Meningioma of the superior leaflet of the velum interpositum: A case report

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Abstract

Background: Meningiomas of the velum interpositum in the roof of the third ventricle are rare. Knowing from which leaflet the meningioma originates and thus its relationships with the internal cerebral and Galen veins, may help in choosing the surgical approach.

Case Description: We report the case of a 40-year-old male with a meningioma arising from the superior leaflet of the velum interpositum. The tumor was resected successfully using the infratentorial-supracerebellar approach. Reviewing the literature, of the 22 reported cases of velum interpositum meningiomas, sufficient information regarding the precise location of the origin of the tumor was provided in 14 cases, all of which were from the inferior leaflet.

Conclusion: We report the first case of velum interpositum meningioma arising from the superior leaflet and give a potential explanation as to why meningiomas of the velum interpositum occur more commonly on the inferior leaflet. Distinguishing from which of the two leaflets the tumor originates may influence the surgical strategy.

Key Words: Meningioma, meningiomas without dural attachment, pineal region, velum interpositum

INTRODUCTION

Meningiomas arising from the velum interpositum (VI) in the roof of the third ventricle are rare. Potentially, they may come from the upper or lower leaflet, displacing the internal cerebral veins accordingly. We describe the first case of a meningioma arising from the superior leaflet of the VI.

CASE REPORT

History and examination
A 40-year-old male consulted in June 2001 for a head trauma following alcohol consumption. His past medical history revealed long-standing alcohol abuse, smoking, and a depressive disorder with anxiety. In addition, he suffered from severe episodic headaches without nausea or vomiting. The neurological examination was entirely normal with good awareness and no focal deficit.

Imagery
The head computed tomography (CT) showed a mild left frontal contusion and a pineal region tumor. A magnetic resonance imaging (MRI) showed an isointense 1.4 cm, well delineated spherical tumor of the pineal region [Figure 1]. The lesion was homogeneously enhanced with gadolinium. There was no associated hydrocephalus and the tumor was not attached to either
the falx cerebri or the tentorium cerebelli. The internal cerebral veins were pushed inferiorly by the lesion. The differential diagnosis at that time included germinoma, ependymoma, and meningioma of the VI.

**Operation**

Even though the relation between the severe intermittent headaches and the tumor was uncertain, given the unknown nature of the lesion, we eventually opted for surgery since the patient was young and the estimated risk was low. The tumor was successfully and completely resected via a supracerebellar infratentorial approach [Figure 2]. Intraoperatively, the tumor was displacing the pineal gland to the left and sat over the right internal cerebral vein, spanning on both sides of it. The tumor was poorly vascularized. The origin of the tumor was found to be in the superior part of the VI.

**Postoperative course**

The postoperative period was uneventful. Postoperative head CT scan and MRI revealed no residual tumor [Figure 3]. The patient was discharged 4 days following surgery with no neurological deficit. The pathological analysis confirmed a World Health Organization (WHO) grade I meningioma. Regular follow-up over 4 years found the patient asymptomatic and MRIs revealed no signs of recurrence.

**DISCUSSION**

Tumors arising from the pineal region represent roughly 1–4% of all intracranial neoplasms.[1,20] The variety of tumors in the pineal region depends on the cells present in that region, whether from the pineal gland itself or from the surrounding structures. Among them are meningiomas, representing 8–10% of all pineal region tumors.[20,29] Since meningiomas originate from the arachnoid’s cap cells, those found in the pineal region can originate from three sites. First, they can arise at the falcotentorial junction, from the arachnoid layer, which tightly follows the dura. These are the most common.[22,23,25] However, some authors do not consider them as being “true” pineal region meningiomas since they do not originate from the region itself, but rather grow toward it.[21,29] Second, they can come from the arachnoid envelope of the gland itself, in which case they do not have a dural attachment. Finally, they can arise from the VI, also without dural attachment.[10,28] The latter two types of meningiomas without dural attachment are very rare and considered to be “true” pineal region meningiomas.

The VI consists of the potential space between the two leaflets of the tela chooroidea, a double layered fold of arachnoid-pia mater in the roof of the third ventricle.[31] Traveling in the VI are the internal cerebral veins and the medial posterior choroidal arteries. The arachnoid inside the tela chooroidea is divided in two layers: A ventral one, which is a direct anterior extension of the arachnoid envelope over the pineal region, and a dorsal one, which envelops the internal cerebral veins.[31]
Although some authors have stated that meningiomas coming from the VI can potentially come from either its superior or inferior leaflet; in our review of the literature, we only found cases of meningiomas arising from the inferior leaflet.

Lozier et al. reviewed all the cases of VI meningiomas up to 2003 and reported a total of 17 cases, including their own, in which there was sufficient reliable information supporting the VI as the origin of the meningiomas.\cite{11} In the current review, one of Lauzier’s rejected case was retained, judging it to provide sufficient information about the origin of the meningioma.\cite{16} Adding cases from the literature since 2003 to the present time\cite{17,18} and one before 2003 not considered by Lozier et al.,\cite{14} we reached a total of 22 cases [Table 1].\cite{3-9,11-19,22-26}

Since the location of the meningioma may have an impact on the surgical approach, in examining these 22 cases of VI meningiomas, we searched for evidence as to whether the meningioma arose from the superior or inferior layer of the VI. In fourteen cases the tumor clearly originated from the inferior leaflet as seen directly during surgery or on imagery where the internal cerebral veins were displaced superiorly. In the remaining eight cases of VI meningiomas, there was insufficient information to determine the location. Therefore, to our knowledge, there is no previously reported case of VI meningioma arising from the superior leaflet. We herein report such a case.

| Authors         | Year | Age (years), sex | Origin (leaflet) | Surgical approach                      |
|-----------------|------|-----------------|-----------------|----------------------------------------|
| Heppner\cite{4} | 1955 | 8, M            | Nonspecified    | Parietal craniotomy                    |
|                 |      | 14, F           | Nonspecified    | Occipital craniotomy                   |
| Sachs et al.\cite{25} | 1962 | 39, F           | Nonspecified    | Suboccipital craniotomy                 |
| Jinai et al.\cite{6} | 1967 | 38, M           | Inferior        | Frontal craniotomy                     |
| Rozario et al.\cite{24} | 1979 | 24, M           | Inferior        | Infratentorial supracerebellar         |
| Ito et al.\cite{8} | 1980 | 40, F           | Inferior        | Parieto-occipital craniotomy           |
| Kamemaya et al.\cite{9} | 1980 | 48, F           | Nonspecified    | Bifrontal craniotomy, transcalfosal    |
| Nakayama et al.\cite{18} | 1980 | 40, M           | Inferior        | Parieto-occipital                      |
| Roda et al.\cite{23} | 1982 | 59, F           | Inferior        | Infratentorial supracerebellar         |
| Piatt et al.\cite{22} | 1983 | 58, M           | Nonspecified    | Occipital craniotomy                   |
| Sakaki et al.\cite{29} | 1984 | 61, M           | Nonspecified    | Occipital craniotomy, transtentorial   |
| Byard et al.\cite{21} | 1989 | 9, F            | Nonspecified    | Transcallosal                          |
| Huang et al.\cite{20} | 1993 | 6, M            | Inferior        | Transcallosal                          |
| Matsuda et al.\cite{14} | 1995 | 34, F           | Inferior        | Occipital interhemispheric and infratentorial supracerebellar |
| Madawi et al.\cite{14} | 1996 | 64, F           | Inferior        | Infratentorial supracerebellar         |
| Mallucci et al.\cite{15} | 1996 | 32, M           | Inferior        | Occipital transtentorial               |
|                 |      | 30, M           | Inferior        | Occipital transtentorial               |
| Lozier et al.\cite{13} | 2003 | 25, M           | Inferior        | Infratentorial supracerebellar         |
| Matushita et al.\cite{17} | 2007 | 5, F            | Inferior        | Suboccipital transtentorial            |
|                 |      | 1, M            | Nonspecified    | Suboccipital transtentorial            |
| Moiyadi et al.\cite{18} | 2013 | 3, F            | Inferior        | Frontal craniotomy, transcortical      |
| Present case    | 2014 | 40, M           | Superior        | Infratentorial supracerebellar         |

M: Male, F: Female

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which, if there are differences between the two, may lead to better anticipate pitfalls during surgical resection.

Many approaches have been described to treat pineal region meningiomas such as the suboccipital transtentorial, supracerebellar infratentorial and posterior interhemispheric approaches.\footnote{1,10,12,13} One important factor in considering the choice of approach is the relationship between the tumor and the deep cerebral veins. Usually meningiomas arising below the internal cerebral veins are approached via a supracerebellar infratentorial approach, while those arising above the major veins are approached via a posterior interhemispheric approach.\footnote{13} However, in our case where the meningioma was above the internal cerebral veins, because of its moderate size, we were able to successfully approach it from below using a supracerebellar infratentorial approach.

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