

## Parapharyngeal cerebrospinal fluid collection: an unusual complication of temporal bone fracture

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### Abstract

**Objective:** We present an unusual case of parapharyngeal cerebrospinal fluid collection causing upper airway obstruction following a temporal bone fracture.

**Method:** Case report and literature review of temporal bone fracture associated with parapharyngeal cerebrospinal fluid collection.

**Results:** A 19-year-old man presented with cerebrospinal fluid otorrhoea and temporal bone fracture following a head injury. He was discharged after 48 hours of observation. The patient returned within 6 hours with sudden unilateral neck swelling and stridor after blowing his nose. Flexible nasendoscopy and computed tomography showed extrinsic compression of the pharynx, with partial upper airway obstruction. A literature review using Pubmed™ and Medline™ identified no previously reported cases of parapharyngeal cerebrospinal fluid collection associated with temporal bone fracture.

**Conclusion:** This case illustrates a previously undescribed complication of temporal bone fracture. Raised intracranial pressure in the presence of a cerebrospinal fluid fistula may lead to airway obstruction, following temporal bone fracture.

**Key words:** Temporal Bone; Fracture; Cerebrospinal Fluid Otorrhea; Airway Obstruction; Meningitis

### Introduction

Temporal bone fracture is a serious sequel of head trauma, with complications including facial nerve injury, hearing loss, cerebrospinal fluid (CSF) fistula and meningitis.<sup>1</sup> We present an unusual case of temporal bone fracture associated with CSF fistula and a parapharyngeal CSF collection causing upper airway obstruction.

### Case report

A 19-year-old man presented to the emergency department following a witnessed fall from 1 m onto concrete. He sustained a head injury with loss of consciousness lasting 3 minutes. On arrival in the emergency department, the patient's Glasgow Coma Score was 13/15 (Eye(E)3 Verbal(V)4 Motor response (M)6), his pupils were equal and reactive, and a neurological examination showed no sensorimotor deficit. The patient was reported to have lost approximately 200 ml of clear fluid from the left ear.

Otосcopy showed haemoserous fluid within the left ear canal but no visible canal wall or tympanic membrane defect. The head and neck examination was

otherwise unremarkable, with normal facial nerve function and no other signs of skull base fracture.

The patient's serum ethanol level on admission was 252 mg/dl.

Computed tomography (CT) showed indirect evidence of temporal bone fracture, with fluid in the left

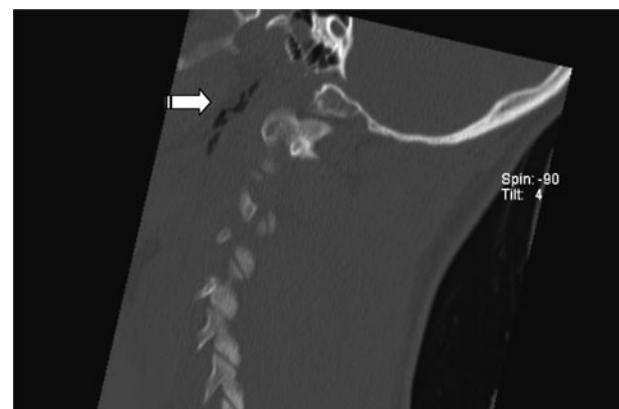


FIG. 1

Sagittal, non-contrast computed tomography scan on initial admission, showing air locules (arrow) within the parapharyngeal tissues.

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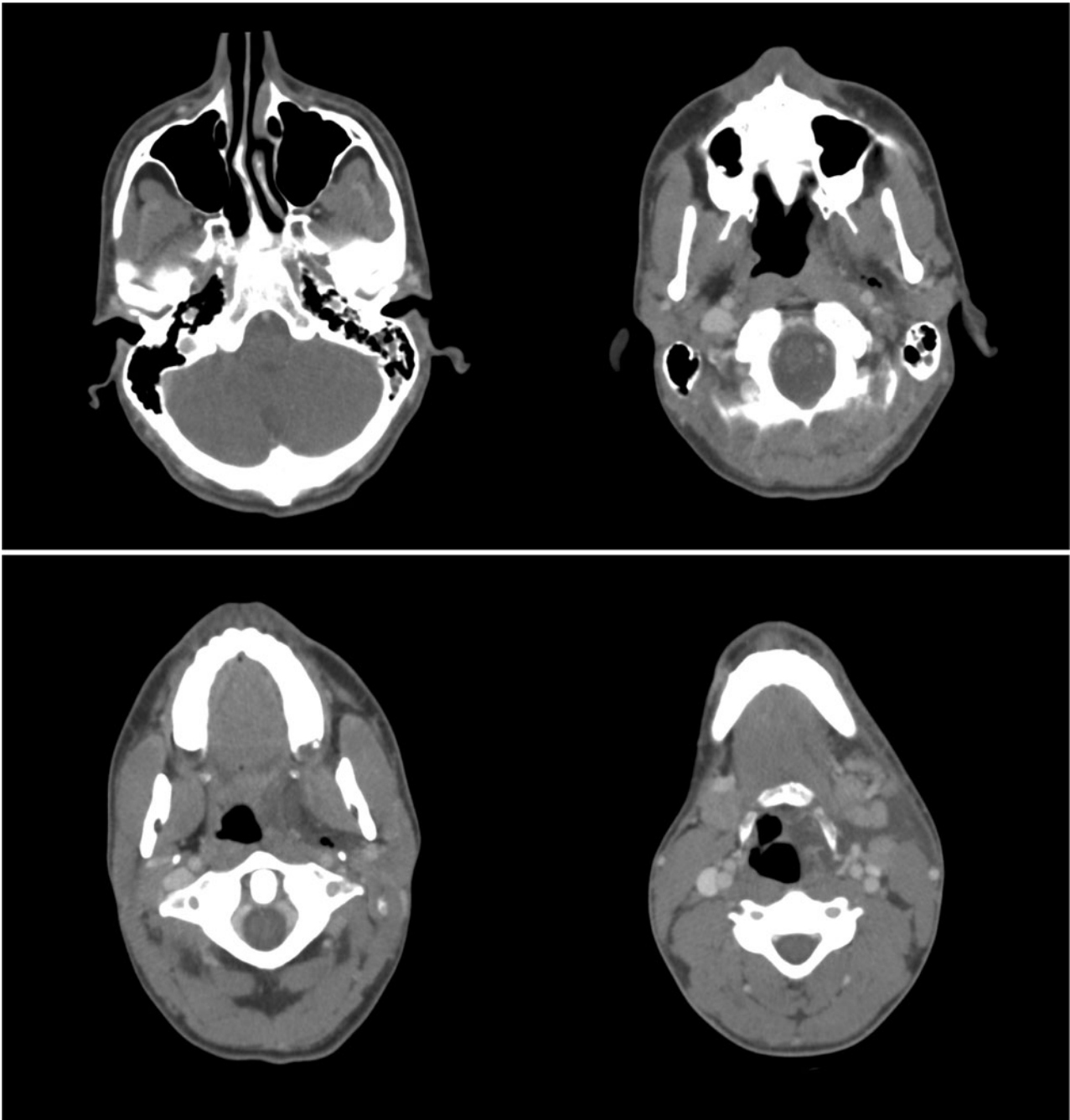


FIG. 2

Axial computed tomography scans taken during second admission, after the patient presented with stridor, showing a parapharyngeal fluid collection causing extrinsic compression of pharyngeal structures.

mastoid air cells and emphysema within the left temporomandibular joint (TMJ) and parapharyngeal tissues (Figure 1). There were no other intracranial or cervical spinal injuries identified, and no evidence of pneumocephalus.

Notably, the patient had undergone previous surgery at the age of eight years for drainage of a left retropharyngeal abscess, via an external approach.

The patient was admitted for observation, and his level of consciousness improved over several hours. Repeated otoscopy after 24 hours showed an intact canal wall and tympanic membrane with a middle-ear

effusion. Audiometry showed a moderate conductive hearing loss across all frequencies.

The patient was observed for 48 hours. There was no further otorrhoea, and he was discharged home without antimicrobial prophylaxis.

Shortly after leaving hospital, the patient developed a sudden, painful swelling in the left side of the neck after blowing his nose.

He returned to the emergency department with stridor. Flexible nasendoscopy showed extrinsic compression of the left supraglottic structures, with partial airway obstruction.

Repeated CT imaging showed extensive fluid stranding within the soft tissues of the left parapharyngeal space, with displacement of the oropharynx towards the right (Figure 2). The fluid extended inferiorly within the left parapharyngeal space, causing a mass effect displacing the carotid sheath. Inferiorly, the fluid did not conform to normal fascial planes, extending both superficial and deep to the strap muscles.

Based on the degree of upper airway compromise, the patient was electively intubated and admitted to the intensive care unit.

Over the next 12 hours, he developed a fever of 39°C with leukocytosis. Lumbar puncture showed  $272 \times 10^6$  white cells, while polymerase chain reaction analysis confirmed *Neisseria meningitidis* infection.

Antimicrobial treatment with intravenous ceftriaxone was commenced, with a good clinical response. The patient was successfully extubated the following day, and his neck swelling resolved over 24 hours.

## Discussion

This case illustrates several unusual clinical and radiological features of temporal bone fracture. The admission CT scan showed no fracture line, despite positive clinical signs and indirect radiological evidence of fracture. The finding of air in the TMJ and parapharyngeal tissues implied a direct communication between air-containing structures of the temporal bone, TMJ fossa and parapharyngeal space.

- **Complications of temporal bone fracture include facial nerve injury, hearing loss, cerebrospinal fluid (CSF) fistula and meningitis**
- **Cerebrospinal fluid fistula can lead to a parapharyngeal CSF collection, following temporal bone fracture**
- **Activities that elevate intracranial pressure may precipitate airway obstruction following temporal bone fracture**

A literature search showed only one previously documented case of parapharyngeal emphysema associated with temporal bone fracture, following a bicycle crash.<sup>2</sup> In this case, a 36-year-old woman presented with dysphagia two days post-injury, and CT scanning showed emphysema below the tympanic bone and spreading along the parapharyngeal space.

Guidelines for the management of CSF fistula include bedrest and stool softeners to avoid elevating

the intracranial pressure.<sup>1</sup> In our patient, we propose that a sudden rise in intracranial pressure associated with nose-blowing precipitated a CSF leak into the neck via a flap-valve mechanism. A similar phenomenon has been described with the development of tension pneumocephalus following temporal bone fracture.<sup>3</sup>

The differential diagnosis for a parapharyngeal fluid collection includes haematoma and infection. Rapid resolution of swelling and the absence of clinical signs of infection make these diagnoses less likely. In our patient, percutaneous aspiration of a fluid sample for  $\beta$ -2 transferrin assay may have confirmed CSF leakage; however, this was contraindicated given the risk of iatrogenic infection.

A further literature review returned several case reports of parapharyngeal CSF collection following cervical discectomy.<sup>4</sup> In one such case, a tiny dural defect associated with raised intracranial pressure led to a retropharyngeal CSF collection causing severe dysphagia. A similar phenomenon has been described in patients following excision of skull base tumours.<sup>5</sup>

This case illustrates a previously unreported complication of temporal bone fracture. A CSF fistula following temporal bone fracture can lead to a parapharyngeal CSF collection causing airway obstruction.

## References

- 1 Brodie HA, Thompson TC. Management of complications from 820 temporal bone fractures. *Am J Otol* 1997;**18**:188–97
- 2 Plaza G, Martinez-San Millan J, Navas C, Martinez-Vidal A. Parapharyngeal emphysema – an unusual complication of temporal bone trauma. *J Laryngol Otol* 1998;**112**:301–2
- 3 Ommaya AK. Cerebrospinal fluid fistula and pneumocephalus. In: Wilkins RH, Rengachary SS, eds. *Neurosurgery*, 2nd edn. New York: McGraw-Hill, 1996;2773–82
- 4 Spennato P, Rapana A, Sannino E, Iaccarino C, Tedeschi E, Massarelli I *et al.* Retropharyngeal cerebrospinal fluid collection as a cause of postoperative dysphagia after anterior cervical discectomy. *Surg Neurol* 2007;**67**:499–503
- 5 Cheng A, Maronian N, Futran N. Cerebrospinal fluid leak in the neck: a rare complication of glomus vagale excision. *Otolaryngol Head Neck Surg* 2006;**134**:334–5

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