CASE REPORT

Orbital trauma and its impact on the heart

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SUMMARY

We present the case of a 16-year-old boy, who was hit in the right orbital region during a soccer match. Immediately after the blow, the patient felt nauseous and fell to the ground. The otherwise healthy patient presented with headache, nausea and sinus bradycardia (38 bpm). Clinically there were no obvious signs of fracture of facial bones. There was no sign of injury to the eyes, only the right globe was slightly restricted in movement. With suspicion of head injury, a CT scan was performed revealing a trapdoor fracture of the medial orbital wall. The medial rectus muscle was entrapped within the fracture inducing the oculocardiac reflex. The trapped rectus muscle was released endoscopically on the same day and the heart rate normalised. Early surgical intervention is recommended to avoid prolonged muscle ischaemia and to shorten the vagal symptoms.

BACKGROUND

Since orbital fractures do not always present with subconjunctival haemorrhage or other obvious fracture signs, the general physician may be surprised to find an otherwise healthy young man with no obvious orbital injuries and profound sinus

bradycardia. First the CT scan reveals the problem, and leads to the diagnosis of oculo vagal or oculo-cardiac reflex (OCR). The so-called 'white eye' blowout fracture is more common in paediatric patients and may not be well known to general physicians. Surgical management should be performed as early as possible to avoid permanent damage to the muscle leading to vision impairment, and when the muscle is released the oculovagal symptoms cease. This case combines both surgical with medical learning points.

CASE PRESENTATION

A 16-year-old boy was hit by his opponent's elbow in the right eye during a soccer match. Immediately after the blow, the patient felt nauseous and fell to the ground. There was no loss of consciousness. There was no obvious injury on clinical examination. The heart rate was slow with 38–48 bpm. The remaining vital parameters were stable and within normal range. The pupils were symmetric and responsive to light. The right eye was slightly restricted in movement on lateral gaze. The patient reported of headache; he was nauseous and vomited once. During the course of the transport to the

Figure 1 ECG taken after the accident demonstrating the sinus bradycardia (38 bpm) with accentuated U waves often seen in sinus bradycardia.

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Figure 2 Axial and coronal views (A and B) of the head CT revealing the trapdoor fracture of medial orbital wall (arrow) with the entrapped medial rectus muscle (*).

hospital his ECG revealed a profound sinus bradycardia with a heart rate of 38 bpm (figure 1). The patient's medical history was otherwise unremarkable and his heart rate was normal prior to the accident. The patient was transferred with continuous headache and general malaise to the hospital, where an urgent head CT was performed (figure 2). The CT scan revealed a trapdoor fracture of the medial orbital wall trapping the medial rectus muscle (figure 2A, B). The clamped extraocular muscle induced OCR and general malaise. On the same day, the trapped medial rectus muscle was released endoscopically via transnasal approach in general anaesthesia. The patient's heart rate normalised and he had no vagal symptoms postoperatively.

DISCUSSION

High velocity compression of orbital contents can lead to orbital blowout fracture, and the paper-thin medial orbital wall (lamina papyracea) or the orbital floor are the commonest sites affected.¹ Entrapment of the orbital soft tissues within the fragments of the fractured orbit can cause symptoms such as pain, enophthalmos, diplopia and disturbed eye movement.² For the latter, other causes need to be included in the differential diagnosis, such as disorders of the neuromuscular junction, cranial nerves III, IV, VI or supranuclear oculomotor pathways.^{1 3} OCR may be induced by orbital soft tissue entrapment and traction of extraocular muscles or compression of the globe.⁴ The ophthalmic division of the trigeminal nerve is the afferent limb. The impulses pass through the reticular formation to the vagus nerve's visceral motor nuclei. The efferent limb message is

carried by the vagus nerve to the heart and stomach.⁵ Vagal efferents depress the sinoatrial node and myocardial contractility, which results in bradycardia and hypotension accompanied by headache, nausea and vomiting.^{4 6} Higher vagal resting tone may be a reason why young patients (1–18 years) are more prone to OCR. Since the bone in children is less calcified and more flexible, it tends to greenstick fracture and it can spring back trapping the orbital soft tissues inducing OCR.⁴ Nevertheless, the orbital trapdoor fracture is reportedly not restricted to children.⁷ The orbital trapdoor fracture may present with only subtle clinical features such as painful restriction of eye movement, autonomic symptoms and no subconjunctival haemorrhage. Hence, this condition is named 'white-eye blowout fracture'.^{1 7 8} In patients with a few or no clinical signs for orbital fracture, OCR is highly suggestive for trapdoor fracture.^{1 5} Early referral and surgical release of the entrapped orbital soft tissues is recommended to prevent

Learning points

- ▶ Orbital fracture does not always present with subconjunctival haemorrhage ('white-eye' blowout fracture).
- ▶ Oculocardiac reflex may induce a sudden change in heart rate.
- ▶ Incarcerated extraocular muscles need to be released as early as possible.

ischaemic necrosis of extraocular muscles and soft tissues leading eventually to permanent visual impairment.^{1 4-8} Furthermore, an early intervention shortens the vagal symptoms caused by OCR.^{4 9}

Contributors FB, CR and AG designed and approved the final draft.

Competing interests None.

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REFERENCES

- 1 Gerber B, Kiwanuka P, Dhariwal D. Orbital fractures in children: a review of outcomes. *Br J Oral Maxillofac Surg* 2013;51:789–93.
- 2 Gosse EM, Ferguson AW, Lymburn EG, *et al*. Blow-out fractures: patterns of ocular motility and effect of surgical repair. *Br J Oral Maxillofac Surg* 2010;48:40–3.
- 3 Borumandi F, Gaggl A. Images in clinical medicine. Traumatic abducens nerve palsy. *N Engl J Med* 2012;367:e5.
- 4 Cobb AR, Jeelani NO, Ayliffe PR. Orbital fractures in children. *Br J Oral Maxillofac Surg* 2013;51:41–6.
- 5 Sires BS, Stanley RB Jr, Levine LM. Oculocardiac reflex caused by orbital floor trapdoor fracture: an indication for urgent repair. *Arch Ophthalmol* 1998;116:955–6.
- 6 Hirjak D, Zajko J, Satko I. Bradycardia after orbital injury. Case report. *Int J Oral Maxillofac Surg* 1993;22:26–7.
- 7 Ethunandan M, Evans BT. Linear trapdoor or “white-eye” blowout fracture of the orbit: not restricted to children. *Br J Oral Maxillofac Surg* 2011;49:142–7.
- 8 Jordan DR, Allen LH, White J, *et al*. Intervention within days for some orbital floor fractures: the white-eyed blowout. *Ophthalm Plast Reconstr Surg* 1998;14:379–90.
- 9 Cobb A, Murthy R, Manisali M, *et al*. Oculovagal reflex in paediatric orbital floor fractures mimicking head injury. *Emerg Med J* 2009;26:351–3.

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