



LETTER TO THE EDITOR

Meningitis and hydrocephalus secondary to panfacial fracture repair in a traumatic brain injury patient

The management of post-traumatic cerebrospinal fluid (CSF) leak in the context of facial bone fracture remains a surgical challenge. The complexity increases in those cases of concurrent traumatic brain injury and craniofacial fractures. The optimal timing for facial bone fracture repair is still controversial in traumatic CSF leak patients [1].

An unrestrained, non-helmeted 14-year-old female on a motor scooter sustained injuries when struck by an automobile. She had an initial loss of consciousness, with multiple contusions and lacerations over the face, trunk and lower limbs. She was subsequently sent to the emergency room of a regional hospital with a Glasgow coma scale of E2V4M5. Brain computed tomography revealed type II frontobasal fracture, Le Fort I maxillary fracture, naso-orbitoethmoid fracture and intracerebral hemorrhage with pneumocephalus (Fig. 1). She was admitted to the intensive care unit for further evaluation and management. CSF leak ceased spontaneously 10 days later under conservative treatment. Her general condition improved gradually.

The patient was referred to our hospital on the third week for further facial fracture repair. Open reduction and internal fixation of the right zygoma, disimpaction of the bilateral maxilla, orbital floor repair, and closed reduction of nasal bone were carried out on the 25th day after injury. The operation proceeded uneventfully. Prophylactic antibiotic was administered perioperatively, but 35 hours after the operation, fever, chills, vomiting and severe headache were noted.

Physical examination revealed a positive Kernig's and Brudzinski's signs, raising suspicion for meningitis. Brain computed tomography revealed enlarged ventricles but showed no intracranial hemorrhage. Lumbar puncture

yielded cloudy CSF and a somewhat elevated opening pressure (16.5 cmH₂O). Vancomycin and a third-generation cephalosporin were administered for *Klebsiella pneumoniae* meningitis with hydrocephalus. Another brain computed tomography scan revealed brain edema and progression of hydrocephalus. An external ventricular device was inserted for CSF drainage in an attempt to reduce the intracranial pressure. After 2 weeks of CSF drainage, a ventricular-peritoneal shunt was placed. Three weeks after facial repair surgery, the patient was transferred to the general ward without neurologic sequelae.

When patients present with CSF leak and complicated facial fractures, determination of the optimal timing of facial reconstruction is a difficult clinical decision to make [2]. We performed midface disimpaction and facial bone repair in the third week. Meningitis is rare in this type of facial bone repair [3]. We did not touch the frontal sinus area, as the integrity of the newly-healed dura could potentially have been compromised by the increased intracranial pressure secondary to the intraoperative vibration of the fractured fragments of the skull base. Her meningitis may have been caused by ascending infection from the compromised dura.

Patients at high risk for hydrocephalus include those who have had a subarachnoid hemorrhage after trauma, and those with spontaneous CSF leak [4]. Increasing age, longer duration of coma, and decompressive craniectomy all appear to increase the risk of post-traumatic hydrocephalus [5]. To the best of our knowledge, we are the first to report two uncommon CNS complications, meningitis and hydrocephalus, in a complex head injury patient post facial bone fracture repair.

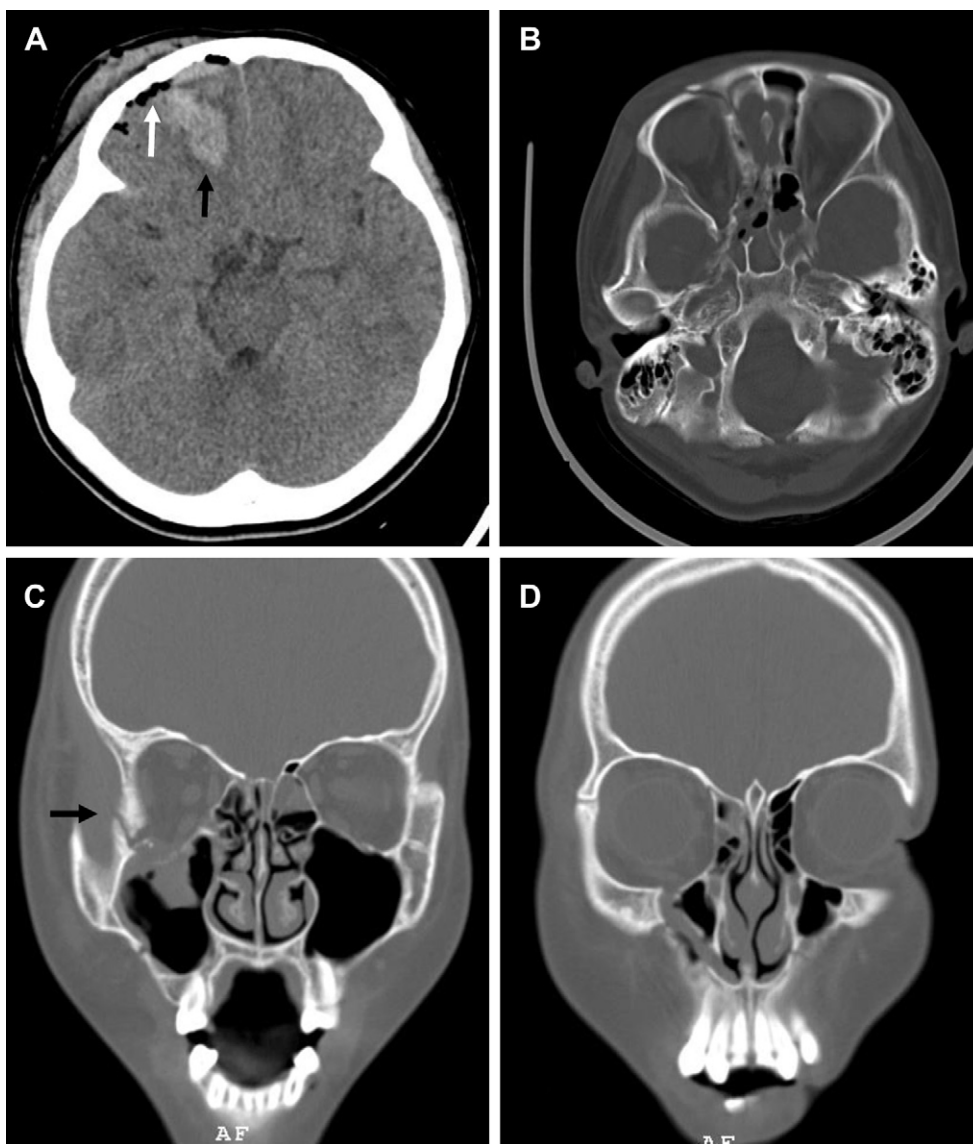


Figure 1. Initial brain computed tomography. (A) Intracerebral hemorrhage (black arrow) and pneumocephalus (white arrow) were noted over right frontal lobe. (B) Frontobasal fracture, type II. (C) and (D) Right zygoma (arrow), orbital floor and Le Fort I maxillary fracture.

References

- [1] Harvey RJ, Smith JE, Wise SK, Patel SJ, Frankel BM, Schlosser RJ. Intracranial complications before and after endoscopic skull base reconstruction. *Am J Rhinol* 2008;22:516–21.
- [2] Malik TH, Bruce IA, Kelly G, Ramsden RT, Saeed SR. Does meningitis stop CSF rhinorrhea following lateral skull base surgery? *Skull Base* 2007;17:235–8.
- [3] Tung TC, Tseng WS, Chen CT, Lai JP, Chen YR. Acute life-threatening injuries in facial fracture patients: a review of 1025 patients. *J Trauma* 2000;49:420–4.
- [4] Carrau RL, Snyderman CH, Kassam AB. The management of cerebrospinal fluid leaks in patients at risk for high-pressure hydrocephalus. *Laryngoscope* 2005;115:205–12.
- [5] Mazzini L, Campini R, Angelino E, Rognone F, Postore I, Oliveri G. Posttraumatic hydrocephalus: a clinical, neuro-radiologic, and neuropsychologic assessment of long-term outcome. *Arch Phys Med Rehabil* 2003;84:1637–41.

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