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ENDOSCOPIC MANAGEMENT OF CEREBROSPINAL FLUID RHINORRHEA: A CASE SERIES EVALUATING SURGICAL OUTCOMES FROM OUR INSTITUTIONAL EXPERIENCE

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ABSTRACT

Background: Cerebrospinal fluid (CSF) rhinorrhea is caused by a breach in the skull base, allowing CSF to leak into the nasal cavity. It is frequently associated with idiopathic intracranial hypertension (IIH) and can be caused by trauma, surgical complications, neoplasms, or spontaneous occurrence. There is a significant chance of severe side effects including meningitis if treatment is not received. By offering efficient and minimally invasive methods, recent developments in endoscopic repair have greatly improved results.

Methods: In this study, we provide the results of three CSF rhinorrhea patients who received treatment in a tertiary care facility. Patient demographics, underlying etiology, diagnostic procedures, surgical techniques, and results were among the information gathered. After endoscopic treatment, all patients received routine postoperative assessments to see whether their symptoms had resolved or returned.

Results: Two of the three cases included spontaneous CSF, whereas one was the consequence of surgery. Imaging methods such as CT cisternography for precise defect localization and beta-2 transferrin tests were among the used diagnostic tools. All multilayered endoscopic repairs were successful, and no significant problems or recurrences were noted at follow-up**.**

Conclusions: Endoscopic surgery is a safe and highly effective approach for managing CSF rhinorrhea with a high success rate and few side effects. Early diagnosis accurate defect identification, and customized treatment plans are essential.

Keywords:CSF leak; Intracranial pressure; Spontaneous; Skull base

INTRODUCTION

A defect in the skull base that allows cerebrospinal fluid to flow into the nasal cavity is known as CSF rhinorrhea. Spontaneous leaks linked to idiopathic intracranial hypertension (IIH) are becoming more widely acknowledged as a large subset of causes, while traumatic or iatrogenic causes have historically been more prevalent.[1]Meningitis can result from untreated CSF rhinorrhea, carrying a significant risk of morbidity and death.[2] Imaging modalities like CT and MR cisternography, which aid in localizing the defect location, and beta-2 transferrin testing, which is very specific for CSF leaks, are examples of diagnostic tools.[3]Due to its low invasiveness and high success rates, endoscopic surgical repair has become the preferred course of treatment.[4] Recent research highlights the effectiveness of multilayer grafting and nasoseptal flaps in producing long-lasting results.[5]Three instances are highlighted in this case series, two of which involve spontaneous CSF rhinorrhea, illustrating the condition's diverse presentations and consequences.

CASE REPORT

Case 1: Spontaneous CSF Rhinorrhea with IIH

A 32-year-old woman complained of chronic headaches and sporadic clear nasal discharge. Testing for beta-2 transferrin verified CSF leakage. (Fig. 1)An empty sella, increased intracranial pressure suggestive of IIH, and a cribriform plate defect with meningoencephalocele were all seen on CT cisternography (Figure 2). In order to control elevated intracranial pressure, she was prescribed acetazolamide and a CSF drain in addition to undergoing endoscopic surgery using a fascia lata graft, middle turbinate flap graft, and tissue glue. Three months and a year after surgery, postoperative follow-up revealed that the symptoms were resolved without reoccurring.

Figure 1:CT cisternography revealed a cribriform plate defect.

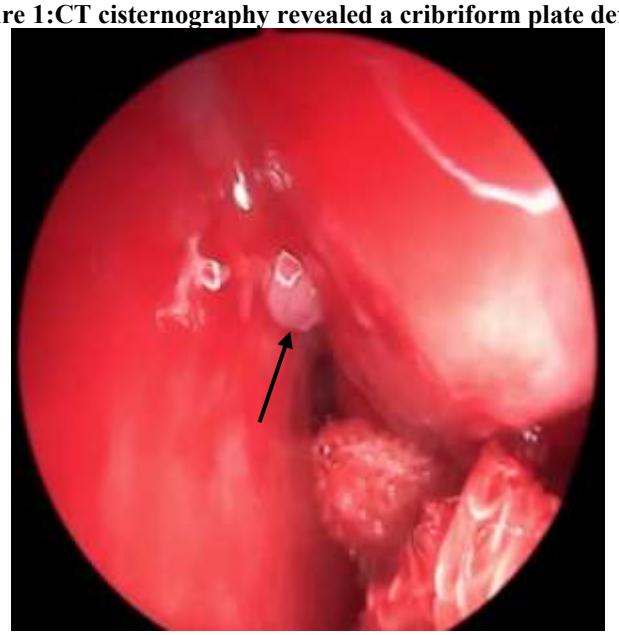

Figure 2: Cribriform plate defect with meningoencephalocele

Case 2: Spontaneous CSF Rhinorrhea from anterior skull base

A 42-year-old obese woman had mild headaches and clear nasal discharge for a year. CT cisternography revealed an anterior cribriform plate defect, confirming CSF rhinorrhea, and beta-2 transferrin was positive. Intraoperative visualization of the defect location was performed using a 0-degree endoscope (Figure 3). A multilayer closure comprising fascia lata graft, middle turbinate flap, and fibrin glue was used for endoscopic repair. (Fig. 4) At the one-year follow-up, the patient's symptoms had completely resolved and had not returned.

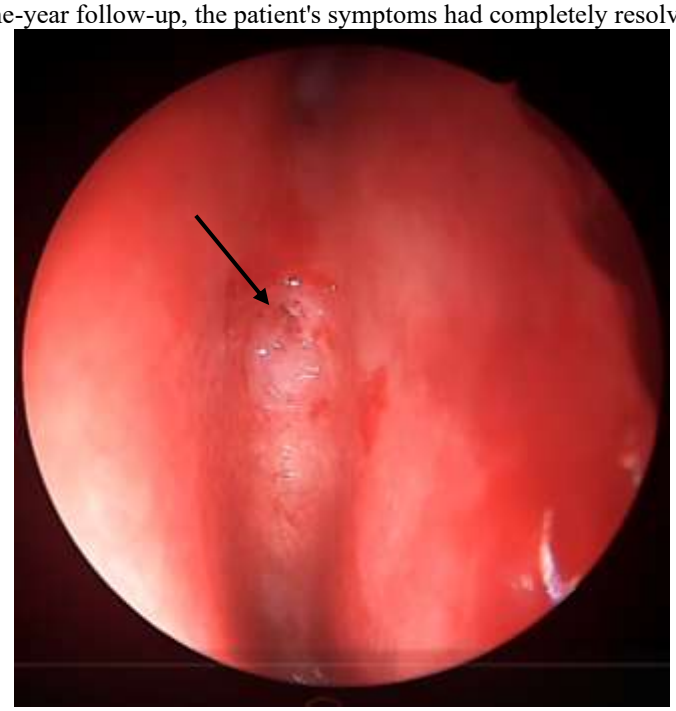

Figure 3: 0-degree endoscopeshowing an anterior cribriform plate defect.

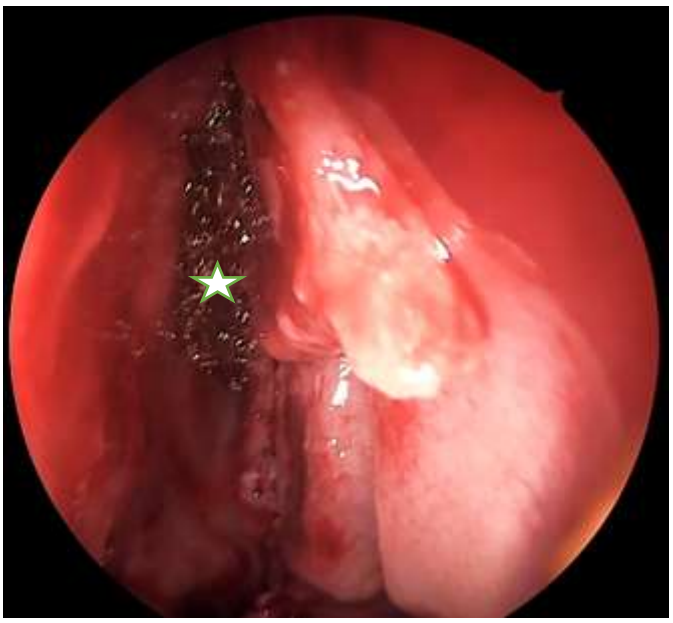

Figure 4:Post-repair of anterior skull base defect.

Case 3: Post-Traumatic Cribriform CSF Leak

After a car accident six weeks prior, a 38-year-old man developed persistent, clear nasal discharge. He complained of sporadic headaches and a salty taste in his mouth, but had no neurological deficits or signs of infection. CT cisternography imaging showed a bony defect in the left cribriform plate and meningoencephalocele consistent with a traumatic CSF leak, and the beta-2 transferrin assay verified that the nasal discharge was CSF. Endoscopic surgical repair was carried out using a multilayer technique with fat, fascia lata, and fibrin glue (Figure 5). A lumbar drain was inserted during surgery to divert CSF to lower the risk of postoperative leakage, and the patient recovered without any problems.

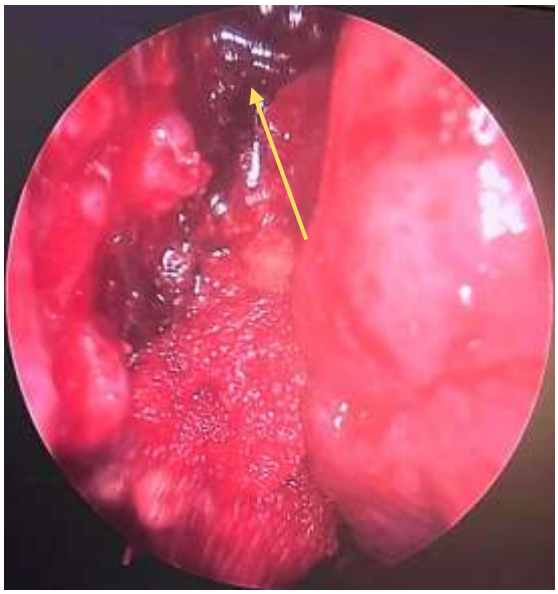

Figure 5: Post-repair of defect site

DISCUSSION

The CSF is a physiologic fluid with total volume of 140 mL are turned over daily and actively circulated .CSF rhinorrhoea can be classified into spontaneous (non traumatic) or non spontaneous (traumatic). Spontaneous causes include congenital anatomical defects to the temporal bone, skull base, or dura mater. Non spontaneous causes include surgical and accidental trauma, tumour, or exposure to radiation therapy involving the base of the skull . CSF that surrounds the brain and spinal cord and it leak or escape from the cavities within the brain or central canal in the spinal cord. A CSF rhinorrhoea occurs when there is an opening between the dura and the skull base and leakage of CSF through the nose .CSF leak from the nasal cavity is important because of the increased risk of infection which could lead to fulminant meningitis and other complications[10]

A thorough assessment and treatment are necessary for CSF rhinorrhea, especially the spontaneous kind, which is becoming more and more linked to IIH.[6] Improvements in imaging modalities like CT and MR cisternography and diagnostics like beta-2 transferrin have made it easier to identify and locate problems in the skull base.[7] The most effective treatment for both spontaneous and post-traumatic leaks is still endoscopic repair, which has a high success rate.[8] Additional treatments improve patient outcomes, such as lumbar drains for high-flow leaks and acetazolamide for IIH.[9]

CONCLUSION

Because cerebrospinal fluid rhinorrhea is a complicated illness, meningitis and other potentially fatal consequences must be avoided with prompt and precise diagnosis. The various causes of CSF leaks, such as unplanned or traumatic causes, are highlighted in this case series, which also emphasizes the significance of tailored management approaches. In all three situations, endoscopic repair was shown to be a dependable, minimally invasive therapeutic option with low complication rates and high success rates. Improvements in imaging methods, including beta-2 transferrin testing and CT and MR cisternography, have greatly increased the accuracy of diagnosis. Acetazolamide for IIH is one example of a customized supplementary medication that significantly enhances results for particular patient subgroups. This approach's effectiveness emphasizes how

crucial a multidisciplinary team is to the management of CSF rhinorrhea. Ongoing research and technological advancements are likely to significantly refine the diagnostic and therapy paradigms for this condition.

DECLARATIONS

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Conflict of interest:
The authors declare that they have no competing interests.

Ethical approval:
All procedures performed in this study involving human participants were in accordance with the ethical standards of the Internal Human Ethics Committee of the Saveetha Medical
College and Hospital, *, and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.*

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FIGURE LEGENDS

Figure 1: CT cisternography revealed a cribriform plate defect
Figure 2:Cribriform plate defect with meningoencephalocele
Figure 3: CT cisternography showed an anterior cribriform plate defect
Figure 4: Post-repair of anterior skull base defect.
Figure 5: Post-repair of defect site