CASE REPORT

Optic Canal Decompression and Direct Ophthalmic Artery Fibrinolysis for Traumatic Optic Neuropathy With Central Retinal Artery Occlusion

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ABSTRACT

Central retinal artery occlusion is a rare association of traumatic optic neuropathy. Superselective fibrinolytic therapy is a management option for central artery occlusion that reduces systemic side effects of thrombolysis. A rare case of posttraumatic central retinal artery occlusion is described where optic nerve decompression was performed followed by restoration of central retinal flow by direct puncture of ophthalmic artery and institution of fibrinolytic therapy.

Keywords: Central retinal artery occlusion, fibrinolysis, optic nerve decompression, transcaruncular optic canal decompression, traumatic optic neuropathy, urokinase

Central retinal artery occlusion is an ocular emergency that results in sudden and profound monocular vision loss. It has been reported rarely with traumatic optic neuropathy following blunt trauma.^{1,2} The use of superselective ophthalmic artery fibrinolysis has recently been described in cases of retinal vascular occlusion.^{3–5} However, this may not be effective in the setting of an associated compressive optic neuropathy due to trauma.

Optic canal decompression for traumatic optic neuropathy may be performed by transcranial and endonasal endoscopic approaches.^{6,7} The present study describes a minimally invasive, transcaruncular-transorbital approach to the orbital apex and the optic nerve. Reperfusion in the central retinal artery was achieved by fibrinolysis instituted by direct cannulation of the ophthalmic artery.

CASE REPORT

A 10-year-old boy presented 6 hours after a fall from height with a sudden loss of vision in the

left eye. There was an associated nasal bleed. Examination revealed no perception of light with a relative afferent pupillary defect in the left eye. Fundus examination revealed disc oedema with arteriolar attenuation and venous dilatation. Tram tracking of the blood column was also seen indicating a central retinal artery occlusion (Figure 1).

Computed tomographic (CT) scan revealed fractures in the medial orbital wall and roof extending to the orbital apex and associated with blood in the ethmoidal and sphenoidal sinuses (Figure 2).

A diagnosis of traumatic optic neuropathy with central retinal artery occlusion was made. Surgical intervention was planned and undertaken within 24 hours of the injury.

Optic canal decompression through a transorbital route was performed through a transcaruncular incision under direct visualisation of structures using an operating microscope with motorised zoom, X–Y control, and a working distance of 350 mm. Fracture fragments in the region of the orbital apex were noted and removed, decompressing the optic nerve. Intraoperative haemostasis was

achieved with use of fibrin glue. The ophthalmic artery was identified after extending the optic sheath fenestration to the orbit beyond the annulus of Zinn. This was cannulated under microscopic visualisation using a bent U-shaped 30-gauge catheter. The catheter was advanced into the artery for a length of 2 mm till the bend was reached. Micro-leaks due to insertion were sealed using fibrin glue over the site of cannulation. Prediluted urokinase, 40,000 units in 0.9% saline, was injected slowly with intraoperative visualisation of the retinal flow by indirect

FIGURE 1 Fundus photograph showing disc hyperaemia with attenuation of retinal arteries and dilated veins. The retina is pale and oedematous, indicative of central retinal artery occlusion.

ophthalmoscopy. Following the infusion, the flow was confirmed to have returned by direct visualisation of retinal blood flow. Haemostasis was achieved and the caruncular incision opposed and sealed using fibrin glue. Postoperative heparin was administered for 24 hours.

The postoperative perfusion was confirmed using fluorescein angiography (Figure 3). The visual acuity improved to 6/24 after 1 week and to 6/9 at 1 month. There were no haemorrhagic or thrombotic complications seen. At 5-year follow-up, the patient maintained a visual acuity of 6/9. The fundus showed disc pallor and healed macular oedema with pigment mottling. The retinal vessels and flow were normal (Figure 4). A relative afferent pupillary defect of 1 log unit persisted. Automated perimetry showed significant restriction with preservation of central fields (Figure 3).

DISCUSSION

Traumatic optic neuropathy is a devastating cause of blindness associated with head trauma. It has been rarely described to present with a central retinal artery occlusion.^{1,2} The present case report describes one such rare presentation.

The pathophysiology of this occlusion may involve the disruption of endothelium as a result of acute stretching of the retinal vessels due to trauma.¹ The intimal damage may have led to thrombotic events and arterial occlusion. The acute loss of vision is contributed to by both direct optic nerve injury as well as its vascular compromise.¹

Surgical decompression for traumatic neuropathy is currently performed using transcranial and

FIGURE 2 Axial and coronal CT scans showing fractures of the medial orbit and apex with blood in the ethmoidal sinuses.

FIGURE 3 Postoperative fluorescein angiography showing near-normal circulation in the retinal arteries and veins. Postoperative automated perimetry showing restriction with preservation of central fields.

FIGURE 4 Postoperative fundus photograph showing disc pallor and healed macular oedema with pigment mottling. The retinal vessels and flow are normal.

The case report highlights the possibility of a local decompression of the optic nerve using a transcaruncular-transorbital approach combined with direct fibrinolysis. The minimally invasive transcaruncular approach provided a direct access to the optic nerve and ophthalmic artery with good intraoperative visualisation, enabling cannulation of the artery in this case. The direct fibrinolysis reversed the vascular block permitting a good and early visual improvement to 6/9.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper

Notes: Figures 1 and 4 of this article are available in colour online at <http://informahealthcare.com/oph>.

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endoscopic approaches.^{6,7} The present study examines a minimally invasive transcaruncular-transorbital route, which provided an easy and safe access to the optic nerve and the ophthalmic artery. This is the first description of a transcaruncular approach to the optic nerve and ophthalmic artery.

Central retinal vascular occlusion has been managed by local fibrinolysis using superselective angiography through femoral puncture.^{2–4} This is the first reported local fibrinolysis using a direct ophthalmic artery puncture. The direct superselective approach reduces the systemic risks of fibrinolysis in a non-life-threatening condition such as retinal vascular occlusion.

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