‘White-eyed’ blowout fracture: a case series of five children

J S Foulds,1 S Laverick,2 C J MacEwen1

ABSTRACT
The ‘white-eyed’ blowout fracture is an orbital injury in children that is commonly initially misdiagnosed as a head injury because of predominant autonomic features and lack of soft-tissue signs. We present five patients who presented with nausea and vomiting following an apparent mild head or facial injury. None of the five had any external evidence of injury. Despite each case describing diplopia, there was a delayed diagnosis of at least 24 h. CT examination demonstrated an inferior orbital wall fracture in all cases with entrapment of the inferior rectus muscle. Each patient underwent surgical repair, two within 48 h of their injury, both of whom achieved complete recovery of ocular movements, while three were delayed beyond 48 h, with a resulting residual limitation of upgaze in all. It is, therefore, important for clinicians to be aware of this condition, so that it can be diagnosed early in order for early surgical release to be performed, which is associated with an excellent prognosis.

INTRODUCTION
Young people who suffer a blowout fracture may demonstrate few signs of soft-tissue injury; hence the term ‘white-eyed blowout fracture’ is commonly used to describe these injuries in children.1 This lack of external signs can make these injuries particularly easy to miss. In addition, associated autonomic symptoms, such as nausea and vomiting, may predominate causing diagnostic confusion and making examination difficult. The inferior rectus muscle is often entrapped in the floor fracture and this may lead to a reduction of blood flow, which can result in muscle ischaemia and necrosis. If not surgically released, persistent diplopia may result.2

CASE REPORTS
We report five cases of ‘white-eyed’ blowout fracture in children.

Five children under the age of 16 years, presented to our hospital over the past 10 years, with autonomic symptoms of nausea and vomiting following an apparent mild head or facial injury. None of the five had any external evidence of ocular injury (figure 1, Case 1). Despite each child describing vertical diplopia on initial presentation, a misdiagnosis of head injury was made in each case because of the predominant associated autonomic symptoms. This, therefore, resulted in a delayed diagnosis of at least 24 h in each child (range 1–5 days). CT examination demonstrated an inferior orbital wall fracture in each case with entrapment of the inferior rectus muscle (figure 2, Case 1). Each patient underwent surgical repair by a maxillofacial surgeon. Two cases were repaired within 48 h of their injury; both of whom achieved complete recovery of ocular movements. The other three cases were repaired beyond 48 h; all three of whom were left with a permanent limitation of upgaze.

DISCUSSION
The lack of soft-tissue signs of trauma, make these injuries easy to miss. This is attributed to the facial fracture pattern often seen in children. When the orbital floor is subjected to force it is more likely to bend apart, creating a linear trapdoor, rather than break, before immediately returning to its original position. When this occurs, there is an increased likelihood that the inferior rectus muscle will become entrapped in the fracture site as opposed to herniating into the maxillary sinus below.3 This muscle is, therefore, at risk of permanent damage due to necrosis and subsequent fibrosis.

Inferior rectus entrapment is also frequently associated with autonomic symptoms, such as nausea and vomiting, as a result of a raised vagal tone.3 These distressing symptoms may predominate and are why the diagnosis is often misinterpreted as a closed head injury.4 By the same pathophysiological process, the more serious oculocardiac reflex can occur, presenting with bradycardia and syncope, which can again mask the diagnosis.5


Figure 1 Restriction of upgaze in the right eye with no evidence of periorcular trauma.
Diagnosis should be made by a combination of clinical examination and CT scan. Features on CT often show a linear bony defect in the orbital floor with entrapment of soft tissue. These fractures may be small and the amount of tissue incarceration minimal, making the findings particularly subtle. 

Surgical release of the entrapped muscle from the fracture site with orbital floor reconstruction remains the gold standard for treatment. In adults, there is a recognised 10–14-day window during which successful orbital floor repair may take place, but this period is shorter in children due to the increased risk of direct muscle damage. Some debate exists as to whether later surgery may be worthwhile, but there is agreement that delays lead to longer recovery times and increased risk of persistent diplopia. Evidence within this short series, would suggest that those operated on more quickly were associated with a better prognosis.

This series demonstrates a delayed diagnosis in all cases because they were initially misdiagnosed as head injuries because of the predominant autonomic features and lack of soft-tissue signs. Awareness of this diagnosis is crucial in order for early surgical release to be performed with relief of autonomic symptoms and reduced risk of permanent muscle damage.

Contributors All authors contributed to the planning, drafting, revising, and final approval of the manuscript. CJM is the guarantor.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

Figure 2 CT orbit demonstrative of a right inferior orbital wall fracture with entrapment of the inferior rectus muscle.

J S Foulds, S Laverick and C J MacEwen

Arch Dis Child 2013 98: 445-446 originally published online April 16, 2013
doi: 10.1136/archdischild-2012-302661

Updated information and services can be found at:
http://adc.bmj.com/content/98/6/445.full.html

These include:

References
This article cites 11 articles, 2 of which can be accessed free at:
http://adc.bmj.com/content/98/6/445.full.html#ref-list-1

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections
Articles on similar topics can be found in the following collections
Injury (232 articles)
Trauma (230 articles)
Eye Diseases (99 articles)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/