Case Report

Posterior clinoid meningioma: A case report with discussion on terminology and surgical approach

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Abstract

**Background:** Posterior clinoid process (PCP) meningiomas are rare lesions. In close proximity to these lesions are the perforators from internal carotid artery and the oculomotor nerve, which need to be considered while deciding the appropriate surgical approach.

**Case Description:** We describe a basal frontotempo-orbito-zygomatic approach with splitting of the sylvian fissure to resect an eccentrically placed PCP meningioma.

**Conclusion:** A basal frontotempo-orbito-zygomatic approach with splitting of the sylvian fissure is a safe approach to resect an eccentrically placed PCP meningioma.

**Key Words:** Basal craniotomy, meningioma, posterior clinoid process

INTRODUCTION

Posterior clinoid process (PCP) meningiomas are extremely rare lesions and comprise about 0.7% of central skull base meningiomas.¹ These tumors are often referred to as “dorsum sellae” or “upper clival” meningiomas.¹⁻⁴ Surgical excision of these tumors is challenging owing to their proximity to important neurovascular structures, including optic chiasm, internal carotid artery (ICA), pituitary stalk, and oculomotor nerve. Various surgical approaches have been described to approach the PCP to minimize complications, and to improve the extent of resection. We describe a case of PCP meningioma, which was excised using a basal frontotempo-orbito-zygomatic (FTOZ) craniotomy and transylvian approach.

CASE REPORT

A 48-year-old female presented with intermittent headache for 3 years and gradually deteriorating vision in both eyes. On examination, patient was conscious, alert, with no sensori-motor deficit. The visual acuity in right eye was 3/60, while in the left eye it was 6/36. She had left homonymous hemianopia. There was no restriction of extra-ocular movements. There was no endocrinological abnormality on evaluation. On noncontrast computed tomography (NCCT) head imaging, a hyperdense lesion was seen in the suprasellar region. On magnetic resonance imaging (MRI) examination, the lesion was hypointense on T1-weighted (T1W), hyperintense on T2-weighted (T2W), with homogenous contrast enhancement, centered over the PCP [Figure 1a-d]. On
MR angiography, the tumor was displacing the right P1 and P2 segments posteriorly and the ICA was displaced anteriorly and laterally [Figure 2a]. The patient underwent a single piece FTOZ craniotomy with wide splitting of the sylvian fissure. The tumor was initially approached through the carotico-optic corridor and was decompressed. The perforators arising from the ICA as well as the posterior communicating and the anterior choroidal artery were draped over the tumor. To avoid manipulation and injury to these perforating vessels, the surgical trajectory was then shifted lateral to the ICA, along the tentorial edge and posterior to the third nerve. A basal FTOZ craniotomy combined with wide sylvian fissure splitting allowed the temporal pole to fall posteriorly and laterally, so that an anterior subtemporal trajectory was available without any temporal lobe retraction. The tumor was therefore accessed from posterior to the perforating vessels. The tumor had a small attachment to the PCP on the right side. Intraoperatively the tumor was grayish, firm, moderately vascular and near total tumor removal with coagulation of its dural attachment was done. Postoperatively, the patient remained stable with partial right third nerve paresis (patient had right ptosis, but no restriction of extra-ocular movements) and was discharged on 10th postoperative day. The histopathological examination of the lesion revealed meningothelial meningioma. Patient on follow-up at 3 months had improvement in ptosis. Postoperative MRI demonstrated complete excision of the lesion [Figure 2b-d].

**DISCUSSION**

**Terminology and incidence**

Various terminologies have been used to describe the tumors, which arise in the region of dorsum sellae, ventral to the brain stem. These include dorsum sellae or upper clival meningiomas, retrosellar meningiomas, and PCP meningiomas.[1-4] Geng et al. further subdivided the dorsum sellae meningiomas into two groups – type 1 (dorsum sellae, inferior third ventricular type) and type 2 (dorsum sellae, third ventricular type), depending upon the site and direction of growth.[2]

Lesions in this region are primarily of two anatomic types:
- Centrally placed meningiomas located between the two PCPs and arising from the dorsum sellae or upper clival region – which should be referred to as dorsum sellae or upper clival meningiomas.
- Eccentrically placed meningiomas centered on the PCP are true PCP meningiomas.

The present case belongs to the second type. The term PCP meningioma should be reserved only for meningiomas that are eccentrically placed and centered over the PCP as in the present case. Meningiomas arising from the PCP can compress the pituitary stalk anteriorly, the oculomotor nerve laterally or infero-laterally and encase the C1-C2 segment of ICA or its perforators and branches.[4]

There are only few anecdotal reports of these types of meningiomas. The tumor described by Nakamura et al. was anteriorly placed, arising from the upper clivus and should be labeled as dorsum sellae or upper clival meningioma.
meningioma. Shukla et al. recently reported a patient as posterior clinoid meningioma, which was eccentric and centered over the PCP. Geng et al. discussed eight cases of dorsum sellae meningiomas (types 1 and 2) but did not mention the exact site of origin. Differentiation between the dorsum sellae/upper clival meningiomas and the PCP meningiomas may have important implications in selecting the surgical approach.

**Surgical approaches**

Various surgical approaches have been described to access the tumors in this region. These include the extradural transcavernous-transsellar approach described by Dolenc, a frontotemporal or pterional approach, presigmoid transpetrosal approach, and a transzygomatic subtemporal approach.

In the frontotemporal and pterional approach, there is direct access to the tumor through the optico-carotid and carotico-oculomotor corridors, but the perforators, which are pushed anteriorly by the tumor, are at risk of injury or vasospasm. A two stage approach, combining retrosigmoid suboccipital corridor to devascularize the tumor, followed by total excision of the tumor by frontotemporal route, has also been described.

The transzygomatic subtemporal approach is anatomically a good technique as it allows the dural attachment of the tumor to be coagulated first, followed by piecemeal tumor excision. However, temporal lobe retraction may be hazardous and occasional venous infarcts have been reported. The transcavernous approach described by Dolenc is also potentially hazardous for the cranial nerves and the ICA.

In the approach described here, a basal FTOZ craniotomy with splitting of the sylvian fissure allowed access through the carotico-optic corridor, and between the carotid artery and the oculomotor nerve, as well as the anterior subtemporal approach. This provided an additional surgical trajectory allowing direct access to the PCP posterior to the perforating vessels without temporal lobe retraction.

**CONCLUSION**

PCP meningiomas are rare lesions. In close proximity to these lesions are the perforators from ICA and the oculomotor nerve, which need to be considered while deciding the appropriate surgical approach. A basal FTOZ approach with splitting of the sylvian fissure is a safe approach to resect an eccentrically placed PCP meningioma.

**REFERENCES**

1. Dolenc VV, Skrap M, Sustersic J, Skrbec M, Morina A, A. Transcavernous-transsellar approach to the basilar tip aneurysms. Br J Neurosurg 1987;1:251-9.
2. Geng SM, Zhang JT, Zhang LW, Wu Z, Wang ZC. Optimal microsurgical treatment of dorsum sellae meningioma. Chin Med J (Engl) 2009;122:1857-61.
3. Nakamura M, Samii M. Surgical management of a meningioma in the retrosellar region. Acta Neurochir (Wien) 2003;145:215-9.
4. Shukla D, Gangadharan J, Kakati A, Devi BI. Posterior clinoid process meningioma. Clin Neurol Neurosurg 2013;115:1517-9.
Commentary

The Authors report a case of meningioma with implant base in the right posterior clinoid process (PCP) successfully treated through a fronto-temporo-orbital-zygomatic (FTOZ) approach.

As the authors claim, the definition of PCP meningiomas refers to lesions eccentrically originating at the level of dorsum sellae; this precision is important because it implies surgical strategies different from the ones requested for centrally located lesions, which are the true dorsum sellae meningiomas (also defined upper clival);[1] also clinical symptomatology appears different for dorsal parasellar lesions with central or lateral implant: Central ones growth superiorly to occupy the interpeduncular cistern and the third ventricle room compressing the chiasm from posterior, while meningiomas with lateral implant on PCP compress the optic pathways from lateral.

The rarity of meningiomas arising from PCP makes it impossible to systematize the possible approaches; however, in this paper the approaches used from other cases in the literature are critically reviewed and the rationale for the choice of the FTOZ craniotomy combined with sylvian fissure opening is very well discussed; the FTOZ approach effectively appears the most useful one when dealing with this kind of tumors, because it allows the better dissection from perforators coming from the posterior wall of the internal carotid artery (ICA) working in the corridor between the artery and the tentorial edge rather than in the optico-carotid corridor (it is noteworthy that the lateral corridor may be further enlarged by sectioning the most proximal portion of the edge of the tentorial notch).

In my opinion the use of endoscopic assistance to microsurgery (EAM) may be extremely helpful in the treatment of these lesions, deeply located in a limited arachnoidal space where critical neurovascular structures are embedded;[2] EAM may allow a better lesional control and dissection and may even allow less invasive approaches; we have reported this technique for the treatment of intracranial lesions,[3] also describing a case, similar to the one presented in this article, in which the use of the endoscope allowed the...

Figure 1: Preoperative (a, b) and postoperative (c, d) axial and sagittal T1 gadolinium enhanced MR scans of the lesion

Figure 2: Microsurgical view of the internal carotid artery (ICA) and tumor (Tu), the 0°-scope (Scope) was initially introduced free hand to expose the 3rd cranial nerve (3cn) located in the depth of the operative field (a). The 3rd cranial nerve was thereafter dissected free from the tumor under direct endoscopic control (with the scope fixed to a holder) until its proximal portion, passing between the superior cerebellar artery (SCA) and the P1 tract of the posterior cerebral artery (rt-P1) (b-d)
resection of the lesion through a pterional approach [Figures 1 and 2].

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REFERENCES

1. Nakamura M, Samii M. Surgical management of a meningioma in the retrosellar region. Acta Neurochir 2003;145:215-9.
2. Schroeder HW, Hickmann AK, Baldauf J. Endoscope-assisted microsurgical resection of skull base meningiomas. Neurosurg Rev 2011;34:441-55.
3. Galzio RJ, Tschabitscher M. Endoscope-assisted microneurosurgery principles, methodology and applications. Germany: Endo: Press Tuttlingen; 2010. p. 10, 23-5.