

Case Report

Isolated orbital roof blow-in fracture

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ABSTRACT

We report a rare case of a right orbital roof blow-in fracture in a 40-year-old male with concomitant basal skull fracture and intracranial hemorrhage after a fall backward. Trauma, neurosurgery, ophthalmology, and maxillofacial surgery consultations were obtained. Conservative, non-surgical management was recommended for all injuries, and outpatient follow up for orbital fracture with no surgery offered.

Case report

A 40-year-old male presented to the emergency department via EMS with hypothermia, soft tissue swelling of the posterior head, and bilateral peri-orbital ecchymosis and edema after being found down on a cement walkway. He was found on his back at the bottom of a short set of steps. Initial examination revealed “raccoon eyes,” bilateral periorbital edema and ecchymosis, but no abrasion, laceration or other sign of direct trauma to the face [1]. Glasgow coma score was 14, and no neurological deficit was appreciated. The patient was intoxicated at time of presentation, blood alcohol level 0.31 g/dL, however he denied striking his face, and recalled falling backward. There were no field of gaze deficits, no pain associated with eye movement, no gross disparity in globe size on secondary survey. Trauma surgery and neurosurgery consultations were obtained following completion of imaging. Transfer to a tertiary care center with ophthalmology and maxillofacial surgery was recommended and performed for management of orbital fractures per recommendation of trauma team. Conservative, non-surgical management was recommended for all injuries, and outpatient follow up at time of discharge for orbital fractures. The patient's hospital course was complicated by alcohol withdraw and *Clostridium difficile* colitis. He was discharged to a skilled nursing facility on hospital day seventeen.

Imaging findings

Noncontrast computed tomography scan (CT) of the head demonstrated contiguous, non-displaced skull fractures involving the left occipital bone, right parietal bone, right temporal bone and extending through the right mastoid/middle ear with extensive intracranial hematomas overlying the superior frontal and parietal convexities (Fig. 1). In addition, there were noted subarachnoid hemorrhages within the basal and prepontine cisterns, and scattered pneumocephalus (Fig. 2). CT scan of the head and maxillofacial structures was obtained and compared with a study from five days prior (Fig. 3). Dedicated maxillofacial CT scan demonstrated acute, isolated blow-in fracture of the posterior roof of the right orbit and non-displaced fracture of the left orbital roof with accompanying orbital hematomas (Fig. 4). The zygomatic arches, pterygoid plates and temporomandibular joints were all intact.

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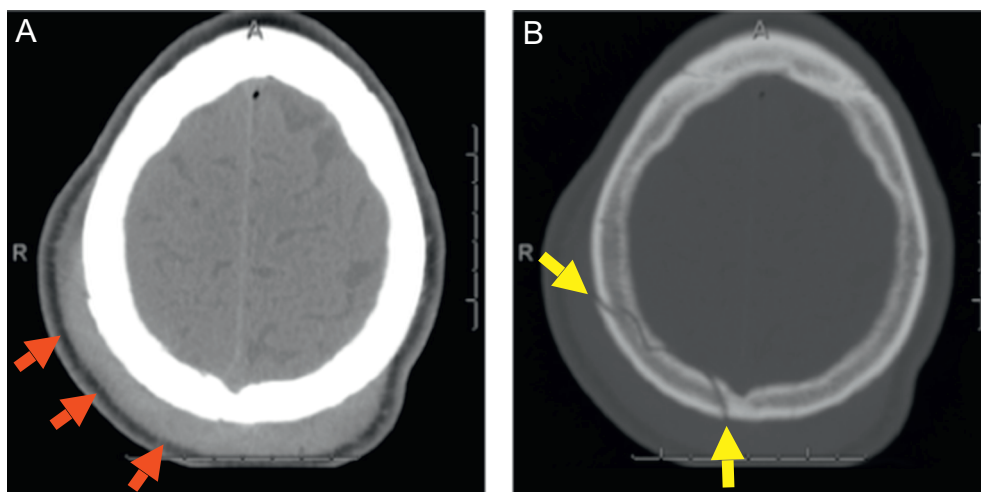


Fig. 1. Axial non-contrast CT images. A) Large parietal scalp hematoma (red arrows). B) Nondisplaced parietal skull fracture (yellow arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

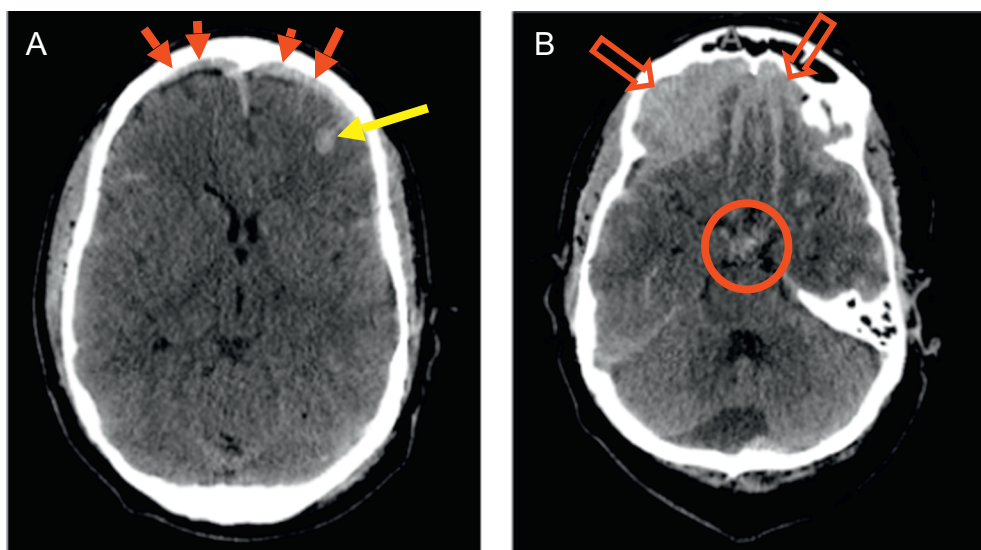


Fig. 2. Axial noncontrast CT images of the brain. A) Bifrontal subdural hemorrhages (red arrows), left frontal hemorrhagic contusion (yellow arrow). B) Suprasellar subarachnoid hemorrhage (red circle). Left cerebellar subdural hematoma. Extensive bifrontal subarachnoid and subdural hemorrhage (open arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

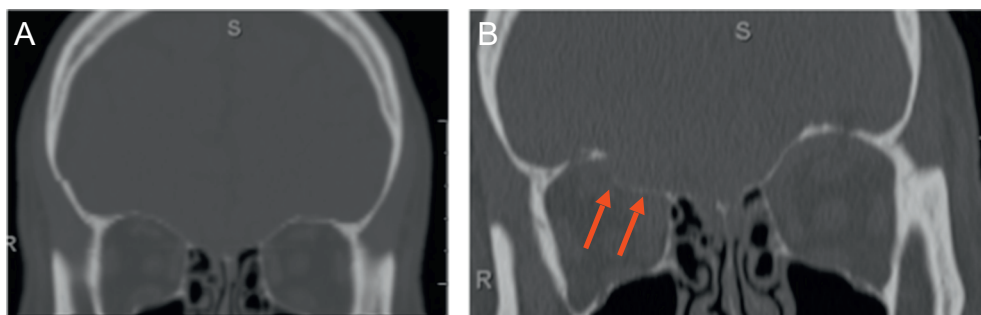


Fig. 3. A) Coronal CT image in bone windowing from 5 days prior shows a normal right orbital roof. B) Coronal and Axial CT images at time of presentation shows a displaced orbital "blow-in" fracture in the medial, posterior right orbital roof (red arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

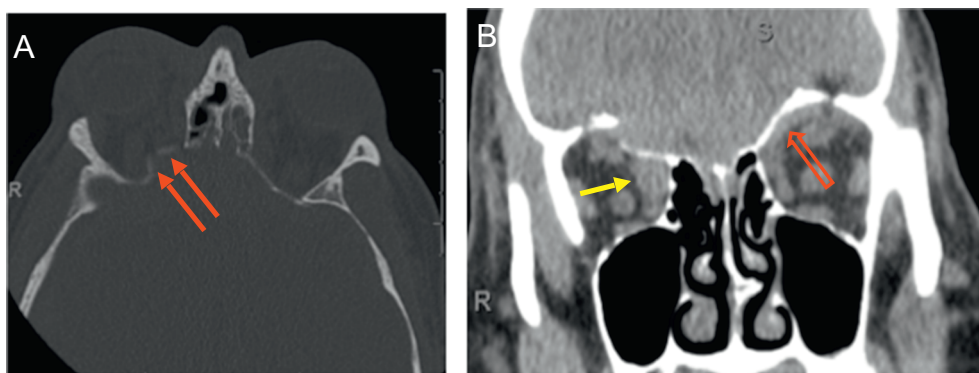


Fig. 4. A) Axial CT images at time of presentation shows a displaced orbital “blow-in” fracture in the medial, posterior right orbital roof (red arrows). B) Coronal CT image in soft tissue windowing demonstrates an associated intraorbital hematoma (yellow arrows). There was a nondisplaced fracture of the left orbital roof as well as a left orbital hematoma (red open arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Discussion

An isolated blow-in fracture is defined as “inferior displacement of the orbital roof without involvement of the supraorbital rim or the frontal sinus”, and is thought to be the result of increased intracranial pressure, a shift of the cranium, or a shift of the intracranial contents [2]. In a single center review from Vermont, of 134 patients with occipital skull fractures 33% of patients had uncomplicated hospital courses, 24% recovered with mild neurological deficit and 14% died of their injuries. Of this same cohort 35% had severe frontal contusions and/or hemorrhage. Three patients were noted to have counter-coup associated fractures; two non-displaced orbital roof fractures, and one patient with an ethmoid fracture and rhinorrhea. The most commonly associated trauma was falling backward down steps with the occiput as the point of impact [3].

Orbital roof fractures are a relatively rare finding, reported incidence ranges from 1 to 9%. Most are accompanied by mid face fractures, specifically zygomatic arch fracture from direct facial trauma [4]. A single center study of 1171 patients with blunt trauma identified a 5% rate of orbital roof fracture with 87% of them having associated craniofacial fractures and 65% having intracranial hemorrhage. There was also a 4 to 1 ratio of male to female patients, with fall being the most common mechanism of injury [5]. Available literature on blow-in orbital fractures is sparse, with only a handful of case reports discussing the topic. With the widespread use of CT imaging for trauma, it is unlikely that this is a matter of under recognition or reporting, and potentially a result of patients not surviving their concomitant injuries.

Conclusion

The patient presented here is suspected to have fulfilled the perfect storm of falling backward down steps, with direct occipital trauma and coup counter-coup injury inducing a pressure gradient high enough to produce an isolated blow-in fracture of the right orbit and isolated non-displaced fracture of the left orbital roof. The management for this type of orbital is conservative in patients with no loss of vision, diplopia, orb malposition or change in follow up exams [6].

Conflict of interest statement

None.

Acknowledgement

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