

## **Case Report 1**

### **Spontaneous recovery of post-traumatic cerebrospinal fluid rhinorrhea following meningitis: A case report**

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#### **Abstract**

The aim of the present report was to present the patient with an anterior cranial base fracture who developed post-traumatic cerebrospinal fluid rhinorrhea, which recovered after onset of meningitis complication. A 26-year-old male patient who had a traffic accident one week ago was sent to our clinic because of his rhinorrhea persisting for 4 days. On cranial computed tomography, fracture of the left frontal skull base and sinus walls, a fracture line on temporal bone, parenchymal bleeding in the vicinity of the frontal sinus, subarachnoidal bleeding and left temporal extradural hematoma were detected. Then he underwent sinus wall repair and extradural hematoma was drained through bifrontal craniotomy. However, rhinorrhea persisted which resulted a deterioration in consciousness and he entered into a deep somnolent state. When his symptoms of meningitis became apparent, rhinorrhea of the patient disappeared. The patient transferred in intensive care unit and re-connected to a lumbar drainage system. On cerebral magnetic resonance imaging, regression of contrast-enhanced lesions localized in the left anterotemporal and frontal and in the regions lateral to the right trigon and medial to the right thalamus and in the right posteroparietal regions was observed. Despite repair of the anterior cranial fracture and lumbar drainage, rhinorrhea may persist. Herein, development of meningitis caused disappearing of rhinorrhea symptoms without any need for surgical intervention.

**Key words:** Traumatic rhinorrhea, meningitis, smoking

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### Introduction

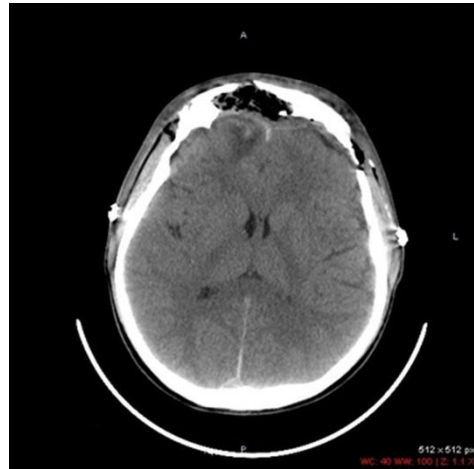
Cerebrospinal fluid (CSF) rhinorrhea is the result of discontinuity of the anatomic borders between the meninges and the mucosa of the paranasal sinuses or nasal cavity. <sup>(1)</sup> The aetiology of CSF rhinorrhea can be classified as traumatic and non-traumatic, with traumatic aetiology subdivided into accidental and iatrogenic. <sup>(2)</sup> Traumatic CSF rhinorrhea is the most common, accounting for about 80-90% of all cases of CSF leakage. <sup>(2)</sup> Most leaks heal with conservative treatment over 7-10 days, with the next stage commonly being lumbar drainage in cases where leaks do not heal. <sup>(3,4)</sup> On the other hand, some surgeons prefer to perform surgical repair of these patients.

The risk of a recurrent leak after transcranial repair of traumatic CSF rhinorrhea has been reported to be 6%-32%. <sup>(4)</sup> The risk of meningitis persists as long as the CSF leak is active. The aim of the present report was to present the patient with an anterior cranial base fracture who developed post-traumatic cerebrospinal fluid rhinorrhea, which recovered after onset of meningitis complication.

### Case presentation

A 26-year-old male patient who had a traffic accident one week ago was sent to our clinic because of his rhinorrhea persisting for 4 days. On cranial computed tomography, fracture of the frontal skull base and sinus walls, a fracture line on temporal bone, parenchymal bleeding in the vicinity of the frontal sinus, subarachnoidal bleeding and left temporal extradural hematoma were detected (**Fig 1**). Then he underwent sinus wall repair and his extradural hematoma was drained through bifrontal craniotomy. However, rhinorrhea persisted which required removal of his lumbar drainage on the 9 day with resultant improvement in his general health state. He was recommended against movements, which increase intracranial pressure and smoking. Despite these recommendations, the patient continued to smoke and one day later his state of consciousness deteriorated and he entered into a deep somnolent state. Besides when his symptoms of meningitis became apparent, rhinorrhea of the patient disappeared. The patient transferred in intensive care unit and re-connected to a lumbar drainage system for monitorization of CSF cells and intrathecal therapy. On his CSF culture media coccobacilli

and on both CSF and blood cultures acinetobacteria grew. On cerebral magnetic resonance imaging, regression of contrast-enhanced lesions localized in the left anterotemporal and frontal and in the regions lateral to the right trigon and medial to the right thalamus and in the right posteroparietal regions was observed (**Fig 2**).



**Fig 1.** Computed tomography images showing anterior cranial base and frontal sinus fractures.



**Fig 2.** Cranial magnetic resonance imaging obtained after diagnosis of meningitis was made, foci of abscess are seen.

### Discussion

The relationship between skull fractures and CSF leaks is well described throughout the

literature. Identifying the types of skull fractures is crucial in determining appropriate management. Anterior skull base fractures include a significant number of injuries resulting in rhinorrhea from a CSF fistula. <sup>(5)</sup> Friedman *et al.* reported that CSF fistulas in 84% of patients were attributable to skull fractures most commonly involving the frontal sinus, followed by the orbital and petrous bones. <sup>(6)</sup> While anterior skull base fractures appear to be the most common types of fractures resulting in rhinorrhea, Brodie *et al.* indicated that CSF rhinorrhea could also result from temporal bone fractures. <sup>(7)</sup> In 820 temporal bone fractures, they found that 72% of patients with temporal bone fractures and CSF fistulas presented with CSF rhinorrhea. In the present case, fracture of the frontal skull base, sinus walls, and temporal bone was observed.

Optimal management of post-traumatic CSF rhinorrhea focuses on the selection of an appropriate treatment strategy. <sup>(2)</sup> Seventy percent of the post-traumatic fistulas generally heal spontaneously within 7 days without any need for therapeutic intervention. In patients who fail first line treatment, including bed rest in an upright position, avoidance of strenuous activities, and the use of laxatives or stool softeners, a lumbar drain may be installed for several days. Some surgeons also use lumbar drain postoperatively. In patients whose posttraumatic fistulas persisted for more than 7-10 days, the risk of developing meningitis increases. Several surgical techniques have been described in the literature, ranging from the classic frontal craniotomy, which can be bilateral or unilateral, to the suprasinuotransfrontal approach with lateral extension. <sup>(8)</sup> Transnasal endoscopic repair of the anterior skull base has become the standard procedure for the repair of most of these fistulas. <sup>(9)</sup> Endoscopic Repair of CSF rhinorrhea is recommended for patients with CSF leaks who do not respond to conservative treatment. <sup>(10)</sup>

In the present case, bifrontal craniotomy was performed. Still unsettled in the literature is the issue of placing a lumbar drain after the repair of CSF rhinorrhea. Indications for lumbar drain placement are not clear, and most surgeons insert them based on their past anecdotal results. <sup>(8)</sup> Some authors report that there is no difference in CSF rhinorrhea repair

with or without postoperative lumbar drain insertion. <sup>(11)</sup> In the present case, lumbar drainage performed for the postoperative 9 days. The risk of a recurrent leak after transcranial repair of traumatic CSF rhinorrhea has been reported to be 6%-32%. <sup>(4)</sup> The risk of meningitis persists as long as the CSF leak is active. Daudia *et al.* reported three patients who developed meningitis after surgical closure in a series of 111 patients with proven CSF rhinorrhea. Brodie *et al.*, in their meta-analysis of 324 CSF leaks, reported one patient with postoperative meningitis. <sup>(7)</sup> In the present case, rhinorrhea persisted which required removal of his lumbar drainage and 14 days after onset of traumatic rhinorrhea, symptoms of meningitis became apparent.

Despite repair of the anterior cranial fracture and lumbar drainage, rhinorrhea may persist. Herein, development of meningitis caused disappearing of rhinorrhea symptoms without any need for surgical intervention.

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#### References:

1. Giannetti AV, de Morais Silva Santiago AP, Becker HMG, Guimaraes RES. Comparative study between primary spontaneous cerebrospinal fluid fistula and late traumatic fistula. *Otolaryngol Head Neck Surg.* 2011;144: 463-8.
2. Abuabara A. Cerebrospinal fluid rhinorrhoea: diagnosis and management. *Med Oral Patol Oral Cirbucal.* 2007;12: E397-400.
3. Kerr JT, Chu FW, Bayles SW. Cerebrospinal fluid rhinorrhea: diagnosis and management. *OtolaryngolClin North Am.* 2005; 38: 597-611.
4. Bell RB, Dierks EJ, Homer L, Potter BE. Management of cerebrospinal fluid leak associated with craniomaxillofacial trauma. *J Oral MaxillofacSurg* 2004; 62: 676-84.
5. Scholsem M, Scholtes F, Collignon F, Robe P, Dubuisson A, Kaschten B, et al. Surgical management of anterior cranial base fractures with cerebrospinal fluid fistulae: a single-institution experience. *Neurosurgery* 2008; 62: 463-71.

6. Friedman JA, Ebersold MJ, Quast LM. Post-traumatic cerebrospinal fluid leakage. *World J Surg.* 2001; 25: 1062-6.
7. Brodie HA, Thompson TC. Management of complications from 820 temporal bone fractures. *Am J Otol.* 1997; 18: 188-97.
8. Casiano RR, Jassir D. Endoscopic cerebrospinal fluid rhinorrhea repair: is a lumbar drain necessary? *Otolaryngol Head Neck Surg.* 1999; 121: 745-50.
9. Tóth M, Selivanova O, Schaefer S, Mann W. Spontaneous cerebrospinal fluid rhinorrhea: a clinical and anatomical study. *Laryngoscope.* 2010;120(9):1724-9.
10. Bolger WE, McLaughlin K. Cranial bone grafts in cerebrospinal fluid leak and encephalocele repair: a preliminary report. *Am J Rhinol.* 2003;17 (3):153-8.
11. Meco C, Arrer E, Oberascher G: Efficacy of cerebrospinal fluid fistula repair: sensitive quality control using the beta-trace protein test. *Am J Rhinol.* 2007; 21: 729-36.