Indian Journal of Pharmacy Practice., 2025; 18(3):348-351.
https://www.ijopp.org

Case Report

Post-Traumatic (Severe Head Injury) Complicated into Left Cerebrospinal Fluid (CSF) Rhinorrhea, Pneumocephalus, Skull Base Fracture, Deviated Nasal Septum

Hemalatha Ganjala*, Ram Nageswara Rao Gajula, Anusha Nakka, Taslima Naaz Shaik, Gayatri Nakka

Doctor of Pharmacy, Department of Pharmacy Practice, Nirmala College of Pharmacy, Atmakur, Mangalgiri, Guntur, Andhra Pradesh, INDIA.

ABSTRACT

A relatively rare case of Cerebrospinal Fluid (CSF) rhinorrhea accompanied by pneumocephalus with a deviated nasal septum is reported in a young, elderly man who met with alleged Road Traffic Accident (RTA) and self-fell from a two-wheeler, who arrived with the chief complaints of loss of consciousness, nose bleeding, discharge from the nose, and 1 episode of seizures occurring before 5 days of this incident. Upon evaluation, blood investigations showed elevated total counts. CT cisternogram revealed no fill of contrast was injected into the intrathecal space at the L3-L4 level through lumbar puncture under local anesthesia. Evidence of leakage of contrast-filled Cerebrospinal Fluid (CSF) is seen into the sinus through the roof of the sphenoid and sphenoethmoidal recess. Fractures noted in the roof of the sphenoid-Cerebrospinal Fluid (CSF) rhinorrhea. Gross pneumocephalus noted. Fracture of the lesser wing of the sphenoid on the left side. Other fractures seen in the base of bones in the CT scan done. Later, an ENT appointment was requested due to Deviated Nasal Septum (DNS) and left CSF rhinorrhea. Based on the ENT surgeon's pre-anesthesia checkup, he underwent left FESS+left sphenoid CSF leak repair+endoscopic septoturbinoplasty was done under General Anesthesia (GA). The postoperative period was uneventful, with the patient receiving IV antibiotics, antituberculars, and supportive care. A follow-up CT brain scan showed stable CSF rhinorrhea, air in the left lateral ventricle, and post-surgical changes from transsphenoidal surgery. CT cisternogram revealed no new leaks, and the patient gradually improved symptomatically.

Keywords: Cerebrospinal Fluid (CSF) rhinorrhea, Deviated Nasal Septum (DNS), Pneumocephalus, Endoscopic septoturbinoplasty, CT cisternogram.

Correspondence:
Ms. Hemalatha Ganjala
Doctor of Pharmacy, Department of Pharmacy Practice, Nirmala College of Pharmacy, Atmakur, Mangalgiri, Guntur-522503, Andhra Pradesh, INDIA.
Email: ganjalahemalatha30@gmail.com

Received: 18-12-2024;
Revised: 12-01-2025;
Accepted: 27-01-2025.

INTRODUCTION

One of the most problematic disorders linked to head injury is post-traumatic Cerebrospinal Fluid (CSF) leaking. Post-traumatic Cerebrospinal Fluid (CSF) leakage is a consequence of traumatic head injury, which is a leading cause of morbidity and death. Following many forms of traumatic brain damage or neurosurgical procedures, including skull base surgeries, rhinorrhea may develop as a side effect. Meningitis and ventriculitis may accompany pneumocephalus, a seldom-reported consequence following severe traumatic head injury, particularly if treatment has been postponed. About 84% of CSF leaking instances are brought on by head trauma that results in injuries to the skull. Pneumocephalus, which means the buildup of trapped air in cerebral tissues or ventricular spaces, or in the subdural, epidural, or subarachnoid area, is sometimes referred to as pneumatocele or intracranial aerocele. Pneumocephalus may develop on its own or as a side effect of brain surgery or trauma. Depending on its intensity and course, this illness is categorized as either simple or tension pneumocephalus. Depending on when it occurs, pneumocephalus can either be acute or delayed. The delayed kind of pneumocephalus appears longer than 72 hr after appearance, whereas the acute type appears less than 72 hr before onset. Rhinorrhea is described as the discharge of cerebrospinal fluid via the nose, known as cerebrospinal fluid rhinorrhea (CSF rhinorrhea). Usually, a skull injury is the basic reason. CSF rhinorrhea can be inherited, traumatic, or idiopathic.[1-5] A deviated nasal septum is one in which the septum is asymmetrical, making one nasal entrance narrower than the other. Damage to the nose can also result in a deviated septum. This could be the result of a violent confrontation, sports injury, or accident. The warning signs and symptoms include headaches, tinnitus, photophobia, nausea, vomiting, and CSF leakage from the nose, ears, or operation area. A brain CT or MRI is recommended in order to identify the underlying disease and to ascertain the location

DOI: 10.5530/ijopp.20250273

and size of the air bubble. When a brain CT scan identifies subdural, intraventricular, or intracerebral air buildup (air cyst), the "air bell" phenomena might be seen. Infections of the central nervous system, meningitis, and chronic CSF fistulae are among the potentially deadly complications of CSF rhinorrhea. Both conservative and surgical methods are used to treat this disease conditions.[6-9]

CASE REPORT

A 25-years-old male patient presented to the emergency with the chief complaints of loss of consciousness, history of headache, vomiting, nose bleeding, discharge from the nose, and 1 episode of seizures. He is present using medicines for the childbirth plan. Patient appetite and sleep were normal, and bowel and urine movements were regular. The patient is in a non-conscious condition, afebrile, and all other systemic and physical examinations are normal.

Upon assessment, the complete blood count reveals a decrease in hemoglobin and lymphocytes and a rise in neutrophils, white blood cells, and the red cell distribution width. Serum potassium values have slightly increased, and serum sodium levels have slightly decreased, according to the biochemistry report. Upon performing diagnostic techniques, the CT cisternogram shows evidence of leakage of contrast-filled CSF is seen into the left nostril through the roof of the sphenoid and sphenoethmoidal recess. Fractures noted in the roof of the sphenoid, indicating CSF rhinorrhea. Gross pneumocephalus is observed with air in both lateral ventricles, third ventricle cisterns, and cortical sulci. Fracture of the lateral and anterior walls of the left maxillary sinus with hemosinus. Fracture of the lesser wing of the sphenoid bone on the left side. Other fractures are present in the facial bones. No leakage is observed on the right side. The CT scan of the brain (plain study) shows Postoperative case of CSF rhinorrhea repair: there is evidence of postoperative changes in the sphenoid and ethmoids (transsphenoidal surgery). Hyperdense components are noted in the ethmoids and sphenoid. Small pneumocephalus is seen with air in the left lateral ventricles. The patient was diagnosed with left Cerebrospinal Fluid (CSF) rhinorrhea with skull base fracture with pneumocephalus with deviated nasal septum resulted from severe head injury.

The patient was instructed to take the Magnex Forte injection (3 g), which is given intravenously twice in a day, used to prevent bacterial infections. Amikacin (750 mg) is used to treat serious bacterial infections and is given Intravenously (IV) according to a 0-1-0 dose regimen. To treat head infections, 100 mL of metronidazole is also administered Intravenously (IV) on a 1-0-1 dosage schedule. To treat seizures, levetiracetam (1 g) is prescribed and given intravenously according to the 1-0-1 regimen. To control vomiting, ondansetron (8 mg) is administered intravenously in a 1-0-1 schedule. When given Intravenously (IV) according to the 1-0-1 regimen, one ampoule of tramadol aids in the management of moderate to severe pain. Lastly, prophylactic treatment involves the intravenous administration of 40 mg of pantoprazole in a 1-0-0 protocol. Table 2 shows the treatment medications, and Table 3 shows the discharge medications given to the patient.

DISCUSSION

A disease known as pneumocephalus occurs when there is gas or air inside the skull. The majority of cases of pneumocephalus are brought on by trauma, and the prevalence of the condition following head injuries ranges from 1% to 82%, depending on the series. Cerebrospinal Fluid (CSF) rhinorrhea occurs when the Sino-nasal mucosa and the subarachnoid space communicate after bony and meningeal abnormalities in the base of the skull cause CSF to leak from the nose. Although they are rare, cerebrospinal fluid leaks are linked to fatal illnesses such as meningitis, pneumocephalus, or brain abscesses. In this instance, it was discovered that the patient had been involved in an accident that caused a head injury, which led to problems such as rhinorrhea in the left Cerebrospinal Fluid (CSF), a fractured skull base, pneumocephalus, and a deviated nasal septum. In accordance with WHO Fact sheets from 2019, road injuries were the tenth most common cause of death in lower-middle-income nations.[10-14] It is the leading cause of death for youths (15-29 years old) globally. The likelihood of CSF rhinorrhea was raised when

Table 1: Abnormal laboratory investigations.

Laboratory parameters	Observed values	Normal values
Hematology		
Hemoglobin (Hb)	13.5 g/dL	14.0-18.0 g/dL
Neutrophils	80%	40.0-75.0%
Lymphocytes	13.0%	20.0-45.0%
WBC (White Blood Cell) count	13,600 cells/cu.mm	4400-11000 cells/cu.mm
RDW (Red cell Distribution Width)	14.6%	11.6-14.0%
Biochemistry		
Serum sodium	133 mmol/L	134.0-145.0 mmol/L
Serum potassium	5.3 mmol/L	3.5-5.2 mmol/L

Table 2: Course of treatment.

Sl. No.	Brand name	Generic name	Dose	Roa	Frequency	Indication
1.	INJ. MAGNEX FORTE	Cefaperazone ans sulbactam	3 g	Intravenous (IV)	1-0-1	To prevent bacterial infections.
2.	INJ. AMIKACIN	Amikacin	750 mg	Intravenous (IV)	0-1-0	To treat severe bacterial infections.
3.	INJ. METROGYL	Metronidazole	100 mL	Intravenous (IV)	1-0-1	To treat infections in the head.
4.	INJ. LEVEPIL	Levetiracetam	1 g	Intravenous (IV)	1-0-1	To treat seizures in the patient.
5.	INJ.ONDAN	Ondansetron	8 mg	Intravenous (IV)	1-0-1	To treat vomiting.
6.	INJ.TRAMADOL	Tramadol	1 amp	Intravenous (IV)	1-0-1	to treat moderate to severe pain.
7.	INJ.PANTOP	Pantoprazole	40 mg	Intravenous (IV)	1-0-0	For prophylactic therapy.

Table 3: Discharge medications.

Sl. No.	Brand name	Generic name	Dose	Roa	Frequency	Duration
1.	INJ. MAGNEX FORTE	Cefaperazone ans sulbactam	3 g	Intravenous (IV)	1-0-1 (BD)	For 8 days.
2.	INJ. AMIKACIN	Amikacin	750 mg	Intravenous (IV)	0-1-0 (OD)	For 8 days.
3.	TAB. AUGPEN	Amoxycillin and clavulanic acid.	625 mg	Orally (PO)	1-0-1(BD)	For 7 days.
4.	TAB. LEVERA	Levetiracetam	750 mg	Orally (PO)	1-0-1 (BD)	For 10 days.
5.	TAB. SOMPRAZ	Esomeprazole	40 mg	Orally (PO)	1-0-0 (OD)	For 10 days.
6.	TAB. EMCEF	Cefixime	200 mg	Orally (PO)	1-0-1 (BD)	For 10 days.
7.	CAP. CORUS	Vitamin supplement	1 cap	Orally (PO)	0-1-0 (OD)	For 10 days.

patients presented with unilateral, noticeable nasal discharge along with nebulous headache symptoms. It takes a high degree of suspicion to make a reliable diagnosis because patients may also appear with meningitis, seizures, and changes in mental state. The patient has abnormal hematological levels that are those of hemoglobin, lymphocytes, neutrophils, RDW (Red cell Distribution Width), WBC count, and abnormal serum sodium and potassium levels. Table 1 shows the abnormal lab values. To find the CSF leak, diagnostic techniques include MRIs, CT scans of the head, and CT imaging. In our instance, the history, CT cisternogram, and brain CT scan were used to diagnose these illnesses. Management encompasses both preventative and invasive methods.[15-18] In our instance, the patient received IV antibiotics and additional supportive treatment in addition to left FESS, left sphenoid CSF leak correction, and endoscopic septoturbinoplasty performed under General Anesthesia (GA). This patient's deviated nasal septum was corrected surgically using a procedure called septoturbinoplasty.

CONCLUSION

Delayed CSF leaks can cause a number of problems, such as tinnitus, neck discomfort, low-pressure headaches and migraines, loss of taste or smell, and-most dangerous of all-meningitis. Pneumocephalus can cause life-threatening neurologic abnormalities. In order to avoid negative results, a multidisciplinary team must actively manage patients. These medical conditions need to be diagnosed as soon as possible using imaging tests like CT or MRI and specific tests like glucose or beta-2 transferrin testing for CSF in nasal discharge. Management entails treating

the underlying damage, avoiding infection, and occasionally repairing fractured skulls or CSF leaks surgically. For patients to have better results and experience fewer consequences, prompt diagnosis and treatment are essential. In our situation, the patient recovered well and was counseled to make lifestyle changes, such as refraining from blowing their nose, drinking enough water, relaxing, and avoiding activities that raise intracranial pressure. These changes, together with recommended medical follow-up, can help prevent future difficulties.

ACKNOWLEDGEMENT

We are thankful to all of our general medicine department colleagues who assisted and supported us in the preparation of this case report. We appreciate the assistance provided by Manipal Hospitals, Vijayawada, Andhra Pradesh.

CONFLICT OF INTEREST

The authors confirm that they do not have any conflicts of interest.

ABBREVIATIONS

RTA: Road Traffic Accident; **CSF:** Cerebrospinal Fluid; **CT cisternogram:** Computed Tomography Cisternogram; **DNS:** Deviated Nasal Septum; **ENT:** Ear, Nose and Throat; **GA:** General Anesthesia; **FESS:** Functional Endoscopic Sinus Surgery; **L3-L4:** Third and Fourth Lumbar vertebrae; **MRI:** Magnetic Resonance Imaging; **WBC:** White Blood Cell; **RDW:** Red cell Distribution Width; **IV:** Intravenously; **PO:** Per Oral; **BD:** Twice in a day; **OD:** Once in a day.

FUNDING

This case report is gathered from the Manipal Hospital, a multispecialty hospital at Vijayawada with no additional external funding.

SUMMARY

A young elderly man with a history of a Road Traffic Accident (RTA) presented with loss of consciousness, nosebleeding, nasal discharge, and a seizure. CT cisternography revealed CSF rhinorrhea due to fractures in the sphenoid sinus and pneumocephalus. The patient also had a deviated nasal septum. After evaluation, the patient underwent left FESS, sphenoid CSF leak repair, and septoturbinoplasty under general anesthesia. Postoperative care included IV antibiotics and antituberculars. Follow-up CT scans showed stable CSF rhinorrhea and no new leaks. The patient gradually improved symptomatically, with no further complications noted after surgery.

REFERENCES

1. Strautmane S, Balodis A, Smidrovskis K, Auslands K. Management of Posttraumatic Cerebrospinal Fluid Leak with Secondary Diffuse Pneumocephalus Complicated by Meningitis and Communicating Hydrocephalus-Illustrative Case Report. OBM Neurobiology. 2024.
2. Álvarez-Holzapfel MJ, JÁ AD, de Quintana-Schmidt C. Diffuse pneumocephalus after lumbar stab wound. In Anales de Pediatria 2018;90(1):63-4.
3. Das JM, Munakomi S, Bajaj J. Pneumocephalus. InStatPearls [Internet] 2024 Dec 11. StatPearls Publishing.
4. Pillai P, Sharma R, MacKenzie L, Reilly EF, Beery PR, Papadimos TJ, Stawicki SP. Traumatic tension pneumocephalus-Two cases and comprehensive review of literature. International journal of critical illness and injury science. 2017;7(1):58-64.
5. Torabi SJ, Abiri A, Chen X, Senel M, Hsu FP, Lupták A, Khine M, Kuan EC. Multimodal diagnosis of cerebrospinal fluid rhinorrhea: State of the art review and emerging concepts. Laryngoscope Investigative Otolaryngology. 2024;9(3):e1272.
6. Ashwinirani SR, Suragimath G, Telrandhe S, Suragimath DG. Deviated Nasal Septum: A Comprehensive Review. Journal of Datta Meghe Institute of Medical Sciences University. 2024;19(3):406-11.
7. Hallenberger TJ, Rychen J, Soleman J, Fernandez-Miranda JC, Brand Y, Mariani L, Roethlisberger M. Management of recurrent cerebrospinal fluid rhinorrhea caused by sequential, anatomically separated skull base defects-A case-based systematic review. World Neurosurgery. 2024.
8. Liao KH, Wang JY, Lin HW, Lui TN, Chen KY, Yen DH, Jeng MJ. Risk of death in patients with post-traumatic cerebrospinal fluid leakage-analysis of 1773 cases. Journal of the Chinese Medical Association. 2016;79(2):58-64.
9. Mohanraj L, Chinnusamy R. Diagnosis and Management of Paradoxical Cerebrospinal Rhinnorhea in Mondini's Dysplasia. Indian Journal of Otolaryngology and Head and Neck Surgery. 2024;76(5):4851-4.
10. Schirmer CM, Heilman CB, Bhardwaj A. Pneumocephalus: case illustrations and review. Neurocritical care. 2010;13:152-8.
11. Oakley GM, Alt JA, Schlosser RJ, Harvey RJ, Orlandi RR. Diagnosis of cerebrospinal fluid rhinorrhea: an evidence-based review with recommendations. In International forum of allergy and rhinology 2016;6(1)8-16.
12. Wang HP, Reif RJ, Kalkwarf KJ, Jensen HK, Jenkins AK, Bhavaraju A. Prophylactic antibiotics in patients with traumatic Pneumocephalus or cerebrospinal fluid leak. The American Surgeon™. 2023;89(7):3037-42.
13. Lin L, Liu J, Zhou M. Top 10 Causes of Death and the Most Growing Causes During the Chinese Spring Festival Holiday-China, 2017-2021. China CDC Weekly. 2023;5(3):68.
14. Dewan MC, Rattani A, Gupta S, Baticulon RE, Hung YC, Punchak M, Agrawal A, Adeleye AO, Shrime MG, Rubiano AM, Rosenfeld JV. Estimating the global incidence of traumatic brain injury. Journal of neurosurgery. 2018;130(4):1080-97.
15. Mathias T, Levy J, Fatakia A, McCoul ED. Contemporary approach to the diagnosis and management of cerebrospinal fluid rhinorrhea. Ochsner Journal. 2016;16(2):136-42.
16. Zlab MK, Moore GF, Daly DT, Yonkers AJ. Cerebrospinal fluid rhinorrhea: a review of the literature. Ear, nose and throat journal. 1992;71(7):314-7.
17. Hwang SH, Kim SW, Kim DH. Efficacy of Imaging Methods in the Detection and Diagnosis of Cerebrospinal Fluid Rhinorrhea. The Laryngoscope. 2023;133(6):1281-7.
18. Briner HR, Swift AC. CSF Rhinorrhoea and the Anterior Skull Base. In Contemporary Rhinology: Science and Practice 2023:491-508. Cham: Springer International Publishing.

Cite this article: Ganjala H, Gajula RNR, Nakka A, Shaik TN. Post-Traumatic (Severe Head Injury) Complicated into Left Cerebrospinal Fluid (CSF) Rhinorrhea, Pneumocephalus, Skull Base Fracture, Deviated Nasal Septum. Indian J Pharmacy Practice. 2025;18(3):348-51.