

## Case Report:

# Endoscopic Transsphenoidal Fenestration of a Medial Temporal Arachnoid Cyst With Extension to Sphenoid Sinus in a Patient With Temporal Lobe Epilepsy



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## ABSTRACT

**Background and Importance:** Arachnoid cysts are developmental cystic lesions which may be found as an incidental finding on neuroimaging or present with symptoms of headache, seizure and neurologic deficit. Presentation with seizure is more common with larger sizes and temporal location. Presentation with Temporal Lobe Epilepsy (TLE) is rare, and fenestration of cysts has variable results for seizure control. We reported controlling TLE symptoms following endoscopic transsphenoidal fenestration of an arachnoid cyst. The anteromedial location in middle fossa, extension toward sphenoid sinus and normal appearance of mesial temporal structures on MRI encouraged us to consider this surgical approach.

**Case Presentation:** A 26-year-old patient with a 13-year history of TLE with uncontrolled symptoms despite taking a combination of AEDs (LTG, CBZ, LEV, CLB) was referred to our clinic. Neuroimaging revealed an arachnoid cyst in anteromedial part of temporal fossa which extended to sphenoid sinus, but showed no abnormality in mesial temporal structures. Endoscopic endonasal transsphenoidal fenestration of the arachnoid cyst was performed, and followed by reconstruction of the skull base. The procedure improved the seizure control during the 9-month follow-up and no sign of radiologic recurrence was observed.

**Conclusion:** Transsphenoidal endoscopic fenestration is a safe and feasible surgical approach for treatment of symptomatic arachnoid cysts in anteromedial part of middle fossa especially when they extend toward lateral wall of sphenoid sinus. This surgical corridor has the privilege of avoiding cortical injury accompanied by transcranial approaches, which is deleterious in epileptic patients.

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## Highlights

- Mesial temporal Arachnoid cysts may rarely present with TLE.
- Transsphenoidal approach for fenestration of a mesial temporal arachnoid cyst is safely performed.
- Skull base reconstruction by the ENT surgeon following the fenestrations is mandatory to avoid CSF leakage.
- Transsphenoidal approach leaves the temporal cortex untouched and avoids the little, but considerable chance of iatrogenic foci for seizures.

## Plain Language Summary

Arachnoid cysts are among the most common cystic lesions in central nervous system. They are commonly found as an incidental finding on brain imaging and most of them are asymptomatic and do not need surgical intervention. However, larger cysts and those located in certain parts of the brain may produce symptoms and require surgical intervention. Shunting, neuroendoscopy and microsurgery are the three commonest surgical modalities performed for treatment of symptomatic arachnoid cyst. Here in, we present a young male with temporal lobe epilepsy who was found to harbor a mesial temporal arachnoid cyst. The proximity to lateral walls of sphenoid sinus and the bony impression made by the mass effect of the cyst, led us to perform a transsphenoidal approach through the nose for fenestration of the cyst. To avoid the leakage of cerebrospinal fluid, we took advantage of the help of an experienced ENT surgeon for reconstruction of skull base. The patient's epilepsy was controlled successfully following the operation and he stayed seizure-free during the 2 years of follow up.

### 1. Background and Importance

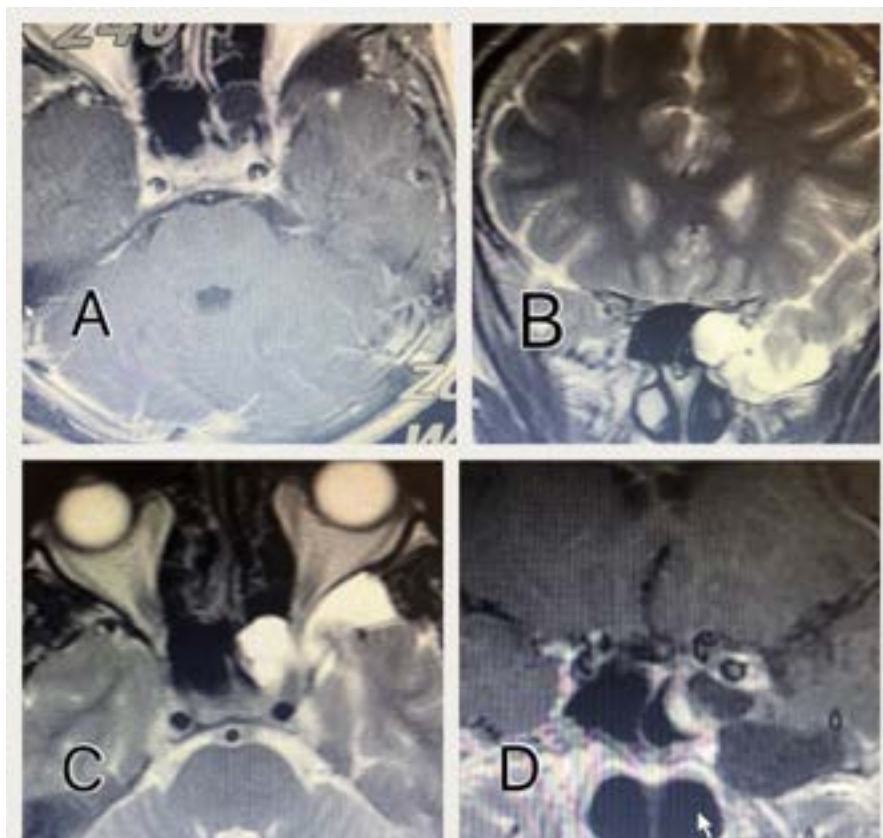
**T**emporal Lobe Epilepsy (TLE) is the most common form of drug-resistant focal epilepsy. Current understanding of TLE supports the hypothesis of impairment of inhibitory action of basket cells following an insult in a critical brain development period, which is rapidly distributed toward other regions via kindling phenomenon [1, 2]. Several pathologies have been associated with TLE including Mesial Temporal Sclerosis (MTS), developmental malformations, vascular malformations, neoplastic lesions and scars caused by infarctions and infective processes [3]. Arachnoid cysts have been reported in as many as 10% of patients with TLE, and their presence is secondary to abnormal development of temporal lobe in most instances [4].

Fenestration of temporal arachnoid cysts have been associated with variable results for seizure control in patients with TLE, according to major differences in cases included. Those with hippocampal sclerosis had suboptimal improvement with standalone arachnoid cyst fenestration and will have to undergo selective amygdalo-hippocampectomy for optimal seizure control.

Herein, we are reporting a 26-year-old man with a 13-year history of TLE. His seizures were successfully controlled with endoscopic transsphenoidal fenestration of an anteromedial temporal arachnoid cyst that had extended to sphenoid sinus and pterygopalatine fossa. The normal appearance of mesial temporal structures on pre-operative MRI and extension to sphenoid sinus encouraged us to consider this surgical approach in this very patient.

### 2. Case Presentation

A 26-year-old healthy male was referred by an epileptologist with a 13-year history of seizures which occurred on a monthly basis despite taking several Anti-Epileptic Drugs (AEDs) (LTG, CBZ, LEV, CLB). His ictus consisted of olfactory and visual hallucinations, and de ja vu with loss of consciousness for 2-3 minutes, but without tonic and clonic phases. The diagnosis was confirmed to be TLE. His drug history included lamotrigine 200 mg daily, imipramine 100 mg daily, alprazolam 0.5 mg at bedtime and trifluoperazine 4 mg daily. His family history was unremarkable for seizures or any other neurological disorders. Brain MRI revealed a left medial temporal cystic lesion, hypointense on T1- and hyperintense on T2- weighted images, respectively which had extended inferiorly to pterygopalatine fossa through



**Figure 1.** Pre-operative MR images showing a cystic lesion at the anteromedial part of left temporal fossa, with extension to left sphenoid sinus

A. Axial Gadolinium enhanced T1W; B. Coronal T2W; C. axial T2W; D. Gadolinium-enhanced Coronal T1W

temporal fossa floor and also medially bulging into sphenoid sinus through its lateral wall (Figure 1).

### Surgical procedure

The cystic lesion was approached endoscopically through transsphenoidal route. After visualizing via a binostril exposure of the sphenoid sinus, the bulged area in the lateral wall of sphenoid sinus was seen. During removal of the eroded thin wall by curettes, the thinned cyst wall was ruptured followed by an abrupt flow of Cerebrospinal Fluid (CSF). After suctioning the fluid, a fat plug was inserted within the opening in cyst wall, and the closure was reinforced with fibrin glue sealants and middle turbinate vascularized flap [5]. Nasal pack was performed with tetracycline ointment 3% soaked mesh.

### Pathology

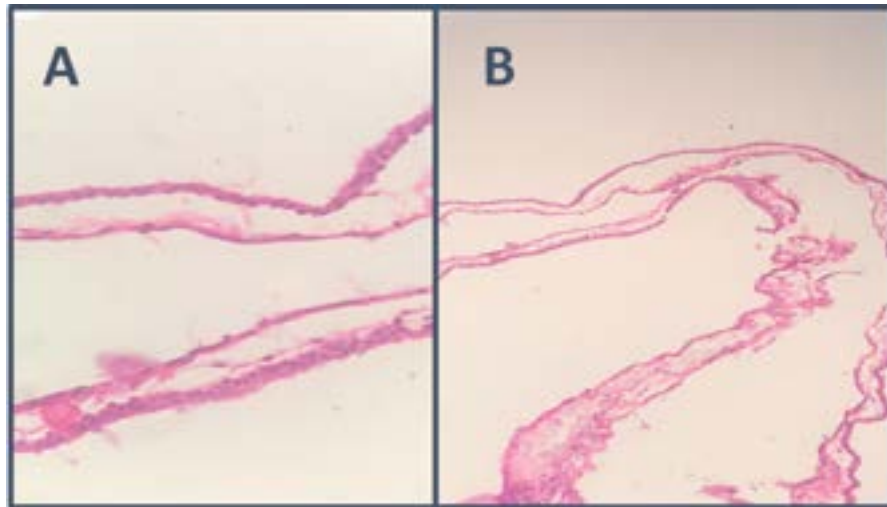
The hematoxylin and eosin stained slides confirmed the diagnosis of arachnoid cyst (Figure 2).

### Follow-up

During post-operative course, the nasal pack was removed the next day and the patient was discharged on the second post-operative day. The skull base closure was satisfactory and he did not develop CSF leakage. After a 9-month follow-up, the patient's seizures were controlled with the previous medications, and post-operative MRI confirmed that the cyst had not recurred (Figure 3).

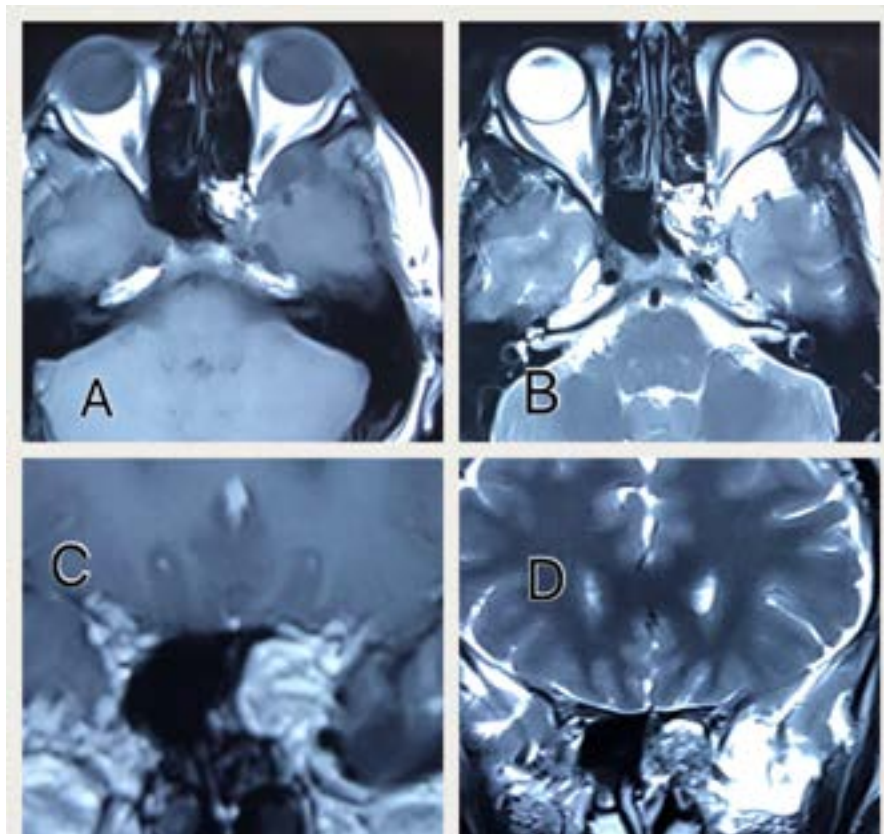
### 3. Discussion

Arachnoid cysts are CSF-filled cystic lesions which can present as an incidental neurologic finding, or headache, seizure and neurological deficits according to their size and location. Temporal fossa, which is the most common site for arachnoid cysts, is the most common location that presents with seizures. According to hospital-based cohort studies, the odds for harboring arachnoid cysts in patients with focal epilepsy is five times of their



**Figure 2.** Histopathology evaluation of the mass, Microscopic section shows a multilocular cystic lesion lined with flat cuboidal cells with scanty stroma in its wall.

A. Hematoxylin and Eosin, X400; B. H&E, X40



**Figure 3.** Post-operative MR images showing resolution of temporal cystic lesion and reconstruction of the skull base with autologous fat tissue fragments

A. Axial T1W; B. Axial T2W; C. Gadolinium enhanced coronal T1W; D. Coronal T2W

healthy counterparts, which is probably due to shared etiological ancestry rather than a causative association.

The source of epilepsy in patients with temporal arachnoid cysts is a matter of debate; whether it is due to intrinsic malformations and hippocampal dysgenesis or mass effect of the adjacent arachnoid cysts. Variable results have been reported regarding control of seizure after fenestration of temporal arachnoid cysts, with better results seen in those whose MRI does not show abnormal signal intensities in mesial temporal structures.

Herein we presented a patient with temporal lobe epilepsy who was found to have an arachnoid cyst at the anteromedial part of his middle cranial fossa. This case is unique regarding two distinctive features; the first one: presentation with TLE. Seizures are reported to accompany temporal arachnoid cyst, probably due to developmental malformation and hypogenesis [6] or compression on adjacent brain tissue. However, his seizure symptoms of TLE (olfactory and visual hallucinations and de ja vu) were not previously reported in the literature.

The second distinguished feature is the surgical approach; endoscopic transnasal transsphenoidal approach can be considered in resection of variable pathologies within the sphenoid sinus [7]. We used this approach for fenestration of the cyst, which controlled TLE attacks during the 9-month follow-up period.

A few instances of temporal lobe arachnoid cysts with extension to sphenoid sinus have been reported in the neurosurgical and otolaryngology literature. In a recently published article titled: "Enlarging Temporal Arachnoid Cyst Extending Inside the Sphenoid Sinus" by Corona-Ruiz JM et al. [8], a 71-year-old lady presented with headache and was diagnosed to have a huge temporal arachnoid cyst. Her cyst had extension toward sphenoid sinus and erosion of temporal fossa floor, so, craniotomy was performed for resection of the arachnoid cyst and reconstruction of skull base.

Previous reports by Couvreur et al. [9] have shown the efficacy of endoscopic technology through fenestration of cysts via transcranial neuroendoscopy. They claimed seizure control in a third of patients with TLE. However, to our knowledge, endoscope has not been used in any reports from a transsphenoidal corridor for fenestration of the temporal arachnoid cysts. We believe this approach should be considered in patients presenting with lesions in anteromedial part of middle fossa extending to sphenoid sinus or eroding its lateral wall.

Theoretically, this approach avoids the cortical damage induced by craniotomy and transcranial neuroendoscopy, which have the potential of inducing seizure activity. Despite the mentioned benefits of transsphenoidal endoscopic fenestration for such selected patients, this approach has some drawbacks; i.e., the risk of post-operative Cerebrospinal Fluid (CSF) leakage, which can be minimized by a teamwork between otolaryngologists and neurosurgeons for reconstruction of skull base.

A report by Bovenzi CD et al. [10] describing the endoscopic transsphenoidal approach for fenestration of a symptomatic petrous apex arachnoid cyst, confirms that this surgical approach can be considered a safe corridor for fenestration of sellar, suprasellar, retrosellar and parasellar arachnoid cysts in selected individuals [10].

#### 4. Conclusion

Transsphenoidal endoscopic fenestration is a safe and feasible surgical approach for treatment of symptomatic arachnoid cysts in anteromedial part of middle fossa, when they erode the lateral wall of sphenoid sinus or have an intrasphenoidal extension. Despite the need for skull base reconstruction to prevent post-operative CSF leakage, this approach has the privilege of avoiding cortical damage accompanied by craniotomy and transcranial endoscopic procedures.

#### Ethical Considerations

##### Compliance with ethical guidelines

The Patient and his family gave informed consent about anonymous use of his surgical intervention, clinical data and MR images for purpose of publishing a research article. Written informed consent was signed by the patient and would be available to editorial office upon request.

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##### Authors contributions

Patient's operation: Arash Saffarian; Surgical intervention and initial draft preparation: Nima Derakhshan and Mousa Taghipour; Contributing in final stages of surgery: Mohammad Faramarzi; Confirming the diagnosis of Temporal Lobe Epilepsy and referred the patient to the clinic: Ali Akbar Asa-

dipooya; Confirming the pathologic diagnosis: Amirreza Dehghanian. Writing – review & editing: Keyvan Eghbal.

#### Conflict of interest

The authors declared no conflict of interest.

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