Meningioma with Intratumoral Abscess: Review of Literature

Mohana Rao Patibandla¹*, Dileep Chowdary Addagada², Gokul Chowdary Addagada³

¹Department of Neurosurgery, University of Virginia, USA
²Katuri Medical College, Guntur, India
³Guntur Medical college, Guntur, India

*Corresponding author: Mohana Rao Patibandla, Department of Neurosurgery, University of Virginia, 725 Denali Way, Apt #202A, Charlottesville, Virginia - 22903, USA. Tel: +12162787670; Email: drpatibandla@gmail.com

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

Magnetic Resonance Spectroscopy (MRS) (Figure 3).

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

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

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

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

Figure 5: Histopathology showing a transitional-type meningioma with central portion of pus and inflammatory cells.
The cultures from the intratumoral abscess showed growth of *Proteus mirabilis* which was consistent with urinary tract infection. After the surgery Cefepimerone 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 (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 | | |
| 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 |
The 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 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 make meningioma a favorable site for abscess formation: 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 intratumoral infiltration by polymorphs and microbial colonies; the latter are sufficient enough to be cultured. These criteria are mandatory to establish a diagnosis of purulent tumour [11].

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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