

Blunt orbital trauma

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A 22 year old man presents to you two hours after an incident at a pub, where he was allegedly punched in the face with a fist. There was no loss of consciousness. He complains of double vision and swelling around his left eye and cheek. He has no other visual symptoms.

Examination reveals some periorbital swelling. Visual acuity is 6/6 in both eyes and the pupils are equal and reactive. There is no proptosis. On opening the eyelids, the whites of the eyes are not red/inflamed and there is no swelling of the conjunctiva. Numbness is present in the distribution of the infraorbital nerve on the left hand side and palpation of the orbital rim fails to elicit a bony defect/step. Extra-ocular movement reveals limitation of downgaze in the left eye associated with reported vertical diplopia in that position. Other extra-ocular movements are full.



Figure 1. Water's view

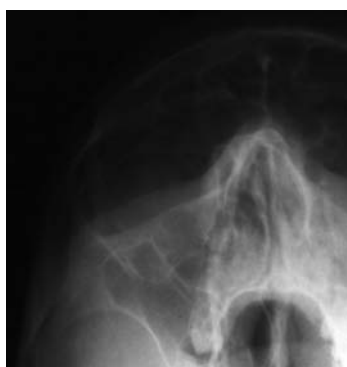


Figure 2. CT scan

Question 1

What is the most likely diagnosis?

- A. left globe rupture
- B. left medial blowout fracture
- C. left inferior (orbital floor) blowout fracture
- D. left inferior orbital rim fracture.

Question 2

You request a plain film series of the facial bones. The Water's view from the series is shown in Figure 1. The following signs are evident on the X-ray: true or false:

- A. soft tissue swelling over the left orbit
- B. discontinuity of the floor of the left orbit
- C. orbital emphysema
- D. opacification of the left maxillary antrum
- E. a metallic foreign body in the left orbit.

Question 3

The next most useful test is a CT examination. Figure 2 shows a CT examination in a patient with the same presentation and examination findings as described earlier. The following are true or false:

- A. the coronal imaging plane is the most useful in assessing orbital floor fractures
- B. there is herniation of intraorbital fat into the left maxillary antrum
- C. there is entrapment of the inferior rectus in the fracture
- D. the orbital rim remains intact in blowout fractures
- E. there is orbital emphysema present.

Question 4

Given the above imaging, what is the most likely course of management of this patient? Answer true or false to the following:

- A. the patient will require immediate surgery to correct the fracture
- B. the management will be expectant, with surgery being required only if the diplopia persists or marked enophthalmos (where the eyeball appears sunken into the orbit) becomes evident once the swelling settles
- C. the patient must be instructed to avoid blowing his nose for at least two weeks after his injury
- D. the patient will be at extremely high risk of secondary orbital cellulitis.

Answers

1. Answer C

Given the mechanism of injury and clinical findings, the diagnosis is a left inferior (orbital floor) blowout fracture. The infra-orbital nerve is often bruised or permanently injured, which results in cheek and upper gum numbness. The limitation of downgaze is due to bruising/entrapment of orbital tissues within the orbital floor fracture (see answers 2–4). This often resolves or improves rapidly over the ensuing weeks once the oedema settles. The exception is when the inferior rectus is entrapped within the fracture, which is clinically evident when there is marked limitation of both upgaze and downgaze on the affected side. These cases need much more urgent surgical intervention.

A globe rupture, although important to exclude in this situation, is unlikely with the above presentation and clinical findings. Trauma which is likely to cause globe rupture is usually of very high velocity, with a small, hard projectile (eg. a golf ball). Clinically, there may be little periorbital swelling, although on opening the lids, the underlying conjunctiva may appear swollen (chemosis), with or without subconjunctival haemorrhage. The giveaway signs are poor visual acuity in the affected eye, an eye that feels soft on palpation with the lids closed in comparison to the other eye, limitation of ocular movement and possibly an afferent pupillary defect. Fundoscopy is also abnormal.

A medial blowout fracture, although quite possible given the mechanism of injury, is unlikely given the clinical findings of limitation of downgaze, vertical diplopia, and infraorbital nerve paraesthesia. These signs can only be explained by an orbital floor fracture.

An orbital rim fracture is also possible given the mechanism of injury. However, this has been ruled out by the lack of a bony defect or 'step' on palpation of the rim. An orbital rim fracture alone will NOT account for the findings of vertical diplopia and downgaze limitation.

2. Answer

- A. True
- B. True
- C. False
- D. True
- E. False.

In orbital blowout fractures there is a sudden increase in intraorbital pressure which decompresses via a fracture of the orbital floor or through the thin lamina papyracea of the medial orbital wall. Plain film findings suggestive of orbital floor fracture include a fluid level in the ipsilateral maxillary sinus, indistinct or discontinuous orbital floor on the Water's projection and soft tissue in the superior ipsilateral maxillary sinus representing herniated orbital contents.¹ There may also be orbital emphysema (gas in the orbit), although this is more commonly seen in medial blowout fractures.

3. Answer

- A. True: as the fracture line is in the axial plane making axial images less useful. Coronal views are best done prone. With the newer helical multislice CT scanners, patients can be scanned supine and reformatted coronal images can be produced. However, the blood layering in the maxillary sinus may obscure soft tissue herniating through the orbital floor.¹
- B. True.
- C. False: the inferior rectus (arrow) is clearly separate from the fracture site.
- D. True: in pure blowout fractures the orbital rim remains intact.
- E. True: locules of gas are seen in the extraconal fat. CT is more sensitive in detecting orbital emphysema than plain films (although this is a different patient than in the Water's view).

4. Answer

- A. False: the only indication for urgent surgery is if there is either:
 - evidence of a secondary retrobulbar haemorrhage (where there will be proptosis, loss of vision and an afferent pupillary defect), or

- clinical and radiological evidence of tight entrapment of the inferior rectus within the fracture. Early repair in these cases is vital to prevent ischaemic necrosis of the entrapped muscle.

B. True: see answer 4A.

C. True: a breach in the bony orbit results in a direct communication between the nasal sinuses and contents of the orbit. Blowing the nose can therefore force air (and bacteria) into the orbit, causing acute proptosis from air being trapped behind the globe (and resultant optic nerve stretching and compromise, which may lead to loss of vision), and/or subcutaneous emphysema and possibly even secondary orbital cellulitis. Patients are therefore placed on oral antibiotics for 10–14 days after an orbital fracture to reduce the risk of secondary infection.

D. False: although orbital cellulitis is a definite risk after any orbital wall fracture (see answer 4C), it is quite rare. Nevertheless, the patient should be warned to represent immediately should they develop severe swelling around the eye, decreased vision, proptosis and pain on eye movements.

Reference

1. Brant W, Helms C. Craniofacial trauma. In: Fundamentals of diagnostic radiology. Chapter 3. 2nd edn. Williams and Wilkins, 1999.

Further reading

1. Orbit, eyelids and lacrimal system. Section 7. San Francisco, California: American Academy of Ophthalmology Basic and Clinical Science Course, 1999.
2. Yanoff M, Duker J. Ophthalmology. Mosby International Ltd, 1999.
3. Rhee D, Pyfer M, eds. In: The Wills Eye Manual. 3rd edn.

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