

Endoscopic Repair of CSF leak – A Case ReportV.U. Shanmugam¹, Dinah Swaroop S², Prem Nivas³, Ruta Shanmugam⁴, R G Mariappan⁵, Balaji Swaminathan⁶¹Professor, ²PG, ³Senior resident, ⁴HOD, ⁵Professor, ⁶Reader, Dept. of ENT, Rajah Muthiah Medical College Hospital (RMMCH), Chidambaram, Tamilnadu, India***Corresponding author**

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Abstract: CSF rhinorrhoea is the leak of CSF through the nasal cavity due to an abnormal communication between subarachnoid space and nasal cavity. Endoscopic instrumentation has gained popularity over the years and has replaced debilitating open approaches for CSF leak repair. Here we report a case of CSF rhinorrhoea seen through the roof of anterior ethmoids which was successfully managed by endoscopic endo nasal approach.

Keywords: Cerebrospinal fluid rhinorrhoea, Cerebro spinal fluid, Cerebrospinal fluid pressure, Endoscopic surgical procedure.

INTRODUCTION

CSF rhinorrhoea results from an abnormal communication between subarachnoid space and nasal cavity. CSF is mainly produced by the choroid plexus of the lateral ventricles, third and fourth ventricles with minor contributions from ependymal cells and parenchymal capillaries. After circulating through the subarachnoid space CSF is reabsorbed into venous system by the sub arachnoid granulations.

Trauma contributes to 80% -90% of CSF fistulas [1]. The cause of trauma could be an injury to the skull base following surgery or head injury. Iatrogenic cause accounts for approximately 16% of the cases. CSF rhinorrhoea due to functional endoscopic sinus surgery is the most common iatrogenic cause and is reported to be around 0.5% [1]. The lateral cribriform lamella is the most common site of leak following endoscopic sinus surgeries.

Non iatrogenic cause has been reported in 2% of all head traumas, 12-30% of skull base fractures and 25% of facial fractures.

CSF leak due to head injury usually involves cribriform plate or ethmoidal roof because the dura is tightly adherent in these areas. Posterior wall of frontal sinus is another site most frequently involved in anterior cranial fossa fractures which eventually lead to CSF leak.

Spontaneous CSF leaks often result from skull base defects and erosion of skull base due to intra cranial lesions. It could be a high pressure leak which accounts to 45% of the non-traumatic CSF rhinorrhoea or a normal pressure leak representing about 55% of non-traumatic cause [2, 3].

Congenital failure of closure of anterior neuropore or persistent craniopharyngeal canal can lead to CSF rhinorrhoea and can be associated with CSF rhinorrhoea.

Persistent CSF rhinorrhoea of more than 7 days carries a higher incidence of meningeal infection and the risk of meningitis in untreated patients is around 10% annually [4]. Thus an early detection of the leak and active surgical intervention can reduce the risk of meningeal complications.

Glucose concentration in the nasal discharge of >30 mg/dl is strongly suggestive of CSF.

Detection of $\beta 2$ – transferrin by immunofixation is the gold standard which has a sensitivity of 94-100% and specificity of 98-100%.

HRCT in complementary to MR cisternography and vice versa in identifying and confirming the site of CSF leak.

In 1926 Dandy reported the 1st successful intra cranial repair of CSF leak. In 1948 Dohlman introduced the extra cranial approach. In 1952 Hirsch performed trans nasal surgery and in 1981 endoscopic treatment was reported by Wigand [5].

Since then excellent visualization, short hospital stay, reduced operating time, better graft placement and better results has made endoscopic treatment gain more attention. Endoscopic closure of CSF fistula has revolutionized the surgical management of CSF rhinorrhoea.

CASE REPORT

A 35 year old female patient came to our OPD with complaints of spontaneous watery discharge from the nose of 3 ½ month duration. She was not able to sniff the discharge and the discharge aggravated on bending forwards. She had a similar episode one year ago which spontaneously resolved. She had No history of trauma or other previous nasal surgeries.

On examination the patient was observed to have watery discharge from left nasal cavity especially on bending forward. Hand kerchief test was positive. Watery rhinorrhoea increased with pressure over bilateral jugular veins. Halo sign was negative.

Diagnostic nasal endoscopy was done and watery nasal discharge was noted from the roof of anterior ethmoids. We diagnosed the patient to have CSF rhinorrhea and hence planned for a ct-cisternography to confirm our diagnosis and to identify the site of leak.

- CT cisternography showed CSF leak through left ethmoidal roof.
- MRI BRAIN showed a partially empty sella
- Fundus examination revealed no evidence of papilloedema

Initially patient was started on medical management along with absolute bed rest with head end elevation.

Patient was treated with Inj. Mannitol 100 ml IV BD, T. Acetazolamide(Diamox) 250 mg tds. & Tab T. Prednisolone(wyslone) 15 mg TDS for two weeks. Since the patient did not respond to conservative management endoscopic approach was planned to correct the CSF leak after 2 weeks.

Under general anesthesia, 0° endoscope was introduced and the site of leak was identified at the roof of the anterior ethmoids with size of approximately 33mm*10mm. Septal cartilage was harvested and placed between dura and cribriform plate. Rotated middle turbinate flap was used as reinforcement. Gel foam was placed over the middle turbinate. valsalva manoever was done which showed no evidence of CSF leak. Anterior nasal packing was done with merocel. Post operative antibiotic coverage was given along with diuretics, antitussives, stool softeners and oral steroids. Patient were on strict bed rest. Nasal pack was removed after 7 days and patient was discharged. Patient was reviewed at regular intervals of 3 weeks, 1 month, 2 months and 6 months. Post operative follow up was uneventful with no further episodes of CSF leak.



Fig-1: Cartilage graft

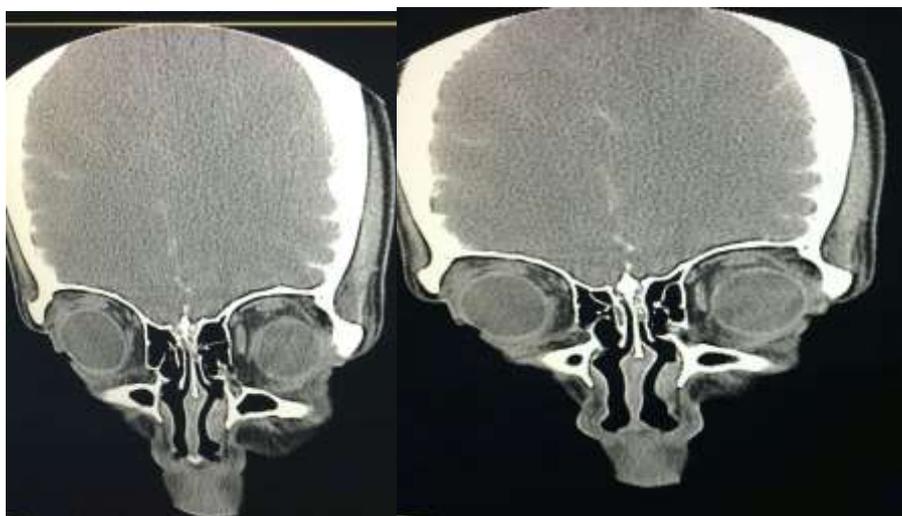


Fig-2: CT cisternography showing leak at roof of ethmoid

DISCUSSION

In recent years we have seen that surgeons prefer procedures or techniques that are less invasive, have maximum visualization of the surgical field, less mortality and morbidity and have a high success rate.

Intra cranial approach has a success rate of 70-90% after first attempt and approximately 94% after second attempt [6]. Intracranial approach is mainly reserved for CSF leaks which are recurrent, severe with multiple fractures and high pressure leaks. This approach has an advantage of direct visualization of tissue injury but they result in significant morbidity such as permanent loss of smell, intra cerebral hemorrhage, cerebral oedema, frontal lobe defect, long hospital stay and high recurrence rate [7].

Extra cranial approach can be an open extra cranial approach or an endoscopic approach. Both have a high success rate and low morbidity.

Literature says that success rate of endoscopic CSF leak repair after 1st attempt is 90.6 % and 96.6% with the II attempt and the overall complication rate as low as 0.03% and the results have been superior to external approaches [8,9]

Endoscopic approach can be used in small defects present in cribriform plate, anterior or posterior ethmoidal sinus and sphenoid sinus.

CONCLUSION

Every case has been a boon in the evolution of CSF rhinorrhoea repair from an open craniotomy to a minimally invasive endoscopic approach. Endoscopic repair of CSF leak has more advantages and success rate when compared to intracranial or open extra cranial approach. The same has been gaining lot of attention in the recent years.

REFERENCES

1. Yadav YR, Parihar V, Janakiram N, Pande S, Bajaj J, Namdev H. Endoscopic management of cerebrospinal fluid rhinorrhea. *Asian Journal of Neurosurgery*. 2016 Jul 1;11(3):183.
2. Schlosser RJ, Woodworth BA, Wilensky EM, Grady MS, Bolger WE. Spontaneous cerebrospinal fluid leaks: a variant of benign intracranial hypertension. *Annals of Otology, Rhinology & Laryngology*. 2006 Jul 1;115(7):495-500.
3. Lopatin AS, Kapitanov DN, Potapov AA. Endonasal endoscopic repair of spontaneous cerebrospinal fluid leaks. *Archives of Otolaryngology-Head & Neck Surgery*. 2003 Aug 1;129(8):859-63.
4. Abuabara A. Cerebrospinal fluid rhinorrhoea: diagnosis and management. *Medicina Oral, Patología Oral y Cirugía Bucal (Internet)*. 2007 Sep;12(5):397-400.
5. Psaltis AJ, Schlosser RJ, Banks CA, Yawn J, Soler ZM. A systematic review of the endoscopic repair of cerebrospinal fluid leaks. *Otolaryngology--Head and Neck Surgery*. 2012 Aug 1;147(2):196-203.
6. Scholsem M, Scholtes F, Collignon F, Robe P, Dubuisson A, Kaschten B, Lenelle J, Martin D. Surgical management of anterior cranial base fractures with cerebrospinal fluid fistulae: a single-institution experience. *Neurosurgery*. 2008 Feb 1;62(2):463-71.
7. Wigand ME. Transnasal ethmoidectomy under endoscopic control. *Rhinology*. 1981 Mar;19(1):7-15.
8. Tolley NS, Brookes GB. Surgical management of cerebrospinal fluid rhinorrhoea. *Journal of the Royal College of Surgeons of Edinburgh*. 1992 Feb;37(1):12-5.
9. McCormack B, Cooper PR, Persky M, Rothstein S. Extracranial repair of cerebrospinal fluid fistulas: technique and results in 37 patients. *Neurosurgery*. 1990 Sep 1;27(3):412-7.