CASE REPORT

A case of ocular cardiac reflex in a child with blunt ocular trauma

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SUMMARY

An 11-year-old boy re-presented with refractory vomiting 18 h after blunt facial and head trauma. Initial CT of the brain performed at his first visit was normal. He was found to have a heart rate of 56 bpm (age appropriate 65–100 bpm) with a blood pressure 90/60 mm Hg. Physical examination revealed an injected sclera and limited vertical movement of the left eye. Neurological examination revealed no focal deficits, but a Glasgow Coma Scale of 14, with mild confusion, depressed mental status and diplopia on upward gaze. Performing upward gaze extra ocular movements exacerbated the patient's bradycardia and confirmed the presence of the oculocardiac reflex. High-resolution CT of orbits demonstrated a left orbital floor fracture with entrapment of the left inferior rectus muscle. Surgical correction resolved his bradycardia.

BACKGROUND

There are few case reports of oculocardiac reflex (OCR) due to blunt trauma.^{1–4} It has been most widely reported in the surgical specialist literature,^{2 5–11} but most generalist physicians are not familiar with OCR. Diagnosis is often delayed or missed due to atypical presentation and confounding symptoms of coexisting brain injury or presence of Cushing's reflex.⁴ The signs and symptoms overlap with presentation, such as intracranial haemorrhage, which can lead to mismanagement; a plain head CT scan can miss the injury.

Although rare, emergency, primary care and trauma physicians should be aware of OCR, since it may present in these settings. Early diagnosis in the settings of facial trauma is extremely important to prevent rapid haemodynamic deterioration.⁵ Recognition helps in appropriate management of the patient in every step of patient care, such as explanation of the need for higher imaging, specialist consultation and surgical repair as soon as possible. Patients undergoing orbital floor surgical repair have been known to go into bradycardic arrest (personal communication with Ophthalmologist).

CASE PRESENTATION

An 11-year-old boy presented to the emergency department with headache and vomiting after a blunt trauma to the left side of his face during a fight with his playmate. There was no loss of consciousness and no seizures. A CT of the head was normal and the boy was discharged on antiemetics with a diagnosis of mild postconcussive syndrome. The next day, he returned with intractable vomiting,

drowsiness and visual disturbances. Further review of systems was positive for double vision. On examination, his pulse was 56 bpm, blood pressure 90/60 mm Hg with a SaO₂ of 97% on room air. He was drowsy but easily arousable with a Glasgow Coma Scale of 14. He had dry mucous membranes with decreased skin turgor. His left eye showed mild conjunctival injection. On neurological examination he had diplopia and pain on upward and left lateral gaze. The sclera was diffusely injected and pupil was normally reactive to light. Funduscopic examination was normal. The rest of the physical examination was unremarkable. Noticeably, there was episodic decrease in his pulse on telemetry monitor while performing upward gaze testing of the extraocular muscle; the bradycardia was persistent throughout his stay; other primary cardiac causes were ruled out by a paediatric cardiologist. There was no history of fever, loose stools, abdominal pain/urinary symptoms, outside food intake or travel. Drug overdose was not suspected. There was no significant medical, developmental or social history.

On the patient's second visit, a high-resolution CT of orbits demonstrated a left orbital floor fracture with entrapment of the left inferior rectus muscle (figures 1–3). He was taken immediately to the operating room, where surgical correction resolved his bradycardia.

INVESTIGATIONS

- ▶ Previous day CT of the head: normal
- ▶ Electrolytes: normal
- ▶ Blood glucose: normal
- ▶ ECG—sinus rhythm with heart rate 56 bpm
- ▶ High-resolution CT of orbit: fracture of inferior wall of left orbit and inferior rectus muscle entrapment.

DIFFERENTIAL DIAGNOSIS

- ▶ Intracranial bleed (eg, Cushing's reflex)
- ▶ Ocular trauma/OCR
- ▶ Primary cardiac rhythm disturbance
- ▶ Electrolyte disorder: hyponatraemia

Figure 1 Image of patient's eyes demonstrating left inferior rectus entrapment.

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Figure 2 High-resolution CT maxillofacial (soft tissue window) axial view of the left inferior orbital floor fracture with arrow indicating soft tissue entrapment.

- Isolated III cranial nerve (CN) palsy

TREATMENT

- Nothing by mouth
- Intravenous fluids
- Intravenous antiemetics
- Atropine 0.01 mg/kg intravenous PRN (at bedside)
- Maxillofacial surgical repair—release of inferior rectus muscle and repair of the defect in left orbital floor to prevent further entrapment.

Figure 3 High-resolution CT (soft tissue window) coronal view of the left inferior orbital floor fracture with arrow indicating soft tissue entrapment.

OUTCOME AND FOLLOW-UP

The patient recovered well. He was discharged after 3 days with advice to follow-up in ophthalmology for re-evaluation.

DISCUSSION

The OCR (a.k.a. Aschner-Dagnini reflex) leading to bradycardia and cardiac arrest is not a rare entity intraoperatively, most ophthalmologists and anaesthesiologists are aware of it (personal communication with ophthalmologist). It is uncommonly seen after infiltration of local anaesthesia for cataract surgery, during ocular surgeries such as correction of strabismus, enucleation, periorbital tumour excision and blepharoplasty.^{3 6 8 12} There have been only a few cases reported in the paediatric and emergency medicine literature.^{1 4}

Familiarity with OCR can improve early diagnosis and treatment, preventing OCR-induced bradycardic arrest, which has been most commonly reported in children,¹³ but also may present in adults. In fact, two adult patients presented to our facility in cardiac arrest status post local anaesthesia for ocular surgery, which was likely secondary to OCR (unreported). We report a paediatric case of OCR and further speculate that the incidence of OCR is higher than reported based on our experience of handling several similar cases at our institution.

The OCR is stimulated by the stretch of ocular muscles. The afferent pathway follows the long and short ciliary nerves to the ciliary ganglion, from there it continues to the Gasserian ganglion body along the ophthalmic division of the trigeminal nerve. It ends in the main trigeminal sensory nucleus in the floor of the fourth ventricle. The efferent impulses start at the vasomotor centre and travel through the vagal nerve (CN X) and the sympathetic chain causing severe parasympathetic stimulation. Thus, vagal blocking agents or sympathetic stimulation can be used to treat haemodynamically unstable patients with bradycardia. Final treatment is surgical correction.

Learning points

- Thorough examination of eye movements is most essential in facial trauma, especially in children.
- Continuous monitoring of vitals should be maintained in any case of suspected orbital floor fracture.
- Avoid ocular manipulation and repeated examination if there is a suspicion of entrapment.
- Immediate surgical release of entrapment should be performed by an appropriate surgical consultant.
- Prevention of bradycardia and cardiac arrest with atropine is crucial. Weight-dosed atropine intravenous (0.01 mg/kg) PRN should be at the bedside.

Competing interests None.

Patient consent Obtained.

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