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Case Report

Meningothelial meningioma of the oculomotor nerve: A case report and review of the literature

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Received : 27 May 2020
Accepted : 01 September 2020
Published : 02 October 2020

DOI
10.25259/SNI_312_2020

Quick Response Code:

ABSTRACT

Background: The origin of meningioma tumors is known as the meningothelial or arachnoid cap cells. The arachnoid granulations or villi are concentrated along with the dural venous sinuses in the cerebral convexity, parasagittally, and sphenoid wing regions. The majority of meningiomas are found in these locations with dural attachment. Infrequently, meningiomas develop without dural attachment but in dural adjacent. There are numerous reports of patients with cranial nerve involvement as a result of the compressive effect of the sinus cavernous or adjacent structures meningioma tumor on the cranial nerve.

Case Description: In this study, we reviewed all reports of patients with third nerve involvement as a result of meningioma tumors in addition to the introduction of a new case. We present a 47-year-old woman presented with headache, diplopia, and ptosis. A gadolinium-enhanced mass on anterolateral of the left cerebral peduncle with no dural attachment was suggesting for Schwannoma at preoperative imaging. An adhesive 10 × 5 × 4 mm meningothelial meningioma arising from the oculomotor nerve was resected.

Conclusion: The findings of this review suggest that there may be other mechanisms as the origin of meningiomas tumors. It is crucial to take into account origination mechanisms of meningioma using ectopic meningiomas due to the increasing prevalence of meningioma.

Keywords: Meningioma, Meningothelial, Oculomotor nerve

INTRODUCTION

Meningiomas are the most common primary brain tumors.[2] Meningioma arises from the arachnoid cap cells of the meninges, shared common location with dura with dural attachment. Infrequently, meningiomas develop in dural distant without dural attachment, including the intraventricular region, the pineal region, and the subcortical region, as ectopic meningiomas,[7] mostly reported at early ages. The primary occurrences of meningiomas without dural attachment, mainly originating from cranial nerves, are rare.

In this report, we present a 47-year-old woman with oculomotor nerve originating meningioma without any dural connection.

CASE REPORT

A 47-year-old woman referred to our center with a history of gradually worsening symptoms of headache, diplopia, and left-sided ptosis (eyelid drooping) for 1 year ago that has progressed intensely during the past 4 months.

Magnetic resonance imagining that performed in another center revealed a localized midbrain lesion and referred to our center 9 months after her initial symptoms.

Examination

The neurological examination revealed left eye hypotropia and ptosis. The medial and upward gaze of the left eye was impaired and deviated slightly out and down in the primary position [Figure 1]. The pupil was unreactive and mildly dilated compare to the right eye. The rest of the physical examinations showed no significant findings.

Imaging

Multiplanar images at different MRI sequences with and without intravenous contrast showed small spherical tumor (10 × 5 × 5 mm) abutting anterolateral of the left cerebral peduncle. The tumor appeared isointense on T1-weighted images, hyperintense on T2-weighted images. Imaging confirmed a gadolinium-enhanced mass with no dural attachment, suggesting for Schwannoma [Figure 2].

Operation

After general anesthesia, lateral subfrontal craniotomy was performed. Dura opened on curly Lina Fashion. The carotid artery was found. By opening the liliequist membrane, the posterior communicating artery was followed to the interpeduncular fossa. Firm dark pink global tumor with a compressive effect on the mesencephalic area appeared. The third nerve ran into the tumor [Figure 3a]. Attempts to separate the tumor from the nerve were seemingly impossible because the tumor was adhesive and appeared to be rising from the oculomotor nerve. Complete paralysis of the third nerve on preoperative examinations indicated neural, and tumor fibers had been intertwined. Therefore, the surgeon considered the complete resection of the tumor as the best option for the patient and the tumor, together with the involved part of the oculomotor nerve, was resected [Figure 3b].

Histology

The histopathological study of the 10 × 5 × 4 mm dark pink mass revealed round to oval centrally located nuclei with dispersed chromatin and eosinophilic cytoplasmic. Lobules of the tumor are separated from each other with collagen sheets and contained whorls and psammoma bodies. Necrosis was not a feature. The final diagnosis was meningothelial meningioma (WHO Grade I).[8]

Postoperative

On postoperative examination, all preoperative signs were found as complete paralysis of the left oculomotor nerve without slight responses and reflexes, which was expected due to the tumor and nerve resection. At a 6-month follow-up, she continued to have diplopia and eyelid drooping. In the brain MRI finding, there was no evidence of recurrence during 1 year follow-up.

DISCUSSION

The origin of meningioma tumors is known as the meningothelial or arachnoid cap cells. The arachnoid villi

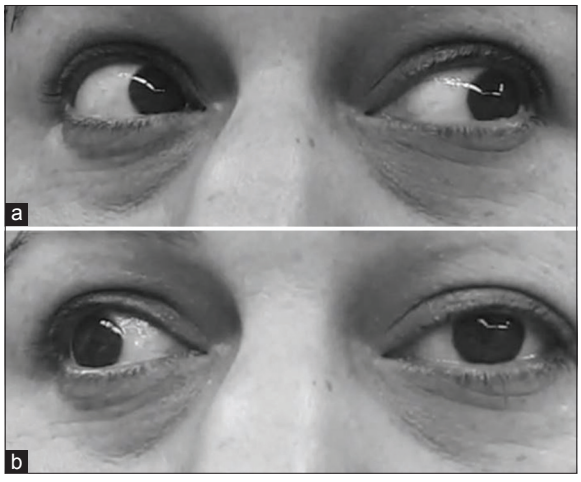

Figure 1: (a) Left gaze (b) Impaired medial gaze of the left eye on right gaze examination.

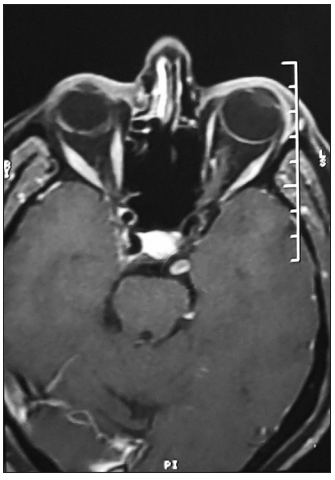

Figure 2: Axial planes of preoperative MRI showing with intravenous contrast showing small spherical tumor (10.5.5 mm) abutting anterolateral of the left cerebral peduncle.

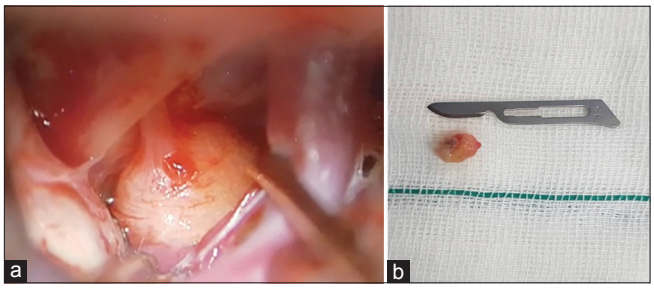

Figure 3: (a) Intraoperative video capture image showing the tumor with the third nerve passing through the tumor. (b) Resected tumor.

have large numbers of arachnoid cap cells.[7] The arachnoid granulations or villi are concentrated along with the dural venous sinuses in the cerebral convexity, parasagittally, and in sphenoid wing regions, and the majority of meningiomas are found in these locations with dural attachment.[1,7] They can also be located in the spinal cord.[3] Occasionally, meningiomas develop in some areas far from the dura.[16] The presence of ectopic arachnoid cap cells distant from the dural mater may account for the rare cases.

There are numerous reports of patients with third nerve involvement as a result of meningioma tumors, but in almost all of them, the compressive effect of the sinus cavernous or adjacent structures meningioma tumor on the oculomotor nerve has caused these symptoms.[5,10-12,15]

In this report, we present a middle-aged woman with oculomotor nerve paralysis. Imaging and examination findings were suggesting for oculomotor schwannoma. Histology of the tumor revealed a meningothelial meningioma tumor.

As our knowledge, there is only one similar case to ours that reported by Hart *et al*.[6] They report a 32-year-old female with a malignant meningioma arising from the oculomotor nerve with a 7-month history of left-sided ptosis and diplopia. Signs and symptoms were similar in both cases. Although the tumor was benign in our case, adhesion of the tumor to the nerve made it impossible to preserve the oculomotor nerve. We identified only three other cases of cranial nerve originate meningioma reported in the literature.[4,6,9] One case with trigeminal nerve and another with accessory nerve origin meningiomas other than Hart *et al.* report.

Mohri *et al*.[9] presented a case with left-sided spinal accessory nerve palsy with an extramedullary tumor at the foramen magnum originating from the spinal accessory nerve. Fujimoto *et al*.[4] reported a 69-year-old woman with a meningioma who presented with a history of progressive facial numbness in the left mandibular nerve and left facial palsy.

All cranial nerve meningioma tumors have been reported in the middle-aged woman and located on the left side. In all three cases, the tumor had caused paralysis symptoms of the involved nerve and had not invaded the surrounding structures. Reported trigeminal and accessory origin tumors were a meningothelial meningioma, like our case.

Fujimoto *et al*. explained the origin of meningioma without dural attachment using the number of mechanisms.[4] Perineural cells resemble arachnoid cells embryologically and functionally and have similar structural features.[13] He hypothesized ectopic arachnoid cap cells within the nerve sheath and the perineural cells as the origin of ectopic meningioma.

Due to the increasing prevalence of meningioma,[14] it is crucial to take into account the origination mechanisms of meningioma using ectopic meningiomas.

CONCLUSION

The findings of this review suggest that there may be other mechanisms as the origin of meningiomas tumors. It is crucial to take into account origination mechanisms of meningioma using ectopic meningiomas due to the increasing prevalence of meningioma.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

Financial support and sponsorship

Publication of this article was made possible by the James I. and Carolyn R. Ausman Educational Foundation.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Buetow M, Buetow P, Smirniotopoulos J. Typical, atypical, and misleading features in meningioma. Radiographics 1991;11:1087-106.
2. Cahill KS, Claus EB. Treatment and survival of patients with nonmalignant intracranial meningioma: Results from the Surveillance, Epidemiology, and end results program of the national cancer institute. Clinical article. J Neurosurg 2011;115:259-67.
3. Duong LM, McCarthy BJ, McLendon RE, Dolecek TA, Kruchko C, Douglas LL, *et al*. Descriptive epidemiology of malignant and nonmalignant primary spinal cord, spinal meninges, and cauda equina tumors, United States, 2004-2007. Cancer 2012;118:4220-7.
4. Fujimoto Y, Kato A, Taniguchi M, Maruno M, Yoshimine T. Meningioma arising from the trigeminal nerve: A case report and literature review. J Neurooncol 2004;68:185-7.
5. Gokce G, Ceylan OM, Altinsoy HI. Recurrent alternating oculomotor nerve palsy: An unusual presentation of

parasagittal meningioma. Neuroophthalmology 2013;37:82-5.
6. Hart AJ, Allibone J, Casey A, Thomas D. Malignant meningioma of the oculomotor nerve without dural attachment. J Neurosurg 1998;88:1104-6.
7. Kunimatsu A, Kunimatsu N, Kamiya K, Katsura M, Mori H, Ohtomo K. Variants of meningiomas: A review of imaging findings and clinical features. Jpn J Radiol 2016;34:459-69.
8. Louis DN, Perry A, Reifenberger G, von Deimling A, Figarella-Branger D, Cavenee WK, *et al*. The 2016 World Health Organization classification of tumors of the central nervous system: A summary. Acta Neuropathol 2016;131:803-20.
9. Mohri M, Yamano J, Saito K, Nakada M. Spinal accessory nerve meningioma at the foramen magnum with medullar compression: A case report and literature review. World Neurosurg 2019;128:158-61.
10. Piatt JH, Campbell GA, Oakes WJ. Papillary meningioma involving the oculomotor nerve in an infant: Case report. J Neurosurg 1986;64:808-12.
11. Shechtman DL, Woods AD, Tyler JA. Pupil sparing incomplete third nerve palsy secondary to a cavernous sinus meningioma: Challenges in management. Clin Exp Optom 2007;90:132-8.
12. Sughrue ME, Rutkowski MJ, Aranda D, Barani IJ, McDermott MW, Parsa AT. Factors affecting outcome following treatment of patients with cavernous sinus meningiomas. J Neurosurg 2010;113:1087-92.
13. Tomaru U, Hasegawa T, Hasegawa F, Kito M, Hirose T, Shimoda T. Primary extracranial meningioma of the foot: A case report. Jpn J Clin Oncol 2000;30:313-7.
14. Wiemels J, Wrensch M, Claus EB. Epidemiology and etiology of meningioma. J Neurooncol 2010;99:307-14.
15. Winterkorn JM, Bruno M. Relative pupil-sparing oculomotor nerve palsy as the presenting sign of posterior fossa meningioma. J Neuroophthalmol 2001;21:207-9.
16. Zhang J, Chi LY, Meng B, Li F, Zhu SG. Meningioma without dural attachment: Case report, classification, and review of the literature. Surg Neurol 2007;67:535-9.

How to cite this article: Sharifi G, Lotfinia M, Omidbeigi M, Asaadi S, Zerehpoosh FB. Meningothelial meningioma of the oculomotor nerve: A case report and review of the literature. Surg Neurol Int 2020;11:314.