Original Article

Traumatic Cerebrospinal Fluid Rhinorrhoea Managed by Endoscopic Endonasal Repair: A Case Series

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Abstract

Background: Traumatic cerebrospinal fluid (CSF) rhinorrhoea is a known complication of skull base fractures following head injury. [1] Persistent CSF leaks can lead to serious complications such as meningitis if untreated. **Material and Methods:** This case series includes four patients diagnosed with traumatic CSF rhinorrhoea following head trauma. Clinical presentation, imaging findings, surgical management, and outcomes were analysed. **Results:** All patients presented with clear watery nasal discharge. CT scan revealed skull base defects involving the cribriform plate, ethmoid roof, or sphenoid sinus. Of the four patients, three underwent endoscopic Endonasal repair using a fascia lata graft, and 1 underwent repair using abdominal fat as a graft. CSF leak closure was successful in all cases, with no recurrence. **Conclusion:** Endoscopic Endonasal repair is a safe and effective technique for the management of traumatic CSF rhinorrhoea with high success rates and minimal complications.

Keywords: CSF, Rhinorrhoea, Endoscopy.

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Introduction

Cerebrospinal fluid rhinorrhoea refers to the leakage of cerebrospinal fluid through the nasal cavity due to a defect in the skull base and dura mater. Trauma is the most common cause of CSF rhinorrhoea and accounts for the majority of cases.[1,2]

Skull base fractures involving the cribriform plate, ethmoid roof, or sphenoid sinus may result in CSF leakage. Persistent CSF rhinorrhoea can predispose patients to serious complications such as meningitis and pneumocephalus.

Because endoscopic repair is minimally invasive and has a high success rate, it is the preferred therapy for cerebrospinal fluid (CSF) rhinorrhea.[3] The goal of this case series is to report the clinical characteristics, course of treatment, and results of individuals who have endoscopically repaired traumatic CSF rhinorrhea.

Materials and Methods

This retrospective case series was conducted in the Department of Otorhinolaryngology at SMBT IMSRC, Nasik, India, between 2025 and 2026. Every patient underwent a thorough history that included information on the duration of the leak, its onset, its aetiology, and meningitis history. To identify the side of the leak and rule out other nasal diseases, a diagnostic nasal endoscopy was performed next. The precise location of the leak could not be determined via nasal endoscopy. To locate the leak source and assess for meningocele and meningoencephalocele, each patient underwent a high-resolution computed tomography (CT) scan, with additional magnetic resonance imaging (MRI) slices. Every patient provided written informed permission for publishing.

Inclusion Criteria

- History of head trauma
- Clinical evidence of CSF rhinorrhoea
- Radiological confirmation of skull base defect

Data Collection

Patient records were reviewed for:

- Age and gender
- Cause of trauma
- Clinical symptoms
- Imaging findings
- Surgical technique
- Postoperative outcomes

The skull base defect was repaired endoscopically and endonasally in every patient.

Results

Patient Demographics: A total of four patients with traumatic

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cerebrospinal fluid (CSF) rhinorrhoea were included in this case series. The mean age of the patients was 50 years (range: 35-65 years). Among the patients, three were female (80%), and one was male (20%)

The most common cause of trauma was a fall.

Case Series Description:

Case 1: A 37-year-old female presented with clear water discharge from the right nostril following a fall. CT scan revealed a cribriform plate defect. Endoscopic repair with fascia lata graft was performed. The patient recovered without recurrence.

Case 2: A 42-year-old female developed intermittent CSF rhinorrhoea four weeks after a fall. Imaging showed a small bony defect of size 1.5mm in the left cribriform plate. Endoscopic repair was performed successfully using abdominal fat as a graft.

Case 3: A 64-year-old male presented with intermittent nasal discharge following a head injury. CT scan showed a fracture defect of 1 mm involving the Left cribriform plate. Endoscopic surgical repair was performed using a fascia lata graft.

Case 4: A 55-year-old female presented with delayed watery nasal discharge following a head injury. CT scan showed a fracture defect of 0.2 cm involving the Right lateral wall of the sphenoid sinus with herniation of meninges. Endoscopic surgical repair was performed using a fascia lata graft.

Table 1: Description of Cases

Case	Age	Sex	Cause of trauma	Site of leak	Treatment	Outcome
1	37	F	Fall	Cribriform plate	Endoscopic repair	Recovered
2	42	F	Fall	Cribriform plate	Endoscopic repair	Recovered
3	64	M	Fall	Cribriform plate	Endoscopic repair	Recovered
5	55	F	Fall	Lateral wall of sphenoid sinus	Endoscopic repair	Recovered

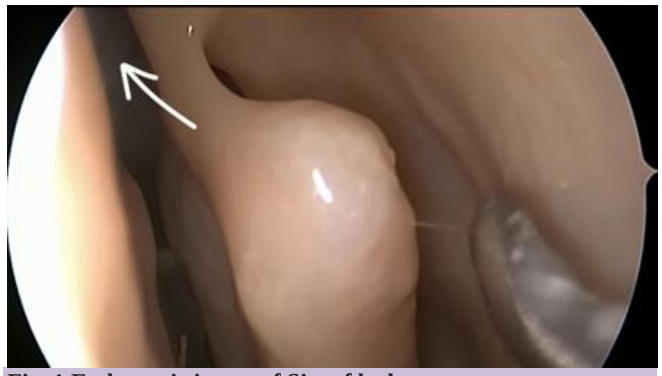

Fig. 1 Endoscopic image of Site of leak.

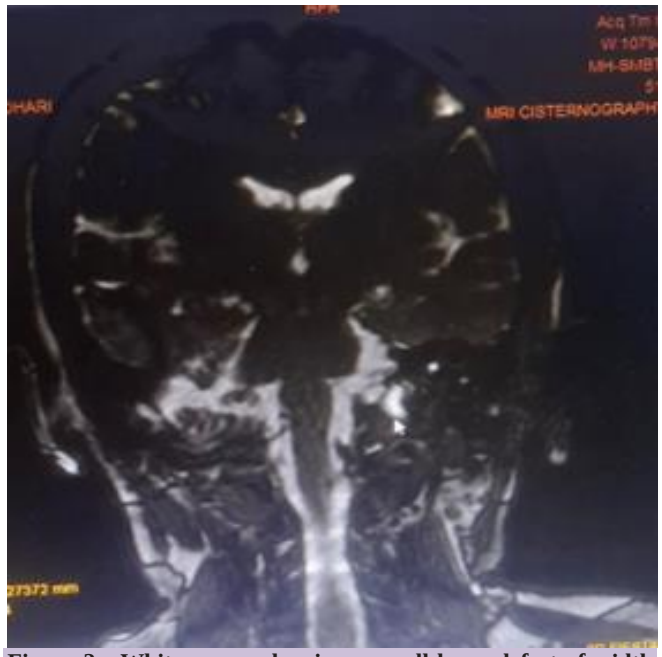

Figure 2: White arrow showing a small bony defect of width 1.5 mm along the left cribriform plate, contiguous with the fluid inferiorly. This fluid column is seen draining along the dependent posterior ethmoid sinuses on the left.

[Figure 1] shows an endoscopic image of the leak site. [Figure 2-4] show a small bony defect of width 1.5 mm along the left cribriform plate, contiguous with the fluid inferiorly. This fluid column is seen draining along the dependent posterior ethmoid sinuses on the left. [Figure 5] shows a defect with a column of CSF fluid signal along the lateral margin of the cribriform plate on the left side with the width of the defect measuring approximately 1 mm. (White arrow showing)

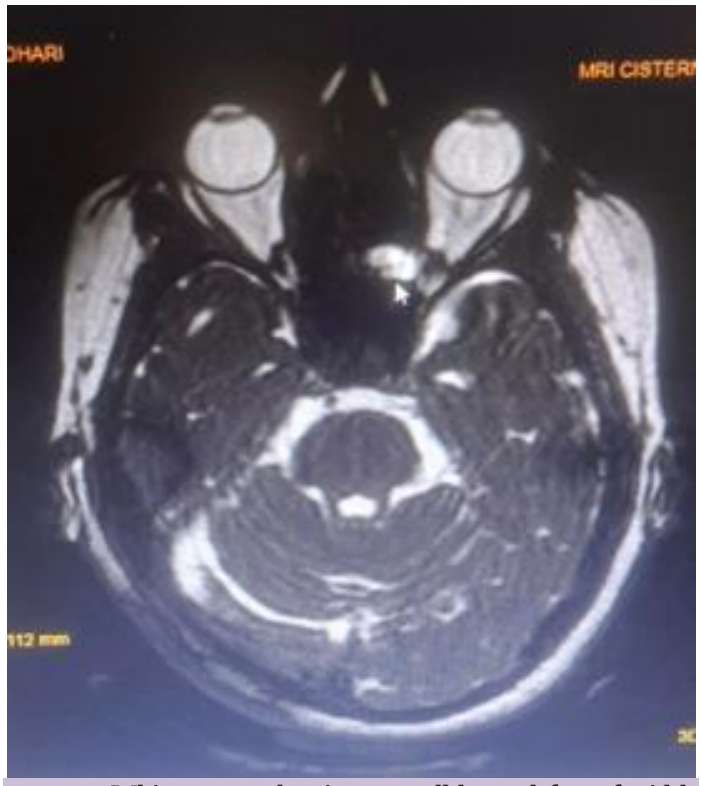

Figure 3: White arrow showing a small bony defect of width 1.5 mm along the left cribriform plate, contiguous with the fluid inferiorly. This fluid column is seen draining along the dependent posterior ethmoid sinuses on the left.

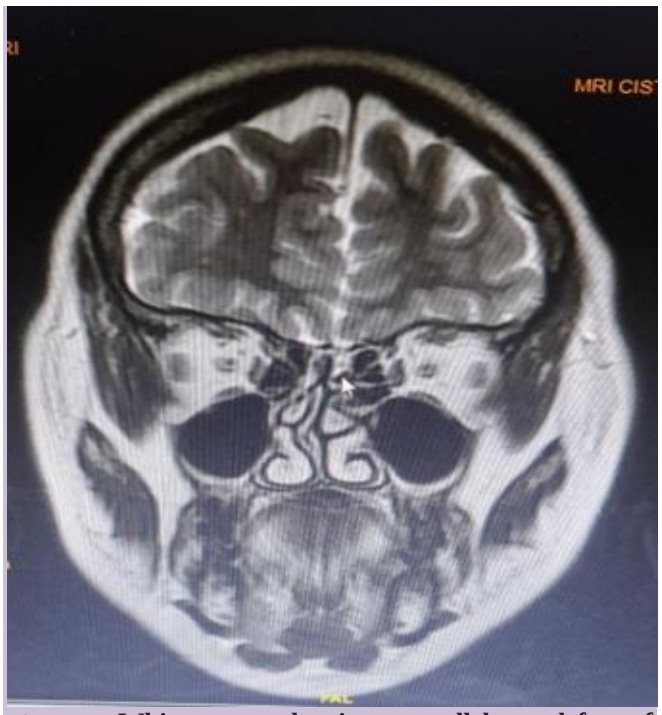

Figure 4: White arrow showing a small bony defect of width 1.5 mm along the left cribriform plate, contiguous with the fluid inferiorly. This fluid column is seen draining along the dependent posterior ethmoid sinuses on the left.

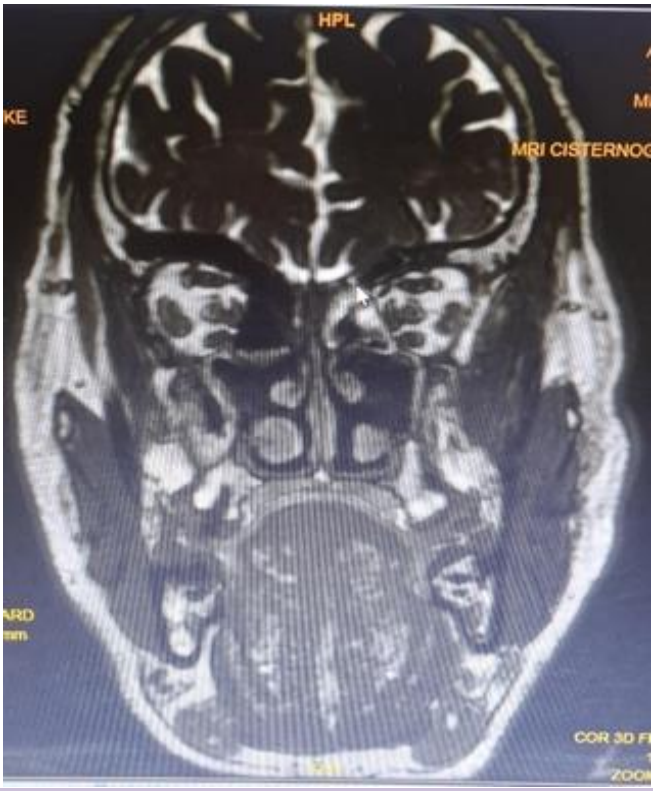

Figure 5: White arrow shows a defect with a column of CSF fluid signal along the lateral margin of the cribriform plate on the left side with the width of the defect measuring approximately 1 mm.

Surgical Management

Under general anesthesia, endoscopic Endonasal correction of the skull base defect was performed on each patient. Without the use of computer-assisted surgical navigation, all procedures were carried out using normal endoscopic sinus surgery equipment. The mucosa near the probable leak location in the base of the skull was removed, and the middle turbinate was removed. The surgical repair was performed using an autologous fascia lata graft in three cases and an autologous abdominal fat graft in one case. The graft was placed using an underlay technique and reinforced with fibrin glue in three cases.

The average surgical duration was 90 minutes (range: 70-110 minutes).

Postoperative Outcomes:

CSF leak closure was achieved in all 4 patients (100%) following endoscopic repair.

No major intraoperative complications were observed.

Patients were instructed to follow rigorous bed rest after surgery. They were also given stool softeners and antitussives to prevent increase in intracranial pressure. On the fourth post-operative day, the nasal pack was removed. On the fifteenth day, the thigh/ abdomen sutures were taken out. On the same day, the surgical site was inspected endoscopically, and crusts were removed, leaving the site unaltered. All patients were followed up for 1-6 months.

Postoperative outcomes were as follows.

Outcome.	Number of Patients
· Complete resolution of CSF leak	4
· Recurrence of leak	0
· Postoperative meningitis.	0
· Other complications.	0

The average hospital stay was 5 days (range 4-7 days).

Follow-Up

Patients were followed for 1 to 3 months.

During the follow-up period:

No recurrence of CSF rhinorrhoea was observed.

All patients remained clinically stable and asymptomatic.

Discussion

Traumatic cerebrospinal fluid (CSF) rhinorrhoea is one of the most common causes of CSF leakage[1] and typically occurs following skull base fractures associated with head injury. The condition results from disruption of the dura mater and skull base, leading to abnormal communication between the subarachnoid space and the nasal cavity. [3] Early recognition and management are essential because persistent CSF leaks can predispose patients to life-threatening complications such as meningitis and intracranial infections.

Trauma accounts for nearly 70-80% of CSF rhinorrhoea cases, most frequently due to road traffic accidents or falls. The most commonly involved anatomical site is the cribriform plate of the ethmoid bone, owing to its thin structure and proximity to the anterior cranial fossa.[4] In the present case series, the majority of patients had defects involving the cribriform plate, which is consistent with previously reported studies.

Clinically, patients typically present with clear watery nasal discharge that increases with changes in head position,

particularly on bending forward. A salty or metallic taste in the throat may also be reported. The reservoir sign is considered a useful clinical indicator.[1] Imaging studies play an important role in confirming the diagnosis and identifying the exact site of the defect. High-resolution computed tomography (CT) of the skull base remains the primary imaging modality for detecting skull base fractures and bony defects.[4]

Historically, open intracranial surgical approaches were used to repair skull base defects. However, these techniques were associated with higher morbidity and longer recovery periods. Over the past few decades, the development of endoscopic techniques has revolutionised the management of CSF rhinorrhoea.

Endoscopic Endonasal repair offers several advantages, including improved visualization, minimal invasiveness, reduced morbidity, and shorter hospital stay. Reported success rates for endoscopic repair range between 90% and 95%, making it the preferred surgical technique in most centers today.

Various graft materials can be used for reconstruction of the skull base defect, including fascia lata, fat grafts, cartilage, and vascularised flaps such as the nasoseptal flap. In our series, majorly fascia lata grafts were used for defect closure due to their availability, flexibility, and high success rate in sealing CSF leaks.

The results of the present case series demonstrate that endoscopic repair achieved successful closure of CSF leaks in all patients, with no recurrences during follow-up. No major postoperative complications were observed. These findings are consistent with previous studies that report excellent outcomes with endoscopic repair techniques

Another important aspect in the management of CSF rhinorrhoea is the prevention of Complications such as meningitis. Early surgical repair in persistent cases significantly reduces this risk. Adequate postoperative care, including head elevation, straining avoidance, and close monitoring, also contributes to favourable outcomes.

Although our study demonstrates successful results with endoscopic repair, certain limitations should be acknowledged. The number of patients included in this case series was relatively small, and the follow-up period was limited. Larger studies with longer follow-up periods would provide stronger evidence regarding long-term outcomes.

Conclusion

Traumatic CSF rhinorrhoea requires early diagnosis and appropriate management to prevent complications such as meningitis. Endoscopic Endonasal repair provides a safe and effective treatment option with excellent outcomes.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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