A Hemangioblastoma in the Pineal Region: Case Report

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OBJECTIVE: Although reported to occur throughout the central nervous system, hemangioblastomas are principally found in the cerebellum and spinal cord. Pineal region tumors comprise approximately 1% of central nervous system neoplasms. A wide variety of tumors can affect this region, the most common being germ cell tumors, gliomas, and pineal cell tumors. In the literature, we found only one case of hemangioblastoma in the pineal region in association with von Hippel-Lindau disease.

CLINICAL PRESENTATION: We describe the case of a patient with a symptomatic hemangioblastoma in the pineal region with no clinical criteria for von Hippel-Lindau disease. The patient had a 1-month history of short-term memory loss, headache, difficulty concentrating and writing, disturbed balance, and loss of bladder function. At the time of physical examination, she was awake, alert, and oriented. An ophthalmoscopic examination revealed nystagmus with conjugate upward gaze and papilledema. Radiological images showed a mass in the pineal region with obstructive hydrocephalus.

INTERVENTION: A lateral suboccipital infratentorial supracerebellar approach was used to remove the tumor, which was attached to the quadrigeminal plate. Histological examination showed the lesion to be a hemangioblastoma. The clinical findings for von Hippel-Lindau disease were negative.

CONCLUSION: The patient's neurological deficits were reversed after surgery. This case emphasizes the importance of the differential diagnosis of hemangioblastomas located in this region. These tumors can be safely removed through surgery.

KEY WORDS: Hemangioblastoma, Pineal region, von Hippel-Lindau disease

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Although reported to occur throughout the central nervous system, hemangioblastomas are found principally in the cerebellum and spinal cord (3, 5). The origin of this tumor is unknown, but it is associated with von Hippel-Lindau (VHL) disease in 20 to 38% of the cases (7, 13). These tumors are benign (World Health Organization Grade I) and do not metastasize (5, 13). Although the risk of spontaneous hemorrhage in these lesions is extremely low, there are reports of significant intraoperative hemorrhage in cases that had not been established preoperatively (3).

A spectrum of tumors can involve the pineal region, the principal one being germ cell tumors. A hemangioblastoma involving the pineal region has been reported in only one patient with VHL disease. To our knowledge, this is the first report of a hemangioblastoma in a patient with no clinical criteria for VHL disease.

CLINICAL PRESENTATION

A 47-year-old woman presented to our clinic with a 1-month history of short-term memory loss, headache, difficulty concentrating and writing, disturbed balance, and loss of bladder function. On physical examination, she was awake, alert, and oriented. An ophthalmoscopic examination revealed nystagmus with conjugate upward gaze (Parinaud's sign) and papilledema. There was no sign of pseudo-Argyll Robertson pupil, and the photomotor and consensual pupillary reflexes were preserved. All other cranial nerve functions were normal. Gadolinium-enhanced, T1-weighted magnetic resonance imaging scans showed a homogeneously enhancing mass (2 × 2 cm) in the pineal region with obstructive hydrocephalus (*Fig. 1*). The tumor was isointense on T1-weighted images. Computed tomographic

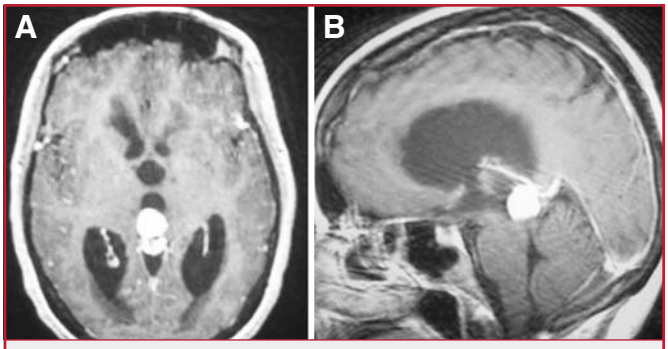

FIGURE 1. *Axial (A) and sagittal (B) gadolinium-enhanced T1-weighted magnetic resonance imaging scans reveal a homogeneous, well-enhanced mass in the pineal region and hydrocephalus.*

scans showed a small calcification within the mass. The serum levels of alfa-fetoprotein (AFP), human chorionic gonadotrophins (HCG), and carcinoembryonic antigen were normal. Because of these findings and the patient's increased intracranial pressure, surgery was considered as the first treatment alternative.

The tumor was completely resected through a lateral suboccipital infratentorial supracerebellar approach with the patient in a sitting position. We approached the tumor laterally on the superior surface of the right hemisphere to preserve the precentral cerebellar veins. The tumor, which arose from the quadrigeminal plate and was separated from the cerebellum by a thick arachnoid layer, was a well-circumscribed, highly vascularized, orange-red mass (*Fig. 2*). We dissected the tumor from the arachnoid layer and removed it *en bloc* after coagulating the small feeding vessels from the medial posterior choroidal artery and the superior cerebellar artery. Histological examination showed large vacuolated stromal cells and a rich capillary network (*Fig. 3*) confirming the intraoperative impression of a hemangioblastoma. The results of immunohistochemical studies were positive for reticulin *(Fig. 3)* and negative for glial fibrillary acid protein, synaptophysin, S-100, and CD57. The patient had an excellent outcome with regression of her hydrocephalus and a normalization of clinical signs, including neuro-ophthalmological findings. Based on this diagnosis, the patient underwent a screening for VHL disease. We performed a pedigree analysis, a 24-hour urine test for catecholamines and metanephrine, a repeated ophthalmologic examination to look for retinal hemangioblastomas, upper abdominal ultrasound, and magnetic resonance imaging of the neuro-axis with gadolinium enhancement. The results of all of these examinations were negative.

FIGURE 2. *Operative view of the tumor in the quadrigeminal cistern depicts the distinguished orange–red color of hemangioblastoma.* Med, *medial;* Post, *posterior;* Sup, *superior;* A, *artery.*

DISCUSSION

A hemangioblastoma is a World Health Organization Grade I tumor of uncertain histogenesis composed of stromal cells and abundant capillaries. It grows slowly and is frequently associated with cysts in the cerebellum or a syrinx in the brain stem or spinal cord. Approximately 25% of all hemangioblas-

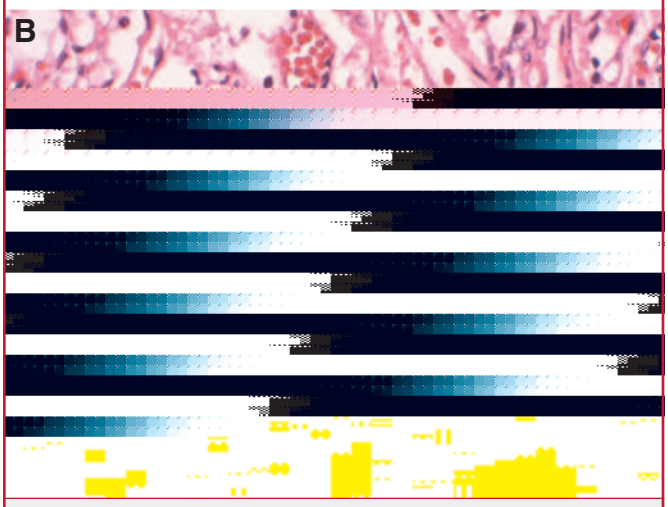

FIGURE 3. *Photomicrographs of the tumor tissue.* **A**, *hematoxylin and eosin staining showing vacuolated stromal cells and a rich capillary network.* **B**, *reticulin stain highlighting the capillary network.*

tomas are associated with VHL disease (1, 2) for which our patient had no clinical evidence (6).

The clinical criteria for VHL disease are described by Melmon and Rosen (6). According to these criteria, a patient with VHL disease must have at least two central nervous system or retinal hemangioblastomas or one hemangioblastoma associated with a renal carcinoma, pheochromocytoma, pancreatic cyst, or papillary cystoadenoma of the epididymis. In the absence of a family history, the presence of only one hemangioblastoma or other manifestation of VHL disease confirms the diagnosis. The mutation for VHL disease is a tumor suppressor gene located on chromosome 3p25 (8, 9, 12). Its presence can be determined through an analysis of peripheral blood. The overall chance of finding VHL germline mutations ranges from 4 to 14% in patients with a single central nervous system hemangioblastoma who do not have clinical criteria for VHL disease (1, 4, 8, 9).

Pineal region tumors comprise approximately 1% of neoplasms in the central nervous system. A wide variety of tumors can affect this region, with the most common being germ cell tumors, gliomas, and pineal cell tumors (11). Magnetic resonance imaging and computed tomography, although powerful diagnostic tools, have low sensitivity and specificity for a differential diagnosis of pineal region masses. The accuracy of the diagnosis increases with the measurement of AFP, HCG, and carcinoembryonic antigen in the serum or cerebrospinal fluid. Choriocarcinoma, a mixed germ cell tumor with choriocarcinomatous elements, or a mixed germ cell tumor with syncytiotrophoblastic giant cells must be considered if the HCG finding is positive. An endodermal sinus tumor or mixed germ cell tumors with elements of an endodermal sinus tumor are positive for AFP. When the HCG and AFP findings are negative, the physician should consider a germinoma, embryonal carcinoma, mature teratoma, immature teratoma, mixed germ cell tumor associated with one of these other tumors, pineocytoma, and pineoblastoma (11).

The principal importance of immunohistochemical evaluation of a hemangioblastoma is to distinguish it from metastatic clear cell renal carcinoma. These two diseases have morphological similarities, but their clinical course and management are totally different. In our case, a full work-up ruled out the presence of renal cell carcinoma.

To our knowledge, this is the first report of a hemangioblastoma in the pineal region in a patient without clinical criteria for VHL disease. Such a tumor has been reported previously in the quadrigeminal cistern in a patient with VHL disease (10). Although hemangioblastomas can occur anywhere throughout the central nervous system, they have a predilection for the cerebellum and spinal cord. Thus, they should be added to the differential diagnosis of tumors in the pineal region and the management and surgical strategy for pineal region masses should be changed. The tumor should be resected *en bloc*, and stereotactic biopsy might show a higher rate of hemorrhagic complications. On the other hand, because this lesion rarely appears in the pineal region, a brightly enhanced mass located there should not be an absolute indication for the use of preoperative angiography. Our diagnosis was confirmed based on the intraoperative appearance of the tumor rather than the preoperative examinations.

CONCLUSION

When radiographic images show a brightly enhanced mass in the pineal region, measurements for HCG, AFP, and carcinoembryonic antigen are negative, and the intraoperative finding is an orange-red mass, the surgeon must consider a hemangioblastoma, and a biopsy or piecemeal surgical removal should be avoided.

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COMMENTS

The authors have described a case of hemangioblastoma in the pineal region successfully removed via suboccipital infratentorial approach. It deals with the signaling of an interesting case because it is the first hemangioblastoma reported that is not associated with von Hippel-Lindau disease developing at this site and, therefore, would not

be expected by the surgeon. The most frequent tumor in the pineal region is the germinoma, and almost all patients with tumors in this area experience hydrocephalus. Consequently, the first steps in the management of these patients tends to consist of third ventricle endoscopy, which permits treatment of hydrocephalus with ventriculocisternostomy, diagnosis of the tumor by biopsy, and possibly even attempting its removal at the same time with a high risk of hemorrhage. Therefore, this case report is potentially very useful in making the surgeon more attentive when choosing the treatment in a tumor that is highly enhancing; whatever the suspicion may be, it would be wise to obtain an angiographic study.

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In this short case report, the authors describe the case of a 47-year-old woman who presented with signs of hydrocephalus and Parinaud's syndrome. A pineal region tumor was removed by the supracerebellar approach after the markers alpha-fetoprotein, β human chorionic gonadotrophin, and carcinoembryonic antigen were found to be negative. Histology revealed a hemangioblastoma, which is very rare in this location. This is a good example of how a pineal region tumor should be managed. The markers for germ cell tumors should always be tested before any surgery is considered. Some may have advocated an endoscopic third ventriculocisternostomy with biopsy of the tumor. In this case, the biopsy may have ended in massive hemorrhage. The hydrocephalus was effectively treated by removing the tumor, which was plugging the aqueduct. En bloc removal is a basic principle in the surgical management of hemangioblastomas, and the surgeon had a "good nose" in suspecting the diagnosis while inspecting the tumor. The lateral supracerebellar approach with the patient in the sitting position allowed the removal of the tumor without having the culmen of the vermis and the precentral cerebellar vein in the way. *Figure 1* in the case report shows that the slope of the straight sinus is very steep, and an occipital transtentorial approach with puncture of the occipital horn to drain cerebrospinal fluid and deflate the occipital lobe in the lateral position may have offered a good alternative.

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This straightforward case report is the first to describe a non-von Hippel-Lindau patient with a hemangioblastoma of the pineal region. The report of this rare tumor emphasizes two important clinical facets of pineal region tumors. The first is that a wide variety of different tumor types can occur in the pineal region. Therefore, obtaining an accurate histological diagnosis is essential for optimizing treatment strategies. The second is that many pineal region tumors are highly vascular and can present a significant bleeding risk if approached with a stereotactic or endoscopic biopsy.

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