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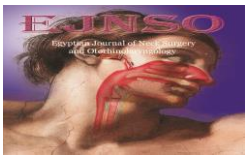

Transsphenoidal endoscopic approach to tuberculum sella meningiomas; our experience

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Abstract:

Objectives*:* Suprasellar meningiomas represent a controversial issue regarding their management. Many transcranial procedures have been described with significant morbidities. Recently, Endoscopic transnasal approaches have become a good and safe substitute for selected tumors. In this series, we presented our experience in the management of suprasellar meningiomas in our tertiary institute via an endoscopic transsphenoidal approach.

Patients and methods: A retrospective study was carried out including patients with suprasellar meningiomas managed in our tertiary institute via endoscopic transsphenoidal approach for three years duration from January 2016 to January 2019. Clinical outcomes, the extent of tumor removal, and perioperative complications were reported.

Results: Seven patients were included in this study. Their ages range from 40–73 (mean 57 years). Six of them were females (~86%). Gross total resection (GTR) was achieved in all patients (100 %). Two of them developed CSF leaks during the postoperative period and were managed conservatively. Three patients developed postoperative diabetes insipidus with complete cure by conservative treatment except in one patient. No mortality, neurovascular injury, or nasal complications were reported.

Conclusions: Endoscopic Transnasal transsphenoidal approach for suprasellar meningioma is a curative and safe alternative as compared to the traditional microscopic approach.

Keywords: Meningioma; Tuberculem sellae; Skull base surgery; Expanded endonasal approach; Endoscopic sinus surgery

Introduction :

Management of suprasellar meningioma is still debatable with many difficulties encountered, despite the great progress in technology including a navigation system and operating microscopy. This is contributed to their proximity to vital neurovascular structures such as the paraclinoidal internal carotid artery, optic nerve, and anterior cerebral artery that might be encased by the tumor tissue. Different transcranial procedures have been described to treat such lesions including bifrontal, unifrontal, pterional, and frontolateral approaches with high morbidity and mortality rates.[1, 2]

Over the last 10 years, the extended transsphenoidal approach comes to be a gold standard for the management of suprasellar meningiomas. This approach

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has provided excellent access to the suprasellar region over the traditional sublabial approach with maximum exposure and better visualization.[3-5]

In this series, we present our experience in the management of suprasellar meningiomas using the endonasal approach.

Patients and Methods:

A retrospective study was carried out by retrieving data for patients with suprasellar meningioma managed in the neurosurgery department, Sohag University in 3 years duration from Jan 2015 to Jan 2018. Written informed consent was obtained from all patients enrolled in this work and approval from the institutional ethical committee was given.

Recurrent and large tumors of more than 3 cm were excluded from our study.

Data included age, gender, surgical details, clinical outcomes, and any complications related to surgery.

All patients underwent full history taking, full neurological examination, and imaging in the form of high-resolution computed tomography (HRCT) and magnetic resonance imaging (MRI) for the brain.

Surgical procedure:

We used the Mayfield headrest to facilitate the moving of the head during surgery while using the endoscope to get the best exposure. The patient's head was extended about 15 degrees from the forehead chin line and turned slightly to the right side. In addition, the patient's head was elevated above the level of the heart to facilitate venous drainage.

A piece of cotton soaked with ephedrine was used to decongest the nasal mucosa. The rigid endoscope (0 and 30 degrees 4 mm in diameter 18 cm length) Brainlab neuronavigation optical Karl Storz system. The operation was performed by a senior neurosurgeon and a senior ENT surgeon.

Surgical technique:

After the removal of the ephedrine pack, we used introduced a 0-degree endoscope into the nasal cavity. Advanced it along the nasal floor until reaching the choana which is identified by the post end of the inferior turbinate laterally, the vomer medially, and the floor of the sphenoid sinus superiorly.

The next step was to identify the natural opening of the sphenoid on both sides sinus by gentle lateral traction of the middle and superior turbinate in the region of the sphenoethmoidal recess.

The mucosa around the ostium was cauterized and widened using the Kerrison rongeur with avoidance of sphenopalatine artery injury (septal branch).

For adequate exposure of the tumor using the Kerrison, we should widen the bone Surgical opening to reach bilaterally the middle clinoid and inferiorly halfway to the sella and superiorly above the level of diaphragm sella. Care should be taken in this step to avoid injury to the important vascular structures (intercavernous sinus and ethmoidal arteries).

Devascularization of the dura with bipolar coagulation above the tumor attachment was done then the dura was opened and piecemeal debulking of the tumor from its center and reflected in its capsule step by step to dissect the tumor.

Repair of the skull base after resection of the tumor was achieved by the use of abdominal fascia and fat as an inlay layer and a pedicled nasoseptal flap was applied and harvested as an onlay layer. Then we putted fibrin glue to support layers for repair. In the recovery, we should a small piece of Telfa for each nostril as an absorbable media for drainage.

Our patients were followed up by periodic regular neurological examinations for one year.

Results :

Our series included 7 patients. Six of them were males (85.7%). Their ages range from 40 to 65 years (mean 51 years).

As regards the patients' presentations, four patients complained of decreased visual acuity (57%), and 3 of our series complained of headache and dizziness (42.8%). In addition, 2 of them (28.5%) had blurred optic disc margins with slight pale disc on fundus examination (**Table 1**).

Table 1; Clinical findings in our series

Clinical Findings	Pre-operative		Post-operative	
	No.	%	No.	%
Decreased Vision	4	57%	0	0.0%
Blurred optic disc	2	28.5%	0	0.0%
Visual field defects	0	0	0	0.0%
Headache	3	42.8%	1	14%
Dizziness	2	28.5%	0	0.0%

Gross total resection was achieved in all cases (100%) (**Fig 1&2, 3**).

Only one patient developed a CSF leak and was managed conservatively by lumbar drain and carbonic anhydrase inhibitor.

Three patients developed postoperative diabetes insipidus. Two of them were cured completely within one week by the use of Miniril spray but one patient developed permanent diabetes insipidus (**Table 2**).

Table 2: Postoperative complications of our series

Complications	No.	%
CSF leak	2	28.5%
Temporary diabetes insipidus	3	42.8%
Permanent diabetes insipidus	1	14%
Sphenoidits & epistaxis	0	0.0%
Death	0	0.0%

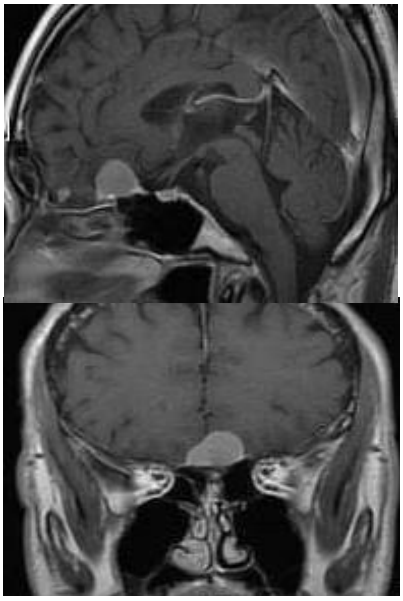

Figure (1). Female patient of 55 years presented with decreased visual acuity associated with headache (Preoperative MRI Sagittal and coronal images showing tuberculum sella meningioma.

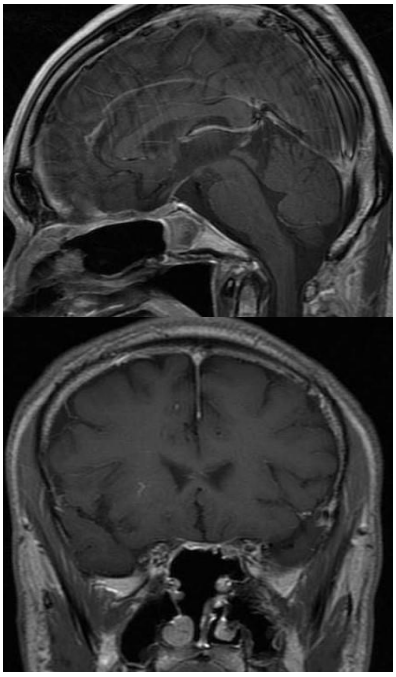

Figure (2) Post-operative MRI sagittal and coronal images showing total excision of tuberculum sella meningioma.

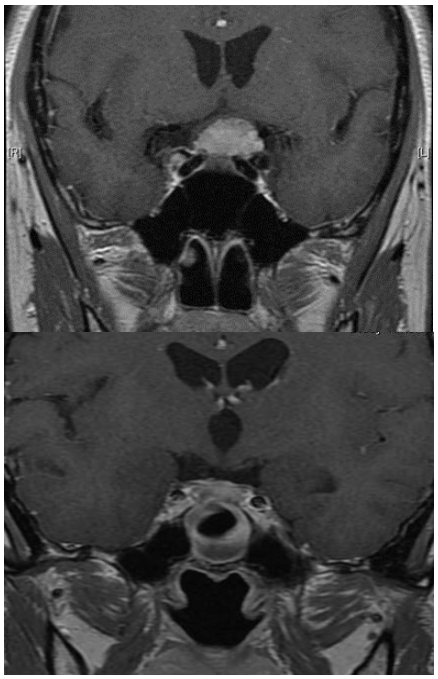

Figure 3: Preoperative and 6 month's postoperative coronal MRI images for tuberculum sellae meningioma in 30 years old female patient

Discussion :

Tuberculum sellae meningiomas represent a great challenge as they usually cause superolateral displacement of the optic nerves and posterior displacement of the optic chiasma. This will lead to visual impairment and visual field defects. The main purpose of surgery is to save vision. Recently, the endoscopic endonasal approach has had the upper hand in manipulating these tumors due to the following advantages over the traditional microscopic approaches and open surgery.[6-8]

A. A No brain retraction and less manipulation of the optic nerve.
B. B Devascularization of the tumor is achieved early through coagulation of its blood supply.
C. C Preservation of hypophyseal vessels adds more protection to vision.
D. D Best cosmetic results due to the absence of surgical scars.

Few disadvantages with the endoscopic approach have been encountered including the longtime of surgery; in addition, intraoperative bleeding may hinder the completion of surgery and total resection of tumor tissue.[9-11]

As regards reconstruction after endoscopic resection, the vascularized septal flap has yielded excellent outcomes with minor complications (nasal crusting and discharge).[12]

In our series, we used the dura gen and fibrin glue for dural closure.

Our series achieved GTR in all cases. We excluded from our series any cases with limitation factors for incomplete resection such as neurovascular encasement or intracanalicular extension. Post-operatively two patients complained of CSF leak and were managed conservatively for three weeks after this CSF stopped without need for intervention.

Post-operative diabetes insipidus has been noticed in 3 patients (42.8%) that respond to medical miniril spray treatment with good observation for 3 weeks one of them didn't respond and continued with permanent diabetes insipidus (14%). In a large series done by M.Koutourousiou et al in 2014 from 75 patients with different suprasellar pathologies after endoscopic resection only 2 cases developed permanent diabetes insipidus.[13]

In our series, we experienced an improvement 100% according to the chart clinical test. Selection of small tuberculum sella meningioma without encasing the optic tract should give an immediate improvement of the visual acuity post-operative (one-month interval).[13]

No deaths, vascular injury, post-operative hypopituitarism, Sphenoiditis, septal perforation, epistaxis, or general complication.

Our results were comparable to other studies with excellent cure rates; however, a larger number of patients

should be included to give more power to our results.

Conclusion:

The endoscopic Transnasal transsphenoidal approach for suprasellar meningioma is a curative and safe alternative as compared to the traditional microscopic approach .

Conflict of interest: The authors declare no competing interests.

Declaration of interest: There are no interests to declare

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