Tuberculum sellae meningioma (TSM)

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Suprasellar meningioma usually arises from the tuberculum sellae or the sulcus chiasmatis. Due to the close proximity to the optic apparatus, the same may be involved even when the lesions are small.

Tuberculum sellae meningiomas originate in the middle fossa (unlike planum sphenoidale meningiomas which are in the anterior fossa).

They are in a deep and sensitive location, proximity to critical neurovascular elements, hypothalamus with often dense and fibrous nature.

Characteristically lie in a suprasellar subchiasmal midline position, displacing the optic chiasm posteriorly and slightly superiorly, and the optic nerves laterally.

Although tuberculum sellae (TS) and diaphragma sellae meningiomas have different anatomical origins, they are frequently discussed as a single entity.

Epidemiology

They comprise approximately 3%-10% of all intracranial meningiomas.

The coexistence of a pituitary macroadenoma and a tuberculum sellae meningioma is very rare.

Classification

Three distinct anatomical patterns were recognized: exclusively tubercular meningiomas (type A) were accompanied by elongation of the tuberculum-sellar floor interval (TSFI) and, more significantly, of the planum-tuberculum interval (PTI); combined tuberculum sellae (TS) and diaphragma sellae (DS) meningiomas (type B) were associated with relative elongation of both the PTI and TSFI; and the sole exclusively DS meningioma (type C) was associated with elongation of neither PTI nor TSFI.

Suprasellar meningiomas can be classified as tubercular, combined, or diaphragmatic based on preoperative MRI. Exclusively tubercular meningiomas (type A) require only a supradiaphragmatic approach. Tumor involvement of the sellar diaphragm (type B or C) requires resection of the diaphragm and thus a combined infra- and supradiaphragmatic approach.

Clinical Features

Tuberculum sellae meningiomas frequently produce visual loss by direct compression from tumor, constriction of the optic nerve (ON) under the falciform ligament, and/or ON ischemia.
Gradual loss of vision is the most common initial complaint by optic nerve compression, and it has been reported that vascular elements may play a significant role in the mechanism of compression. Levatin was a pioneer in 1961 when he described strangulation of the optic tract by the anterior cerebral artery in a patient harboring a suprasellar tumor.

Renewed visual deterioration after some initial recovery is highly indicative of tumor recurrence.

In case of pressure on the chiasm, bitemporal filed defects may occur, while in prechiasmal involvement, vision in one eye may be more seriously involved than the other.

**Evaluation**

Ophthalmological examination include visual acuity, fundoscopy, and visual field.

From

All patients needs evaluation by CT scanning and MR imaging, with intravenous administration of a contrast agent. The radiological parameters include tumor size, brain-tumor interface, peritumoral edema, arterial encasement, optic canal extension, hyperostosis, etc.

**MR**
Gadolinium-enhanced sagittal and coronal T1 weighted image demonstrating a tuberculum sellae meningioma with suprasellar and sellar involvement.

**Angiography**

Angiographic embolization of tuberculum sellae meningiomas is not routinely performed. The vascular supply tends to derive from small perforating branches from the posterior ethmoidal artery, ophthalmic artery, superior hypophyseal artery, and A1/A2 artery segments. Preoperative angiography can help demonstrate distorted vascular anatomy secondary to tumor mass effect, which usually reveals posterior displacement of the A1 and A2 segments of the ACA in 80% of patients and encasement of the A1 segment in 24%.

**Treatment**

see Tuberculum sellae meningioma treatment.

**Outcome**

During the macrosurgical era, visual improvement varied between 40% and 63%.

The range of improvement rates in microsurgical series is 25%–80%.

In the series of Seol et al., seventy-four of 86 patients (86%) underwent total removal of the tumor. In three of these cases (3.4%), recurrence developed. Thirty patients were classified into the “Excellent” group, 21 into the “Good” group, 20 into the “Fair” group, and 15 into the “Poor” group. In multivariate analysis, adhesion to optic nerve was an independent and significant predictor of clinical outcome. Favorable visual outcomes in both short- and long-term postoperative periods were achieved in 80.8% of cases. Preoperative and short-term visual outcomes were closely related to long-term visual outcome. Six of eight patients with preoperative CF status showed reversibility to a serviceable status after surgery. However, there was no conversion to serviceable status from no perception of light (NPL), to hand movement (HM).
Han et al., hypothesized that changes in visual function after tumor removal may be related to changes in blood supply to the optic nerve that might be seen in the pial circulation at surgery. Indocyanine green (ICG) angiography was used to attempt to document these changes at surgery. The first patient in whom the technique was used had a left-sided, 1.4-cm, tuberculum meningioma. Time-lapse comparison of images was done postsurgery, and the comparison of video images revealed both faster initial filling and earlier complete filling of the ON pial circulation, suggesting improved pial blood flow after surgical decompression. In follow-up the patient had significant improvements in both visual acuity and visual fields function. Intraoperative ICG angiography of the ON can demonstrate measurable changes in pial vascular flow that may be predictive of postoperative visual outcome. The predictive value of this technique during neurosurgical procedures around the optic apparatus warrants further investigation in a larger cohort.

Case series

see Tuberculum sellae meningioma case series.

Videos

The authors present a 64-year-old woman with progressive bilateral vision loss, including visual acuity deficits and bitemporal hemianopsia. MRI revealed a 2-cm tuberculum sellae meningioma causing optic apparatus compression. An extended endoscopic endonasal transtuberculum approach was utilized for gross-total resection, including microdissection of tumor from the optic chiasm and infundibulum. Closure was performed with multilayer tensor fascia lata autograft and a pedicled nasal-septal flap. The patient's postoperative exam showed visual improvement and normal pituitary function. The video can be found here: https://youtu.be/ZfNB_rhlyeI.

A 60-year-old male who presented with bitemporal hemianopia and significant right-side visual acuity compromise due to a large tuberculum sella meningioma. The tumor had an important extension to the posterior fossa. A right orbitozygomatic trans-sylvian approach was deemed most suitable to tackle the posterior extension of the tumor. Some operative nuances are detailed in the video including dissection of the tumor off the carotid artery, basilar bifurcation, and small thalamoperforators attached to the tumor. Postoperatively, the patient's bilateral hemianopia improved significantly, but his right visual activity remained unchanged. The remaining part of the tumor in the sella and midclivus was addressed with a second-stage expanded endoscopic transclival approach. The video can be found here: https://youtu.be/KbewhT2FWs.

Case reports

2017

A 54-year-old otherwise healthy man presented with progressive bitemporal hemianopsia. Magnetic
resonance imaging of the head revealed a large, homogeneously enhancing sellar and suprasellar mass consistent with a meningioma. An endoscopic endonasal transsphenoidal approach was performed to resect the tuberculum sellae meningioma. The patient developed basal bacterial meningitis secondary to a CSF leak, requiring repair on two separate occasions. At the time of both repairs, there was evidence of necrosis of the nasoseptal flaps used for the repairs. Soon after the diagnosis of meningitis, the patient developed bilateral caudate infarcts.

This report discusses the possible underlying etiologies for the bilateral caudate infarcts and necrosed flaps including bacterial meningitis with associated local vasospasm of nearby vessels resulting in infarction. This case emphasizes the importance of concise management of postendoscopic CSF leak and discusses the guidelines regarding antimicrobial therapy and the management of lumbar drains.

A case of primary moyamoya disease coexisting with tuberculum sellae meningioma and left cavernous sinus hemangioma. Simultaneous management of tuberculum sellae meningioma and moyamoya disease was performed using left modified pterional incision. Two separate bone windows were opened to protect transdural anastomosis via the middle meningeal artery. Tuberculum sellae meningioma was successfully removed through a small frontal craniotomy, whereas encephalo-duro- myo-synangiosis (EDMS) was used to treat moyamoya disease through a temporoparietal craniotomy. Finally, CyberKnife radiotherapy was used to treat the left cavernous sinus hemangioma six weeks after operation. The patient recovered well without experiencing any complications. This is the first report of moyamoya disease associated with tuberculum sellae meningioma and cavernous sinus hemangioma.

With careful bone flap design, moyamoya disease and skull base tumors can be treated simultaneously. Cares should be taken to avoid interruption of critical dural-pial collaterals and injury to fragile moyamoya vessels.

7) Margalit N., Kesler A., Ezer H., Freedman S., Ram Z. Tuberculum and diaphragma sella...


