

Traumatic direct carotid cavernous fistula following partial maxillectomy



Carotid cavernous fistula (CCF) is a rare traumatic complication that can occur following iatrogenic interventions.¹ We report a case of direct CCF (type A) developing following partial maxillectomy with the Le Fort I approach. This case report adheres to the ethical principles outlined in the Declaration of Helsinki as amended in 2013.

An otherwise healthy 77-year-old male underwent left wide local excision with partial maxillectomy, neck dissection, and free flap reconstruction by oral and maxillofacial surgeons for left buccal small cell carcinoma. The maxillectomy was carried out with pterygomaxillary dysjunction as per the Le Fort I procedure, with the maxilla being fractured in a downward and outward direction. The operation lasted 10 hours, and the patient was planned for overnight ventilation in the intensive care unit.

At the end of surgery, the patient was noted to have left pupillary dilation and proptosis, prompting an immediate lateral canthotomy with cantholysis for presumed orbital compartment syndrome, as well as a concurrent urgent ophthalmology consult. Ophthalmic examination 30 minutes after the intervention revealed a left pupil that remained dilated, left proptosis with moderate chemosis, intraocular pressure of 24 mm Hg, and a soft orbit.

A computed tomography scan was obtained and showed no significant orbital hemorrhage. There was a subtle abnormality at the left internal carotid artery (ICA) region.

Further computed tomography angiography (CTA; Fig 1 and 2) and subsequent digital subtraction angiography confirmed a direct CCF adjacent to a sphenoid bone fragment. A fracture plane was noted extending vertically from the maxilla through the pterygoid plate toward the sphenoid (Fig. 2). On extubation the following day, the patient's visual acuity OS was no light perception. The patient developed increasing left eye pain, worsening proptosis, chemosis, and a pulsatile bruit and underwent urgent coil embolization of the CCF. One month later, visual acuity remained no perception to light, and the patient's pupil remained unreactive, but there was improved swelling and proptosis.

We report a case of poor visual outcome following traumatic direct CCF after maxillectomy with the Le Fort I approach. In our case, a fracture plane was noted extending from the surgical site toward the sphenoid, causing a fracture near the ICA, with probable ICA laceration causing a direct CCF.

The majority of direct CCFs arise secondary to trauma resulting in arterial wall damage. The rate of iatrogenic CCF formation is rare and has been reported following Le Fort osteotomies, maxillary expansion, rhinoplasty, and sphenoid surgery. Suggested mechanisms of CCF formation include pterygoid osteotomy and downfracture of the maxillary segment causing trauma to the skull base and the carotid artery. Furthermore, anatomic differences of the skull base and patients with craniofacial abnormalities may be predisposed to iatrogenic carotid artery injury.

A unique characteristic of our patient is the poor visual acuity on presentation, which was only present in 3

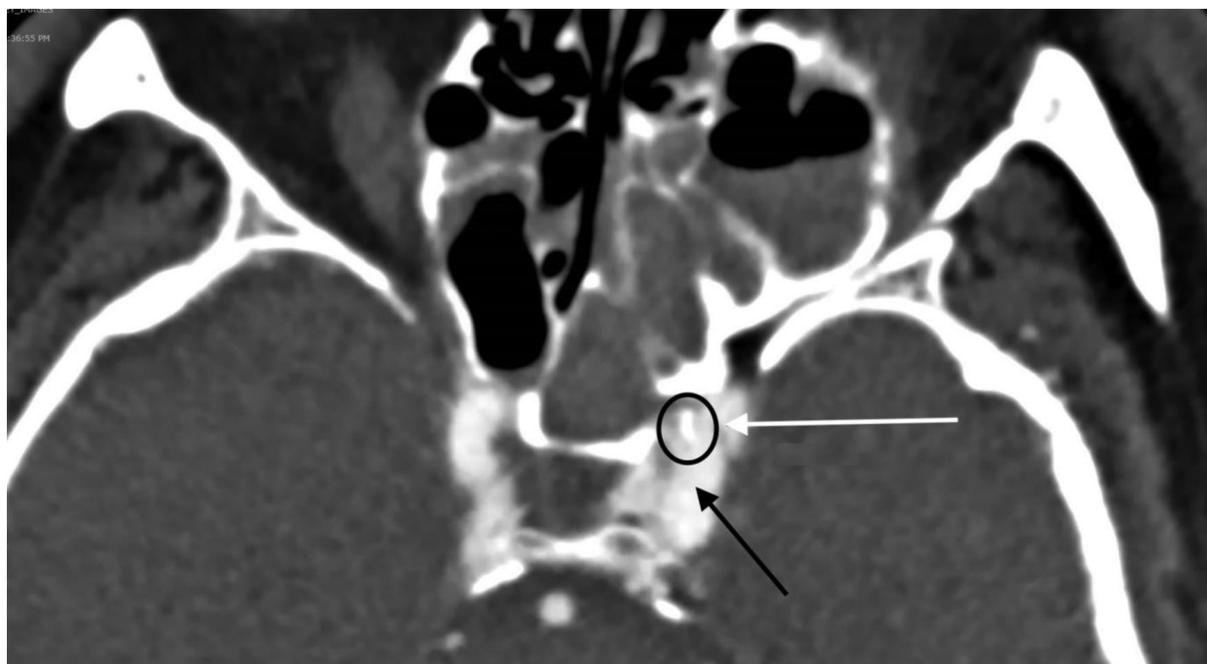


Fig. 1—Computed tomography angiography, axial view, soft tissue window. Direct carotid-cavernous fistula (white arrow) is visualized due to arterial opacification of the cavernous sinus from the internal carotid artery (black arrow). Small fracture fragment of sphenoid bone (black circle) is noted near the internal carotid artery and immediately adjacent to the fistula.

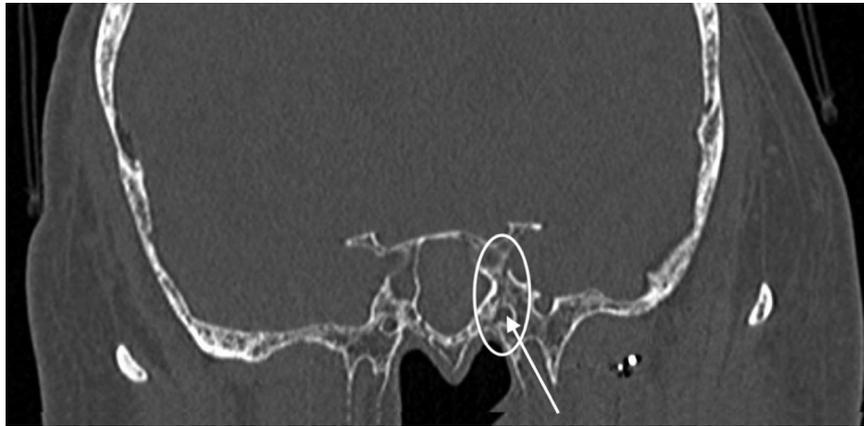


Fig. 2—Computed tomography angiography, axial view, bone window. A fracture plane is noted extending vertically from the maxilla through the pterygoid plate toward the sphenoid (white circle). The fracture runs medially to the foramen rotundum (white arrow). The apex of the fracture is traced to the small bone fragment (black circle) in Fig. 1. CA = internal carotid artery

previously reported cases of direct CCF.^{1–3} Hes and de Man describe a patient with rapidly decreasing visual acuity OD due to a direct CCF following a Le Fort 1 advancement who made a complete recovery following coil embolization to treat the fistula.¹ Similarly, the patient of Demarkarian et al. presented with slightly decreased visual acuity OS and diplopia due to a direct CCF from similar etiology that had completely resolved on follow-up after treatment with coil embolization.² Permanent vision loss as in our patient, however, has only been reported by Kamio et al., whose patient also had significant vision loss on presentation that did not improve despite identical urgent treatment.³ Similarly, despite urgent CCF embolization on clinical deterioration, our patient remained no perception to light, suggesting that significant vision loss on presentation due to CCF confers an extremely poor prognosis. In a retrospective review by Halbach et al., blindness occurred in 4.5% of patients with CCF despite urgent closure of the fistula, and only 1 patient was noted to gradually recover vision 4 days after treatment.⁴ Commonly postulated mechanisms of vision loss secondary to direct CCF include venous hypertension secondary to outflow obstruction with subsequent optic nerve ischemia and direct compression of the optic nerve or chiasm by the distended cavernous sinus.⁵

In conclusion, direct CCF is a rare postoperative complication that poses the severe risk of vision loss. This case adds to the sparse body of literature that describes permanent vision loss as a complication of direct CCF developing in the context of a partial maxillectomy with a Le Fort I approach.

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Footnotes and Disclosure

The authors have no proprietary or commercial interest in any materials discussed in this correspondence.