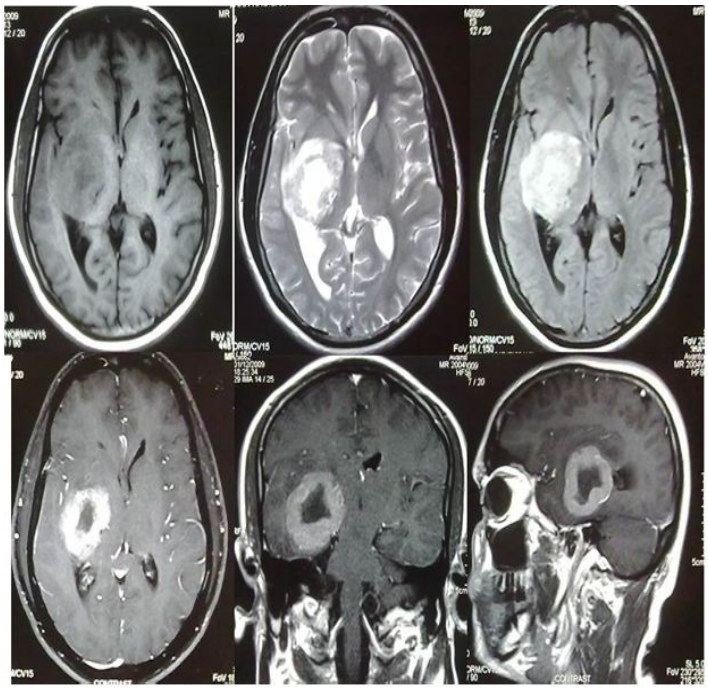

Figure 2: Magnetic Resonance Imaging plain and contrast showing solid enhancing peripheral region with central non-enhancing necrotic portion(abscess)

Magnetic Resonance Spectroscopy (MRS) (Figure 3).

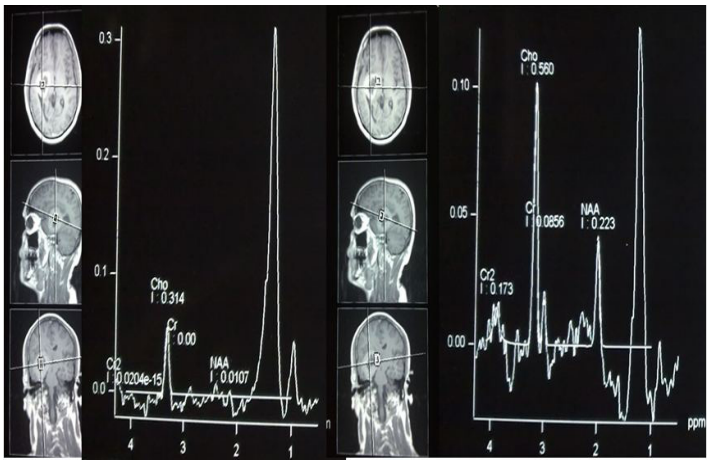

Figure 3: Magnetic resonance spectroscopy showing lacate peak with low Cho/Cr ratio in the nonenhancing region.

Showed elevated lactate peak with reduced Cho/Cr peak in the center of lesion, raised Cho/Cr peaks with elevated lactate peak in the wall of the lesion, suggestive of probability of tumor with necrosis. Laboratory studies included an erythrocyte sedimentation rate and acute phase reactant C-reactive protein was elevated with positive urine culture for Gram negative organism *Proteus mirabilis*. In view of radiological and laboratory findings, tumor with necrosis was included as pre-operative differential diagnosis. The patient was loaded with anti-seizure medications and surgery was done with presumed tumor removal through Right frontotemporoparietal craniotomy. Intraoperatively, we found solid peripheral portion with central cavity of yellowish pus, (Figure 4).

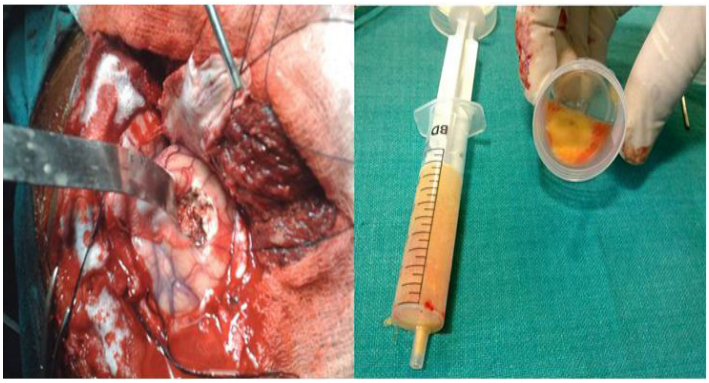

Figure 4: Specimen of abscess showing yellow colored pus and intra op meningioma.

Which we obtained for cultures of bacteria, yeast, and tuberculosis. To our surprise histopathology showed a transitional-type meningioma with central portion of the pus and inflammatory cells (Figure 5).

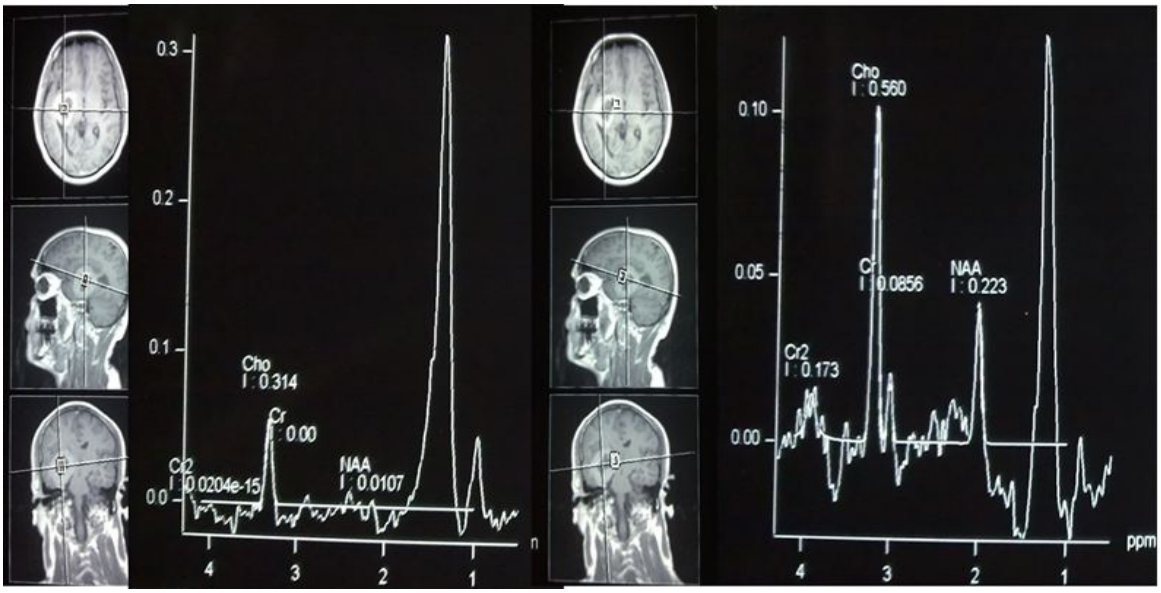

Figure 5: Histopathological exam Meningioma inner border infiltrated with inflammatory cells and Gram smear of Gram negative rods.

The cultures from the intratumoral abscess showed growth of *Proteus mirabilis* which was consistent with urinary tract infection. After the surgery Cefeperazone plus Sulbactum, Amikacin antibiotics were given intravenously for 6 weeks and converted to oral antibiotics for the next 3 weeks. At the end of 2 years patient was doing well with resolution and without deficits.

Discussion

Only few patients with intracranial tumors with tumor associated abscesses have been reported those include pituitary tumors, craniopharyngiomas, meningiomas, astrocytomas, glioblastomas, and ependymoma [1]. The previously reported cases of meningioma with intratumoral abscess are listed in the (Table 1).

Series	Age/sex	Associated conditions	Meningioma type	pathogen	outcome
Shimomura, et al. 1994 [2]	64/F	Prolapsed uterus Sepsis Bacterial meningitis	Transitional Parasagittal	Blood culture: *Bacteroides oralis*. Abscess: gram negative rods	Left hemiparesis
Eisenberg, et al. 1998 [3]	78/F	Urinary tract infection	Transitional parasagittal	Urinary tract: *Proteus mirabilis* Abscess: *Proteus mirabilis*	Deep venous thrombosis with placement of inferior vena cava filter
Nassar, et al. 1997 [4]	35/F	Urinary tract infection	Falcotentorial occipital meningioma	*E. coli*	Favorable
Yeates, et al. 2003 [5]	38/F	Genito-Urinary surgery	Lt Convexity Meningioma	*Bacteroides fragilis*	Favorable
Young, et al. 2005 [6]	38/M	Dental surgery	Right temporal pole meningioma	Group B *Streptococcus, Peptostreptococcus*	Favorable
Lind, et al. 2005 [7]	74/F	Atrial Fibrillation	Lt Parasagittal meningioma	*Citrobacter koseri*	Favorable
Onopchenko, et al. 1999 [8]	63/F	Pyonephrosis Gluteal abscess	Frontotemporal convexity meningioma	*Staphylococcus*	Favorable
Lo WB [9]	70/M	Lithotripsy	Rt Parietal and temporal meningiomas	*E. coli*	Favorable
Krishnan SS [10]	55/F	DJ stent	Lt posterior frontal meningioma	*E. coli*	Favorable

Present case, 2014	35/M	Urinary tract infection	Lateral ventricle transitional meningioma	*Proteus mirabilis*	Doing well at the end of 2 years

Table 1: Previously reported cases in the literature.

[2-10] This is a unique case report, in the sense previously reported cases are within convexity meningiomas where as we report a deep-seated intraventricular lesion Magnetic resonance spectroscopy findings of elevated lactate peak in the abscess with raised alanine peak in the solid portion of the tumor are suggestive of meningioma with abscess formation, but those findings were not seen. Diffusion Weighted Imaging (DWI) with Apparent Diffusion Coefficient (ADC) maps typically would provide better diagnosis of abscess along with spectroscopy, but in our case, the diffusion weighted imaging was not available for review.

Meningiomas have a rich blood supply depending on the location from either the internal or external carotid artery or its branches with drainage to into surrounding dural venous sinuses. The etiology, in our case, leading to the intratumoral abscess formation begins with a transient bacteremia from a urinary tract infection that hematogenously seeded the existing meningioma tumor as a result of its rich blood supply and relationship with the choroid plexus. Intracerebral tumors are more vulnerable to infective embolization due to presence of necrosis, arteriovenous shunts, hematoma, poor oxygenation and disrupted blood brain barrier [1]. Several predisposing factors which make meningioma a favorable site for abscess formation include: Very high tumoral vascularity, lack of blood brain barrier, highly vascular channels may act as filter to retain bacteria, non-branching arterial supply network until it reaches the center of meningioma, absence of immune response, and presence of lipids and glycoproteins which lead to rich nutritive environment [10]. Histopathological features in these lesions include well defined tumour with necrotic centre and a demarcation interface of abscess from tumor. There is perivascular and intratumoural infiltration by polymorphs and microbial colonies; the latter are sufficient enough to be cultured. These criteria are mandatory to establish a diagnosis of purulent tumourn [11]. Common source of the abscess in the setting of tumor are paranasal sinuses, the noncontiguous sources reported in literature are related to genitourinary surgery, dental surgery, septic state and some cardiac-related seeding. [2-9] Causative organisms in the literature are *E. coli, Proteus mirabilis, Staphylococcus, Bacteroides fragilis/oralis, Citrobacter koseri* and Group B *Streptococcus* [2-10].

We propose intratumoral abscess should be considered as one of the differential diagnosis in patients who present with tumors with non-enhancing central cavity with concomitant state of infection and/or source of infection. Treatment should include removal of the tumor with abscess along with both intravenous antibiotics for a period of 6 weeks with the monitoring of inflammatory markers. Most of the patients reported in literature have good prognosis.

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