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Technical Notes

Elective inferior temporal lobe resection as an adjunct to subtemporal approach for a case of tentorial meningioma arising from the middle part of the free edge of the tentorium: A case report

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ABSTRACT

Background: Tentorial meningiomas attached to the inner edge of the tentorium are difficult to excise due to their deep location. Sufficient space may not be always available through a subtemporal approach. Thus, the aim of not retracting the brain is not fulfilled.

Methods: To gain surgical corridor, we electively resected the inferior temporal lobe. This helped in greater working space, better visualization, and less chances of venous damage.

Results: Employing this technique of elective temporal lobe resection helped us in complete tumor removal without compromising on vision or surgical corridor.

Conclusion: A limited inferior temporal lobectomy greatly enhances the working space and vision in cases of difficult tentorial meningiomas. This translates into ease of tumor excision without compromising the patient safety.

Keywords: Free edge of tentorium, Inferior temporal lobe resection, Meningioma

INTRODUCTION

Large tentorial meningiomas arising from the free inner edge of the tentorium and compressing the brain stem are difficult to excise completely. The ideal surgical approach should allow early control of vascular supply of the tumor, avoid brain retraction and venous injury, and allow excision without any cranial nerve manipulation and injury.

We discuss here a case of tentorial meningioma arising from the free edge of the tentorium in its middle part which was excised completely through a subtemporal approach with addition of inferior temporal lobectomy.

CASE REPORT

A 50-year-old female presented with history of mild frontal headache, weakness of the left half of body, and numbness of the right side of face for 1 year. On examination, the patient had

grade 4 power in the left upper and lower limb and 50% sensory loss in the distribution of the right 5th nerve. The rest of the neurological examination was unremarkable. Noncontrast computed tomography head [Figure 1a-c] revealed an isointense lesion situated anterolateral to the pons on the right side, behind the clivus. It was abutting the inner edge of the tentorium and extending to the anterosuperior surface of the petrous bone in the region of the Meckel's cave. Magnetic resonance imaging (MRI) brain demonstrated a lesion which was hypodense on T1-weighted images and hyperdense on T2 and showed uniform intense enhancement [Figure 1 d to i and Figure 2]. Anatomically, it was an extra-axial mass in the region of the middle third on the medial or inner edge of the tentorial hiatus, severely compressing the anterolateral aspect of the pons from the right side. The tumor was extending toward the anterior incisural space but did not reach the anterior clinoid process, and the suprasellar cisterns were not involved. The tumor appeared attached to the inner tentorial edge, with the bulk of the tumor present infratentorially, but also extending in the supratentorial compartment across the tentorium into the region of the Meckel's cave and abutting the medial temporal lobe posteriorly. The anterior extent of the tumor was till the posterior part of the cavernous sinus, but the bulk of the tumor was situated posterior to the posterior clinoid processes and behind the clivus. The imaging diagnosis was middle third medial tentorial meningioma.

The tumor was approached initially by extradural subtemporal approach. The bone in the region of Kawase's triangle was drilled, the dura was opened on the inferior medial temporal side and extended into the posterior fossa after ligating the superior petrosal sinus. The tentorium was sectioned. The tumor was firm, not easily suckable, and not even amenable to excision by cavitron ultrasonic surgical aspirator. In the

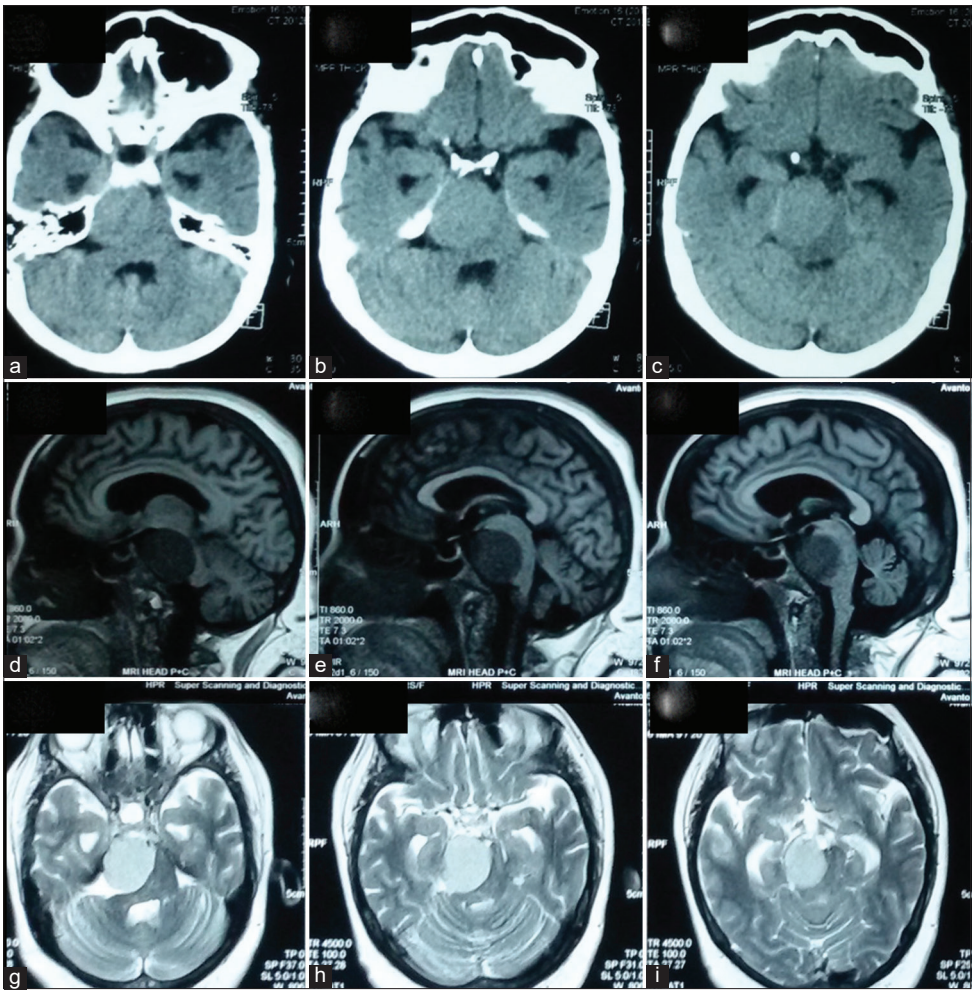

Figure 1: (a-c) Axial noncontrast computed tomography head showing isointense tumor in the right incisural space causing distortion of the brain stem and producing mass effect. (d-f) Magnetic resonance imaging (MRI) T1WI sagittal section showing hypodense tumor anterolateral to the brain stem and posterior to clivus. (g-i) MRI T2WI axial section showing hyperintense tumor in the right incisural space causing distortion of the brain stem and producing mass effect.

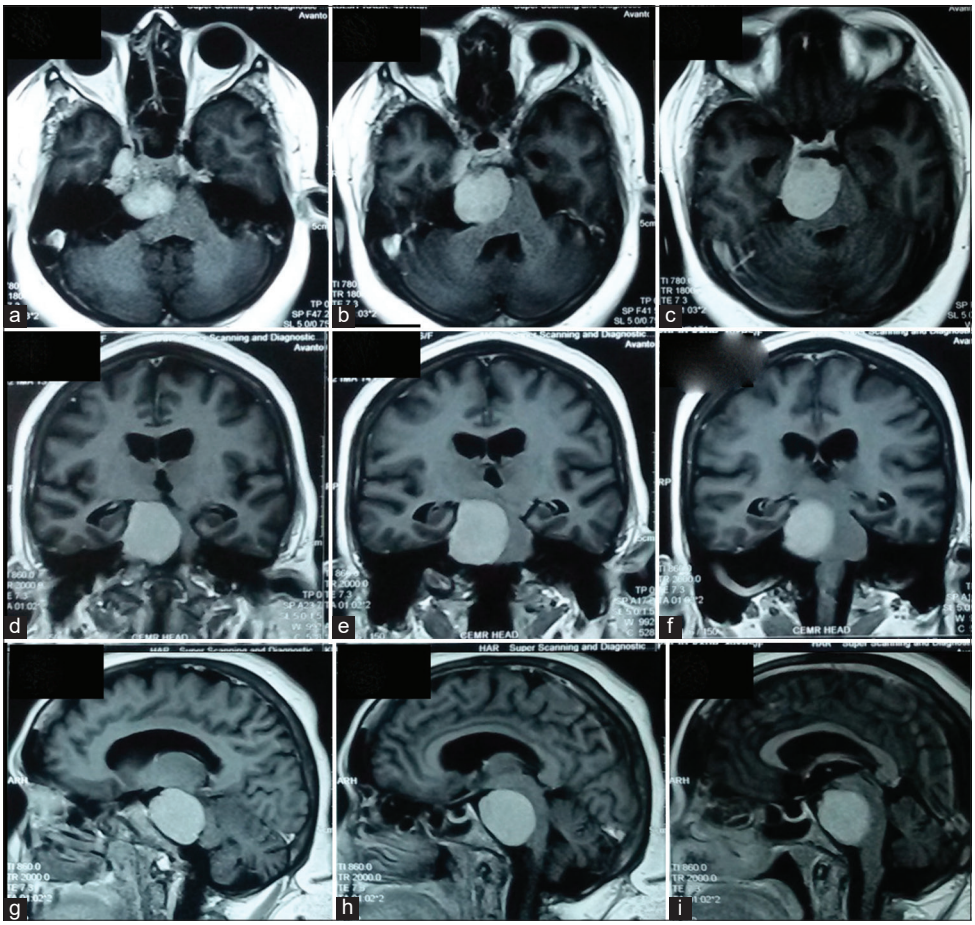

Figure 2: (a-c) Contrast-enhanced magnetic resonance imaging (CEMRI) axial section showing contrast-enhancing lesion in the right incusral space causing mass effect on adjacent structures. (d-f) CEMRI coronal section showing tumor extending in the supra and infratentorial compartment and compressing medial part of temporal lobe and brain stem. (g-i) CEMRI sagittal section showing tumor anterolateral to the brain stem and posterior to clivus.

limited corridor thus available, the excision of tumor became difficult as it involved the retraction of temporal lobe.

To gain space further, the inferior temporal lobe was electively resected. This maneuver remarkably improved the operative corridor and the tumor now could be resected completely without any temporal lobe retraction and without compromise of the vein of Labbe. The tumor was attached to the inner edge of the tentorium and had vascular supply from the tentorial branch of the meningohypophyseal trunk which was encountered and coagulated early in the course of excision. The V3 division of the 5th nerve and the Gasserian ganglion was severely compressed and partly encased by the tumor.

The patient had an uneventful postoperative course. Postoperative MRI brain [Figure 3a-f] showed a complete tumor excision. Histopathology was fibroblastic meningioma, Grade I. Patient's hemiparesis improved completely, but sensory deficit on the right side of the face persisted. The patient had a significant cerebrospinal fluid (CSF) collection under the scalp which gradually subsided spontaneously.

Relevant surgical anatomy

The free inner edge of the tentorium extends from the anterior clinoid process anteriorly to falcotentorial junction on each side. It is attached to the posterior clinoid process, petrous apex, and the anterior clinoid process forming the interclinoid, anterior petroclinoid, and posterior petroclinoid folds.[4] The free edge is related to the third nerve, which pierces the dura of the posterior roof of the cavernous sinus to lie on its lateral wall. The fourth cranial nerve comes in relation to the free edge of the tentorium about 1.5 cm behind the point, where the 3rd nerve pierces the dural folds.[3] After leaving the side of the brain stem, the fourth nerve runs in close relation to the inferior aspect of the tentorial edge for a variable distance before it, too, pierces the posterior superior cavernous sinus dura. The third nerve is usually displaced anterosuperiorly by a tentorial meningioma arising from

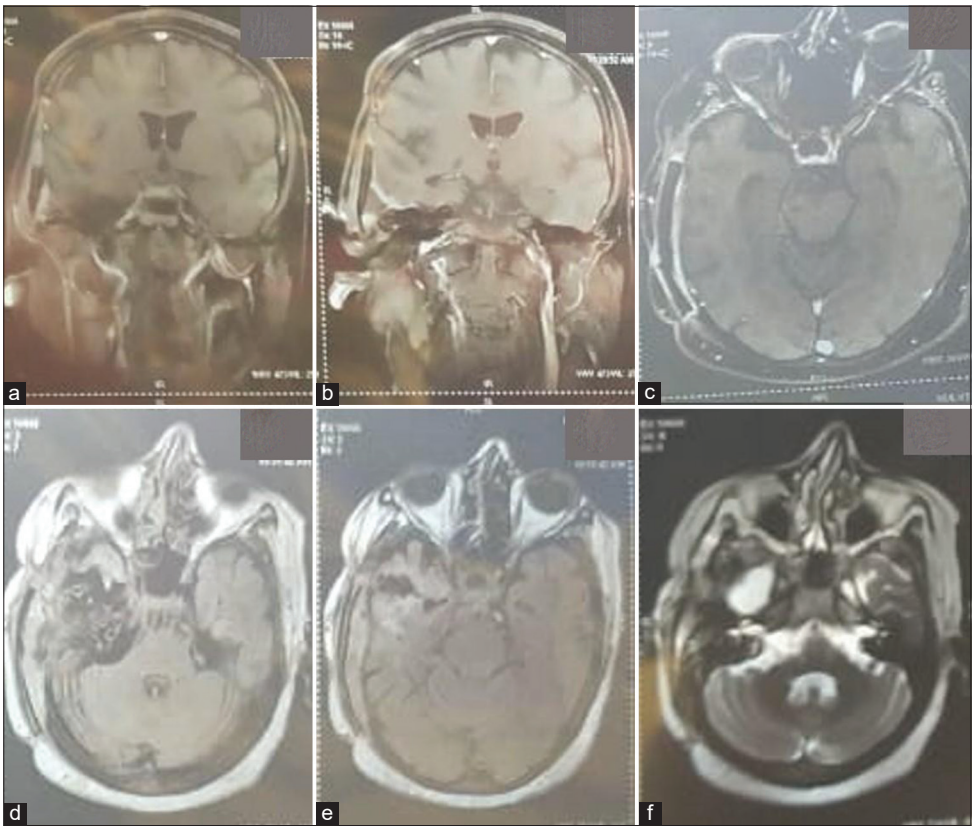

Figure 3: (a and b) Contrast-enhanced magnetic resonance (CEMR) coronal T1WI showing area of encephalomalacia from where temporal lobe was partially excised. No tumor is visible. (c) CEMR axial T1WI showing complete tumor excision. (d and e) MR axial fluid-attenuated inversion recovery image showing area of temporal lobe excision. The surgical corridor is visible. (f) MR axial T2WI showing area of encephalomalacia in temporal lobe and complete tumor excision.

the inner tentorial edge. The fourth nerve may be displaced or occasionally encased in such a meningioma, but its relation to the undersurface of the tentorial edge is usually maintained [Figures 4 and 5].

This knowledge of anatomy is helpful while sectioning the tentorium to gain access to the infratentorial tumor. The tentorium is cut from lateral to medial with the aim to section the tentorial edge posterior to the point where the fourth nerve comes in contact with it. Lateral to medial sectioning, with a continuous vision of the undersurface of the tentorium, is necessary to avoid inadvertent 4th nerve injury. The major vascular supply of the tentorial meningioma is from the tentorial artery. Sectioning and coagulating the tentorium helps to de vascularize the tumor.

The supraclinoid internal carotid artery may come into contact with tumors situated in the anterior incisural space and extending supratentorially. The arteries which are at risk during surgery for meningiomas of the middle tentorial edge are branches from the posterior communicating artery, anterior choroidal artery, and the posterior cerebral artery. The best way to avoid injury to these is not to breach the arachnoid and remain extra-arachnoidal, especially on the

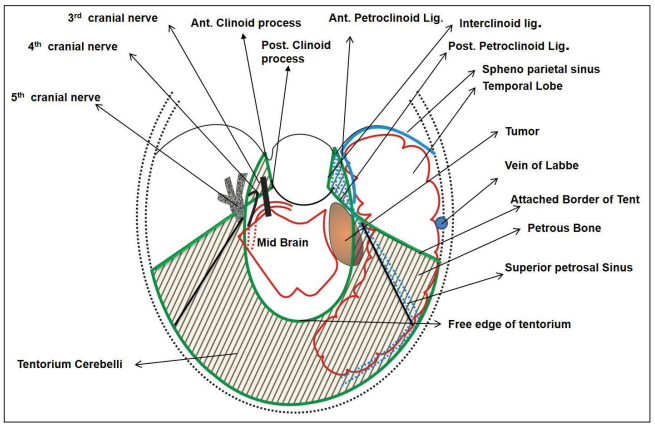

Figure 4: Schematic axial diagram showing the location of tumor and its relation with surrounding structures.

medial aspect of the tumor. The most important venous structure is the vein of Labbe which is likely to be damaged if there is significant subtemporal retraction. The surgeon should also be aware of the venous anatomy of the floor of the middle fossa. Apart from veins from the undersurface of the temporal lobe, there may be large venous sinuses in

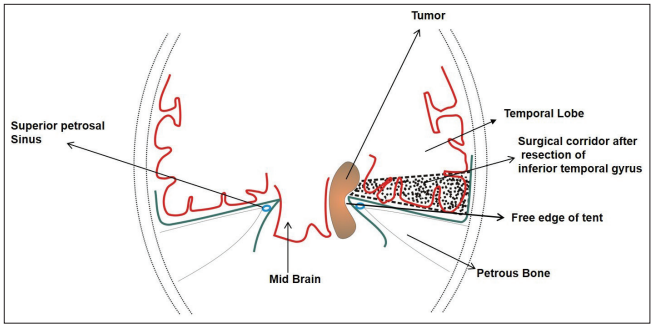

Figure 5: Schematic coronal diagram showing the location of tumor and its relation with surrounding structures and also shown is the surgical corridor available after inferior temporal resection.

the dural leaves of the middle fossa. The cavernous sinus can also be accidentally injured during tentorial sectioning if the incision is too close to petrous apex. Identification of the Gasserian ganglion and the V3 division of the 5th nerve and the superior petrosal sinus is necessary before the tentorial section. The basal vein of Rosenthal lies on the medial aspect of the tumor and is best preserved if the surgeon takes care not to breach the arachnoid.

DISCUSSION

Meningiomas arising from the medial or inner edge of the tentorium and occupying the tentorial incisural space are a surgical challenge. The intended approach is decided taking into consideration the location of meningioma (in relation to anterior, middle, or posterior incisural space), the size of the tumor, and the degree of supra and infratentorial extension.

Yasargil's classification of tentorial meningiomas is the most comprehensive and practical one for deciding the surgical approach. As per that classification, the present case was type 2 tentorial meningioma, that is, anterolateral.[7] The surgical approaches recommended for this location include supracerebellar transtentorial,[1] suboccipital retrosigmoid, presigmoid, and subtemporal. The tumor in our patient was situated anterior to 5th, 7th, and 8th nerves and the first three approaches would have entailed working in-between these nerves and at quite a depth from the surface dura. Moreover, it was compressing the pons from an anterolateral aspect. Tentorial meningiomas occupying the anterior/middle incisural space may be approached by a fronto-orbito-zygomatic craniotomy and a transsylvian transtentorial approach.[2] However, as described above, the major part of the tumor was infratentorial and posterior to the clivus; therefore, this approach was not chosen, as it would have involved extensive splitting of the sylvian fissure, coagulation of the sphenoparietal sinus, and anterior temporal bridging veins as well as significant temporal lobe retraction along with tentorial incision. The initial plan was to use the Kawase approach with a tentorial incision to access the infratentorial tumor, but intraoperatively, we found a limited surgical corridor. Resection of the inferior temporal lobe significantly improved the exposure allowing a total excision and a favorable outcome.

In our opinion, tumors such as the present case should be approached by a subtemporal route. However, in few situations, the exposure is limited in spite of adequate middle cranial fossa base drilling. In addition, tumor may be hard and unsuckable. In these desperate situations, an intradural route with elective partial inferior temporal lobectomy may be employed. The addition of inferior temporal lobectomy avoids temporal lobe retraction and inadvertent injury to the vein of Labbe. Lee *et al*. have described a "trans zygomatic approach with anteriorly limited inferior temporal gyrectomy" for large medial tentorial meningiomas.[6] Hayashi *et al*. added partial mastoidectomy to the subtemporal transtentorial approach for the middle tentorial incisural space.[5] The aim of both these techniques, as well as the one used by us, is to avoid temporal lobe retraction and to avoid injuring the vein of Labbe.

We feel that a limited inferior temporal lobectomy greatly enhances the surgeons view and working space and obviates the need for any additional bony work. This may also have an additional benefit of avoidance of postoperative CSF leak.

CONCLUSION

Large tumors of the middle incisural space in few select cases may be exposed by a subtemporal transtentorial approach with elective partial resection of the inferior temporal lobe, in situations when the operative corridor is found to be restrictive. This may be better than excessive temporal lobe retraction with the consequent risk of venous injury.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Ansari SF, Young RL, Bohnstedt BN, Cohen-Gadol AA. The extended supracerebellar transtentorial approach for resection of medial tentorial meningiomas. Surg Neurol Int 2014;5:35.
2. Gupta SK. Trans-sylvian transtentorial approach for skull base lesions extending from the middle fossa to the upper petro-

clival region. Br J Neurosurg 2009;23:287-92.
3. Gupta T, Gupta SK, Sahni D. Anatomy of the tentorial segment of the trochlear nerve in reference to its preservation during surgery for skull base lesions. Surg Radiol Anat 2014;36:967-71.
4. Hashemi M, Schick U, Hassler W, Hefti M. Tentorial meningiomas with special aspect to the tentorial fold: Management, surgical technique, and outcome. Acta Neurochir (Wien) 2010;152:827-34.
5. Hayashi N, Kurimoto M, Nagai S, Sato H, Hori S, Endo S. Tentorial incision in a lateral-medial direction with minimal retraction of the temporal lobe in the subtemporal transtentorial approach to the middle tentorial incisural space. Minim Invasive Neurosurg 2008;51:340-4.
6. Lee EJ, Park ES, Cho YH, Hong SH, Kim JH, Kim CJ. Transzygomatic approach with anteriorly limited inferior temporal gyrectomy for large medial tentorial meningiomas. Acta Neurochir (Wien) 2015;157:1747-55.
7. Shukla D, Behari S, Jaiswal AK, Banerji D, Tyagi I, Jain VK. Tentorial meningiomas: Operative nuances and perioperative management dilemmas. Acta Neurochir (Wien) 2009;151:1037-51.

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