

## A Rare Case of Spontaneous CSF Rhinorrhea from Lateral Recess of Sphenoid Sinus Which Was Repaired By Endoscopic Trans-Nasal Trans-Pterygoid Approach.

Dr.Lukka Vijay Kumar<sup>1</sup>, Dr.Avinash Nalluri<sup>2</sup>

1.Department of ENT, NRI medical college and general hospital, Chinakakani, Andhra Pradesh, India.

1.Department of ENT, NRI medical college and general hospital, Chinakakani, Andhra Pradesh, India.

Corresponding Author: Dr.Lukka Vijay Kumar

---

**Abstract:** Spontaneous cerebrospinal fluid leaks with meningoencephaloceles restricted to the sphenoid sinus are rare clinical findings. Patients presenting with this special clinical entity usually do not have any history of trauma, tumour or iatrogenic injury. Persistent Sternberg's canal, extensively pneumatized sphenoid sinuses, elevated intracranial pressure and obesity are believed as possible reasons for spontaneous CSF rhinorrhea and meningoencephaloceles in this region. The aim of this study was to define Sternberg's canal as a potential source for spontaneous CSF-leaks and meningoencephaloceles in this region and to describe their endoscopic endonasal management.

**Keywords:** CSF (Cerebrospinal fluid), Endoscopic repair, Lateral recess of sphenoid sinus, Rhinorrhea.

---

Date of Submission: 25-02-2019

Date of acceptance: 11-03-2019

---

### I. Introduction

CSF rhinorrhea is the leakage of CSF from the subarachnoid space to the nasal cavity due to defect in dura, bone and mucosa<sup>1</sup>. It can arise as a complication from trauma, which is most common (account for upto 80%) followed by iatrogenic as in endoscopic sinus surgery. The non-traumatic or primary CSF fistula accounts for less than 4% of all CSF fistulae<sup>2</sup>.

Spontaneous cerebrospinal fluid leaks with meningoencephaloceles restricted to the sphenoid sinus are rare clinical findings. Patients presenting with this special clinical entity usually do not have any history of trauma, tumour or iatrogenic injury. Persistent Sternberg's canal, extensively pneumatized sphenoid sinuses, elevated intracranial pressure and obesity are believed to be possible reasons for spontaneous CSF rhinorrhea and meningoencephaloceles in this region.

Spontaneous cerebrospinal fluid (CSF) rhinorrhea with or without a meningoencephalocele from the lateral recess of the sphenoid sinus (LRSS) represents a unique challenge due to its anatomical relations to the internal carotid artery, cavernous sinus, optic nerve, and extreme variations in the pneumatization of the sphenoid sinus. The location of meningoencephaloceles in the sphenoid sinus may be medial/planum type, perisellar type, and alateral recess type (which is the pneumatization of the sphenoid sinus lateral to the foramen rotundum and the vidian canal orifice)<sup>3,4</sup>.

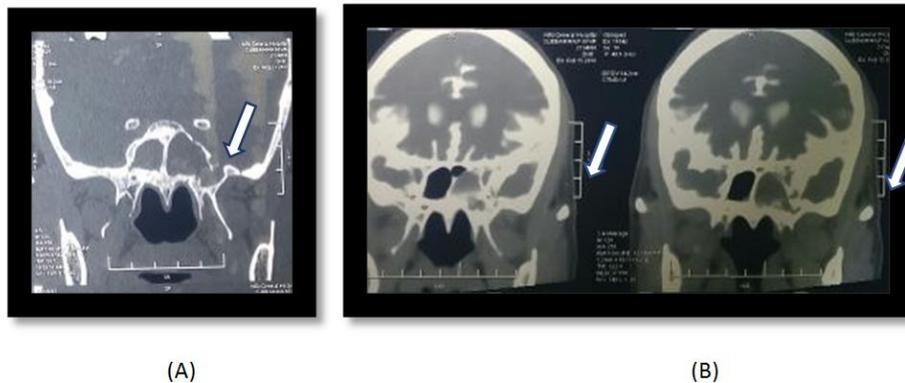
The endoscopic endonasal trans-ptyergoid approach has been used to gain exposure for a variety of skull base lesions<sup>5</sup>. Traditional microsurgical trans-sphenoidal approaches may not adequately expose these so-called far-lateral encephaloceles located in the lateral recess of the sphenoid sinus. This is due to the strictly midline nature of the exposure as well as the limited visibility and maneuverability restricted by an obstructing nasal speculum. Open fronto-temporal trans-cranial approaches often require temporal lobe retraction, and trans-facial approaches involve facial incisions and osteotomies to access these lateral sphenoid encephaloceles of the Sternberg canal. The primary advantage of the endoscopic endonasal trans-ptyergoid approach is its ability to offer maximal exposure and panoramic visualization of encephaloceles in the far-lateral recesses of the sphenoid sinus without the risk of complications associated with brain retraction or facial osteotomies. The direct access given to these laterally based encephaloceles through this approach also permits increased surgical maneuverability. Repair of CSF leaks arising from these encephaloceles can be safely and effectively performed with meticulous multilayered reconstruction<sup>5</sup>.

## II. Case Report

We present a case of 60 year old female patient who presented with watery discharge from left nostril since 1year that increased on straining ,sneezing and bending forwards associated with occasional headache.- There was no h/o nasal block,nasalallergy,change of perception of smell or trauma-accidental or surgery in the past.She is a known hypertensive and diabetic and using medication for the same.

ENT examination revealed clear watery fluid coming from left nostril on bending forwards which could not be sniffed back which is referred to as the “reservoir sign” and could not stiffen the handkerchief, which is called “Handkerchief sign”.Diagnostic Nasal Endoscopy revealed clear pulsatile watery discharge from left sphenoid sinus.

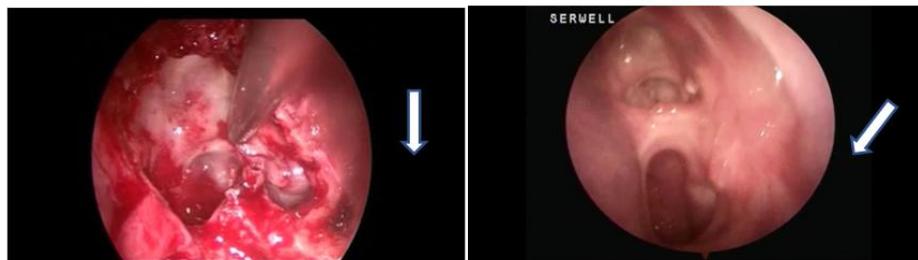
Computed tomography of paranasal sinuses(CT PNS) and CT-Cisternogram were done.CT PNS revealed a small osseous defect in the roof of the lateral recess of left sphenoid sinus.CT-Cisternogram shows contrast opacified active CSF leak through the bony defect in the roof of lateral recess of left sphenoid sinus.



**Fig.1:** CT-PNS coronal reformatted image (A) and CT-Cisternogram coronal reformatted images(B)show small bony defect in the roof of lateral recess of left sphenoid sinus(white arrows).

Magnetic resonance imaging(MRI) brain was done to look for signs of raised intracranial pressure which is one of the causes of spontaneous CSF rhinorrhea ,however,in our case it was normal.

Case was treated by endoscopic trans-nasal trans-pterygoid approach and repair of left sphenoid sinus with CSF leak under GA was performed.Multilayered closure was performed using abdominal fat,fascialata,gelfoam,surgical and fibrin glue.On follow up, there was complete closure of the defect with no postoperative complications.



**Fig.2:** Intraoperative endoscopic image (A) shows defect in the roof of lateral recess of left sphenoid sinus and endoscopic image at 3 months follow up(B) shows well healed defect in mucosa covering it.

## III. Discussion

Spontaneous CSF rhinorrhea is an uncommon cause.Spontaneous leaks could be associated with or without raised ICP<sup>5</sup> High pressure leaks could account up to 45% of the non- traumatic CSF rhinorrhea. Sustained increased ICP isthought to lead to remodeling and the thinning of the skullbase. The increased hydrostatic pressure of long duration iscapable of the bone erosion. Bone erosion and creation ofan osteodural defect in pneumatized parts of the skull baselead to CSF leak. The cribriform plate, craniopharyngealcanal, sella, and spheno- occipital synchondrosis are some ofthe possible sites of the predilection of the leak. Arachnoid

Granulations in proximity to the ethmoid and sphenoid sinus have been implicated as precursors of osteodural leaks. CSFleaks in these cases have been postulated to represent amanifestation of benign intracranial hypertension or pseudotumor cerebri<sup>6-10</sup>.Obesity is also hypothesized to increase the intracranial pressure and hence cause high pressure CSF leak.

Normal pressure leaks represent 55% of the non-traumatic cases of the CSF rhinorrhea. It is hypothesized that the spontaneous leak is due to the physiologic alterations in CSF pressure that lead to point erosions in the skull base<sup>6</sup>. These include erosion of the skull base by tumors, infection, mucocele, and following radiation<sup>6</sup>.

Nonfusion due to defective ossification and synchondroses can lead to osteodural defects at the skull base through several mechanisms<sup>3,11</sup>:

- (1) Persistence of craniopharyngeal canal<sup>12,13</sup>;
- (2) Lateral craniopharyngeal canal (Sternberg's canal); and
- (3) Cartilaginous vascular channels at or near ossification centers of the sphenoid bone<sup>3,11,14-16</sup>.

In terms of the diagnosis and localization of CSF rhinorrhea, imaging examination has a definite superiority to biochemical examination, especially in the determination of the location of the leakage and the choice of surgical method<sup>17</sup>. Imaging examination methods include sinus CT and CT cisternography, sinus magnetic resonance imaging (MRI)<sup>17,18</sup>.

Surgical management of CSF rhinorrhea can be achieved by an intracranial or extracranial approach. The decision depends on the size and pathology causing the leak. Management of CSF rhinorrhea by an intracranial approach<sup>19,20</sup> carries morbidity and failure rates between 20 and 40%<sup>19,21,22</sup>. On the other hand, an endoscopic approach is less morbid and has a success rate of 90–100%<sup>19,23</sup>.

In present study, trans-nasal, trans-ptyergoid approach of endoscopic repair was done to repair the osseous defect with multilayered closure of the defect. On follow up, there was complete closure of the defect with no postoperative complications or recurrence.

Use of multilayered flap in the management of CSF leaks provided a successful obliterating material for the anatomical defect. This flap adds the stiffness of the bony or cartilaginous tissue to the elasticity and sealing capability of the soft tissues<sup>19,24,25</sup>. Multilayered closure also prevents recurrence.

#### IV. Conclusion

CSF rhinorrhea must always be considered in a case of unilateral watery nasal discharge. The cause of CSF rhinorrhea must be then identified. CSF opening pressure must always be measured while putting lumbar drain in case of spontaneous CSF rhinorrhea.

Endoscopic trans-nasal approach and repair is the current standard of care for CSF rhinorrhea with few exceptions. With multilayered closure, the failure and recurrence rates of the procedure drastically decline. However, recurrence is higher in spontaneous CSF leak rather than traumatic CSF rhinorrhea.

#### References

- [1]. Abdelazim MH, Ismail WF, Taha A. Multilayered endonasal endoscopic repair of CSF leaks of sphenoid sinus.
- [2]. Deenadayal DS, Vidyasagar D, Kumar MN, Sudhakshin P, Chandra SS, Hameed S. Spontaneous CSF rhinorrhea our experience. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2013 Aug 1;65(2):271-5.
- [3]. Mahmoud N, El Tarabishi, Hossam M, Rabie, Tamer A, Youssef, Mohamed M, El-Sharnouby, Samia A, Fawaz, Ihab M, Nada, Mohamed S, Hasab-Allah. The transnasal endoscopic management of spontaneous cerebrospinal fluid rhinorrhea from the lateral recess of the sphenoid sinus. *The Egyptian Journal of Otolaryngology*. 2016, 32:13–20.
- [4]. Forer B, Sethi DS. Endoscopic repair of cerebrospinal fluid leaks in the lateral sphenoid sinus recess. *J Neurosurg* 2010; 11 2:444–448.
- [5]. Schmidt RF, Choudhry OJ, Raviv J, Baredes S, Casiano RR, Eloy JA, Liu JK. Surgical nuances for the endoscopic endonasal transpterygoid approach to lateral sphenoid sinus encephaloceles. *Neurosurgical focus*. 2012 Jun 1;32(6):E5.
- [6]. Yadav YR, Parihar V, Janakiram N, Pande S, Bajaj J, Namdev H. Endoscopic management of cerebrospinal fluid rhinorrhea. *Asian journal of neurosurgery*. 2016 Jul;11(3):183.
- [7]. Schlosser RJ, Woodworth BA, Wilensky EM, Grady MS, Bolger WE. Spontaneous cerebrospinal fluid leaks: A variant of benign intracranial hypertension. *Ann Otol Rhinol Laryngol* 2006;115:495- 500.
- [8]. Owler BK, Allan R, Parker G, Besser M. Pseudotumour cerebri, CSF rhinorrhoea and the role of venous sinus stenting in treatment. *Br J Neurosurg* 2003;17:79- 83.
- [9]. Al-Sebeih K, Karagiozov K, Elbeltagi A, Al-Qattan F. Nontraumatic cerebrospinal fluid rhinorrhea: Diagnosis and management. *Ann Saudi Med* 2004;24:453- 8. Comment in *Ann Saudi Med* 2005;25:515.
- [10]. Schlosser RJ, Bolger WE. Spontaneous nasal cerebrospinal fluid leaks and empty sella syndrome: A clinical association. *Am J Rhinol* 2003;17:91- 6.
- [11]. Nemzek WR, Brodie HA, Hecht ST, Chong BW, Babcock CJ, Seibert JA. MR, CT, and plain film imaging of the developing skull base in fetal specimens. *Am J Neuroradiol* 2000; 21:1699–1706.
- [12]. Pinilla-Arias D, Hinojosa J, Esparza J, Muñoz A. Recurrent meningitis and persistence of craniopharyngeal canal: case report. *Neurocirugia (Astur)* 2009; 20:50–53.
- [13]. Aggarwal B, Gupta M, Goyal N. Accessory foramina in the body of sphenoid bone. *Bombay Hosp J* 201 2; 54:232–235.
- [14]. Narasimhan K, Cotichia J. Transsphenoidal encephalocele in a neonate. *Ear Nose Throat J* 2006; 8 5:420, 422
- [15]. Cendekian T, Wong R, Rabie A. Relationships between cranial base synchondroses and craniofacial development: a review. *Open Anat J* 2010; 2:67–75.
- [16]. Dharwal K. A sphenoid with multiple developmental variations. *Eur J Anat*. 16:68–73, 2012.
- [17]. Chen GY, Ma L, Xu ML, Zhang JN, He ZD, He CY, Zhao CH, Fu C, Li M, Gao YF. Spontaneous cerebrospinal fluid rhinorrhea: A case report and analysis. *Medicine*. 2018 Feb;97(5).

- [18]. Reddy M, Baugnon K. Imaging of Cerebrospinal Fluid Rhinorrhea and Otorrhea. *Radiol Clin North Am* 2017;55:167–87.
- [19]. Mortuaire G, Vandeville S, Assaker R. Endoscopic repair of anterior or middle skull base cerebrospinal fluid leaks after tumour resection. *Eur Ann Otorhinolaryngol Head Neck Dis* 2012; 129:77–81.
- [20]. Nachtigal D, Frenkiel S, Yoskovitch A, Mohr G (1999) endoscopic repair of cerebrospinal fluid rhinorrhea: is it the treatment of choice? *Otolaryngo* 28:129–133
- [21]. Hubbard JL, McDonald TJ, Pearson BW, Laws ER (1985) Spontaneous cerebrospinal fluid rhinorrhea: evolving concepts in diagnosis and surgical management based on the Mayo Clinic experience from 1970 through 1981. *Neurosurgery* 16:314–321
- [22]. Aarabi B, Leibrock LG (1992) Neurosurgical approaches to cerebrospinal fluid rhinorrhea. *Ear Nose Throat J* 71:300–305
- [23]. Mattox DE, Kennedy DW (1990) Endoscopic management of cerebrospinal fluid leaks and cephaloceles. *Laryngoscope* 100: 857–862
- [24]. Abdelazim MH, Ismail WF, Taha A. Multilayered Endonasal endoscopic repair of CSF leaks of sphenoid sinus.
- [25]. Tormenti MJ, Paluzzi A, Pinheiro-Nieto C. Endoscopic endonasal repair of spontaneous CSF fistulae. *J Neurosurg* 2012; 32:E6.

Dr. Lukka Vijay Kumar. "A Rare Case of Spontaneous CSF Rhinorrhea from Lateral Recess of Sphenoid Sinus Which Was Repaired By Endoscopic Trans-Nasal Trans-Pterygoid Approach." *OSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 18, no. 3, 2019, pp 62-65.