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Original Research Article

Cerebrospinal fluid rhinorrhea: a novel approach

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ABSTRACT

Background: This study aimed to describe the use of nasal endoscopic technique in the management of cerebrospinal fluid (CSF) rhinorrhea repair. Over the last decade, endoscopic surgery has established itself as the most widely used technique for the repair of CSF leak.
Methods: 20 patients diagnosed with CSF rhinorrhea undergoing endoscopic CSF rhinorrhea repair were included in this study. To confirm the diagnosis beta-2 transferrin test was done. Accurate localization of site of lesion using CT cisternography was done.
Results: Spontaneous onset of CSF rhinnorhea was noted in 75% of patients. The most common cause of CSF rhinorrhea in our study was spontaneous and the second most common cause was post traumatic. Almost 45% of patients presented with headache as primary complaint, 30% with only CSF leak, 20% with nasal obstruction and rest 5% with hyposmia.
Conclusions: Multilayered closure of the dural defect was done. It can be concluded that middle aged people presented as CSF rhinorrhea with female predominance and there was high success rate of endoscopic CSF rhinorrhea repair with low morbidity.

Keywords: CSF rhinorrhea, Endoscopic repair, CSF leak

INTRODUCTION

Cerebrospinal fluid (CSF) rhinorrhea is a condition where the protective fluid that surrounds the brain finds its way into the nose and sinuses, often appearing as a watery runny nose. the main surgical approaches for the surgical repair of CSF leaks are intracranial and extracranial. The endoscopic guided approach for repair of CSF rhinorrhea offers the benefit of both panoramic and detailed image of the site of surgery, in fact owing to the specific direction of view of endoscopic lens system. It is possible to inspect the circumference of the operating field at 360^0 by rotating the telescope around its longitudinal axis which enable direct endonasal access to the anatomical structures at rhinobase without need for cutaneous incison.[1]

CSF rhinorrhea has been reported to be spontaneous or secondary to head trauma, surgery, neoplastic invasion, congenital malformations. Since Wigand first reported the endoscopic repair of CSF rhinorrhea in 1981, it is now considered the preferred choice of treatment.[2]

Trans nasal endoscopic repair has about 87-100% success rate, most of traumatic CSF leaks stop after conservative treatment. cases with persistent CSF rhinorrhea need definitive intervention. Risk of meningitis in untreated patients is reported to be about 10% annually.[3]

METHODS

Study design

Study design was an institutional based prospective study.

Study area

Study was conducted at Alluri Sitarama Raju academy of medical sciences (ASRAM), West Godavari district, Andhra Pradesh.

Study period

Data collected from march 2021 to march 2022 in tertiary care centre.

Data collection

Data collection was done by interview method.

Data analysis

The collected data was entered in Microsoft excel 2007 and analyzed using SPSS version 26 software trail version. The results were displayed in the form of charts and tables.

Sample size

All cases presented with CSF rhinorrhea during my study period were considered. A total of 20 cases were included.

Sampling technique

Universal sampling technique was used.

Study tool

A pretested and validated questionnaire was used which was reviewed by 4 research experts.

Inclusion criteria

Patients with age group above 15 years, traumatic CSF leak and non-traumatic CSF leak were included in the study.

Exclusion criteria

Patients with postoperative skull base tumor complicated by CSF rhinorrhea were excluded from the study.

Procedure

All cases were subjected to a detailed history, regarding the duration of leak, mode of onset, etiology and history of meningitis.

Following this, diagnostic nasal endoscopy was performed to confirm the side of leak and to rule out other nasal pathologies. Ophthalmic examination was done to rule out papilloedema.

Nasal discharge was sent for beta-2 transferrin test (Figure 1).

Figure 1: Sample collection for beta-2 transferrin test.

Computed tomography (CT) cisternography was done in all patients (Figure 2).

Figure 2: CT cisternograhpy showing defect in right cribriform plate.

RESULTS

Table 1 summarizes the age distribution of study population. A total of 20 patients were included in the study. Majority of patients were between 31-60 years of age (65%). The 15-30 years age group there 6 patients (30%). Only one patient was above 60 years, minimum age was 15 years and maximum age was 61 years.

Table 1: Age distribution of the studied group.

Age (years)	N (%)
15-30	6 (30)
31-60	13 (65)
>60	1 (5)

Gender distribution of studied group is presented in Figure 3 1. Females represented (70%) of the studied group with female to male ratio of almost (2.33:1). Males were only 30% of the studied group.

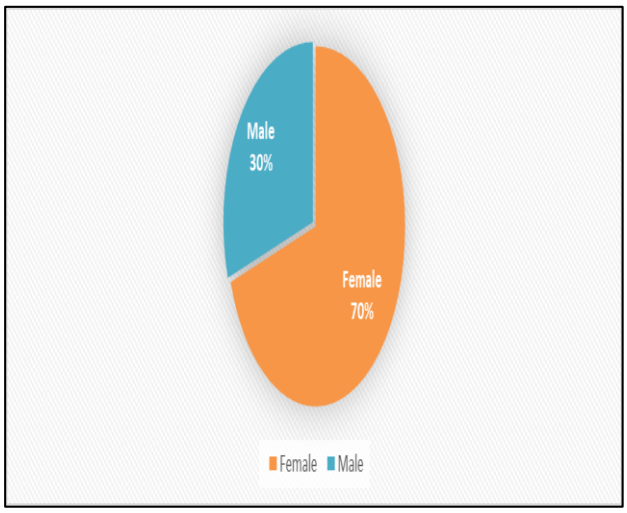

Figure 3: Gender distribution of the studied group.

Table 2 summarizes the etiologies of CSF leak. Most of the CSF leaks were spontaneous 15 (75%) patients, rest of the patients were due to trauma 5 (25%). Three of them due to surgery and remaining 2 were due to head trauma.

Table 2: Etiologies of CSF leak.

Etiology	N	Percentages (%)
Spontaneous	15	75
Traumatic	5	25
Total	20	100

Table 3 shows the presentation of patient with meningocele. Among 20 patients only 2 (10%) patients presented with meningocele.

Table 3: Presence of meningocele.

Meningocele	N	Percentages (%)
Yes	2	10
No	18	90
Total	20	100

Figure 4 describes how a patient of CSF rhinorrhea presented in the study that is symptom distribution. Out of 20 patients, 9 patients presented with headache.6 patents presented with CSF leak only, 4 patients with nasal obstruction, only 1 patient presented with hyposmia. major complaint was headache in our study.

Table 4 gives details of site of CSF leaks. In this study right sided leaks were more common than left sided. right sided leaks were seen in 13 patients (65%). Left sided leaks were seen in 7 patients (35%).

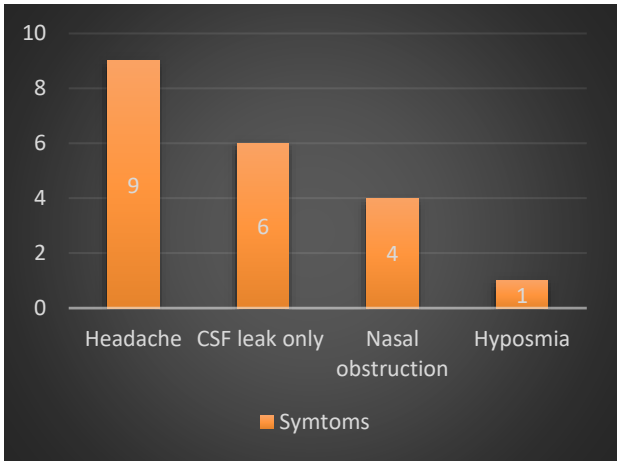

Figure 4: Symptoms distribution associated with CSF leak.

Table 4: Site of CSF leak.

Site of leak	N	Percentages (%)
Right	13	65
Left	7	35
Total	20	100

DISCUSSION

Three patients of traumatic CSF rhinorrhea were observed for 3 weeks. There was spontaneous resolution. The 17 patients (15 spontaneous and 2 traumatic leaks were repaired endoscopically). Size of defect repaired was 1mm-3mm.Intraoperatively in few patients where an active leak was not seen, it was noted by Valsalva maneuver (positive pressure ventilation). Two patients who presented with meningocele, cauterization was done. Lumbar drain was used for 4 patients with high pressure leak (spontaneous leak). In most of the cases 80% 5 layered technique was used (tensor fascia lata, fat, surgical, gelfoam, mucosal flap), 15% cases(surgical glue, fat, tensor fascia lata, gelfoam), 5% cases (tensor fat lata, fat, bone from middle turbinate, gelfoam) by Overlay technique (Figure 5).

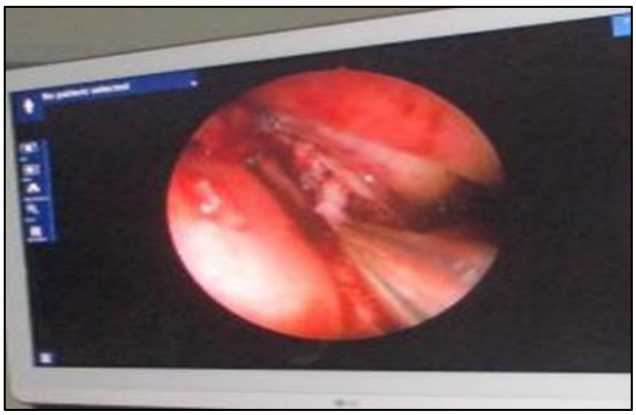

Figure 5: Intra-operative CSF rhinorrhea repair.

Post operative care

Carbonic anhydrase inhibitors like acetazolamide for 3 months. The 15^0 head elevation was advised. Straining was avoided by giving laxatives, cough suppressors were used, strict bed rest was advised. Patients were discharged on POD-7. Weekly once follow up was done for a month then later monthly once follow up was done. Obese patients were advised for lifestyle changes. No recurrence was seen.

Since Dandy described the first case of intracranial repair of CSF rhinorrhea by way of a bi-frontal craniotomy, this approach remained the mainstream of surgical treatment until Dohlman reported the first case treated with an extracranial non endoscopic approach by way of a naso-frontal incision.[4,5] Since then, a variety of endonasal approaches has evolved. In 1952, Hirsch performed the first transnasal approach to close a sphenoid sinus leak.[6]

Vrabec and Hallberg undertook an intranasal approach to manage cribriform plate leaks in 1964.[7] Wigand, in 1981, was the first to describe the use of an endoscope in the treatment of CSF rhinorrhea incurred during FESS.[8] Mattox and Kennedy reported their seven successful repairs with free grafts and defined the indication of endoscopic technique for CSF repair.[9]

With the rapid development of endoscopic instrumentation, which has markedly improved the visualization of the entire roof of the sinonasal region and contributed to the surgical technique. An increasing number of surgeons have begun using the endoscope to repair CSF leaks and skull defects.[10]

Although spontaneous CSF leaks have the highest recurrence rate of any etiology, prospective evaluation demonstrates high success rates with control of intracranial hypertension.[11]

The presence of a headache should raise the suspicion of elevated intracranial pressure and intracranial pathology.[1]

Etiology of leak

A history of a sinonasal or neurosurgical procedure, head trauma, meningitis, and intracranial or skull base tumors should raise the suspicion of CSF leak.[12]

Location of the leak

The ethmoid roof, cribriform plate, and sphenoid sinus are the common locations of the defect in CSF rhinorrhea.[13,14] Frontal sinus could also be the site of the leak. The frequency of the defect location varies in different types of CSF rhinorrhea. The most of the leaks are along the course of anterior ethmoid artery followed by the sphenoid sinus in spontaneous leaks. Defect in the sphenoid sinus could be in the roof, the lateral wall, anterior wall, or the posterior wall.[15]

Primary investigations

Although all investigations are useful in diagnosis of CSF leak, high-resolution (HR) CT and MRI scans are primary investigations of choice. These two primary investigations helpful in detection of most of leaks.[16,17]

Secondary investigations

Secondary investigations such as CT cisternography, radionuclide cisternography, fluorescence cisternography, and diagnostic nasal endoscopy may be useful if MR cisternography and HR CT scan do not show site of leak.[3]

Management

Conservative management: Most of the traumatic CSF rhinorrhea can be managed with conservative treatment. The routine management involves acetazolamide, laxatives, and the prophylactic antibiotics. Measures such as bed rest with head elevated, avoidance of sneezing, etc., are also effective. A lumbar drain can be useful. The conservative treatment for 2 to 4 weeks can be tried if a CSF leak is caused by trauma or operation.[18]

Operative management: Surgery is indicated to prevent complications if conservative management fails. Success rate of CSF leak by the intracranial approach is in the range of 70 to 90% while it is 87 to 100% in transnasal endoscopic technique.[19]

Limitations

Small sample size so results cannot be generalized.

CONCLUSION

It can be concluded that middle aged patients presented as CSF rhinorrhea with female predominance and there was high success rate of endoscopic CSF rhinorrhea repair with low morbidity.

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