

# Traumatic ischaemic optic neuropathy

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Persistent profound visual loss following contusion of the globe or ocular adnexae has been well documented, the visual loss being attributed to haemorrhage into, or contusion of, the optic nerve, or to interference with the blood supply of the eye. The patient described below presented after a contusion of the eye and orbit, with the clinical picture of ischaemic optic neuropathy presumably resulting from injury to the posterior ciliary arteries.

## Case report

On June 30, 1971, a housewife aged 47 years was kicked around the left orbit by a young man wearing leather shoes; 3 days later, as the eyelid haematoma abated, she was able to open her left eye and noticed that she could not distinguish between light and darkness. She immediately attended the emergency eye clinic where it was confirmed that she had no perception of light in this eye.

### *Examination*

There was bruising of the eyelids with a total bulbar subconjunctival haematoma. There was some proptosis, and depression and elevation in abduction of the globe were deficient. The pupil was dilated, not reacting to light, but reacting briskly consensually. Red blood cells and flare were noted in the anterior chamber. Fundus examination revealed oedema around the disc extending about one disc diameter from its margin. The disc itself was pale with circumferential blurring of the margin. Apart from this, the posterior pole did not show oedema, and there was no cherry-red spot at the macula. The retinal vessels appeared normal and there was no cilio-retinal artery. No haemorrhages were seen either on the disc or in the rest of the fundus. X-ray of the facial bones, including tomograms, revealed no fracture at this time, but the left antrum was opaque, probably because of local haemorrhage.

The patient was observed in hospital, no specific treatment being given, and 4 days later the left disc was still swollen and pale, the peridisc oedema was regressing, and the eye movements were full. Intraocular tension was 14 mm. Hg in the right eye and 12 mm. Hg in the left. Stereoscopic colour photographs of each disc confirmed the swelling and blurring of the optic disc and its margin.

Fluorescein angiography showed increase of fluorescence over the whole area of the affected disc as compared to the normal right disc. The left disc also showed leakage of dye from 2 to at least 40 minutes after the dye transit. Otherwise at this stage the choroidal and retinal dye circulation appeared normal. The electro-oculogram was consistent with reduced function of the pigment epithelium in the left eye (left 185 per cent.; right 260 per cent.). Electroretinography showed greater responses in the left eye than the right, the scotopic 'b' wave amplitude being 620  $\mu$ v in the left and 550  $\mu$ v in the right. This latter reading also demonstrated the health of the central retinal artery and the maintained function of the bipolar cells.

### *Course*

After 4 weeks there was still no perception of light in the left eye, which gave amaurotic pupil responses, and in which optic atrophy was developing. Eye movements were full, but there was still

hypoesthesia and paraesthesia of the left infraorbital region. Further X-rays showed clearing of the left maxillary sinus, revealing a herniation of the orbital contents into the sinus, and also a fracture of the infraorbital margin.

Fluorescein angiography indicated delayed filling of the left optic disc with increased fluorescence over the whole disc area as compared to the normal right disc. Electro-oculogram values were again lower on the left side (left 200 per cent.; right 254 per cent.) with no long displacement. The electroretinogram also gave similar readings as before, being 40 per cent. higher on the left than on the right.

### Discussion and comments

Rowbotham (1949), in his series of 1,000 cases of closed head injuries, found fifty patients with post-traumatic blindness. The loss of sight in such cases has been attributed to haemorrhage within the optic nerve sheath, to rupture of the small vessels supplying the nerve, or to contusion of the nerve within the canal.

Occlusion of the central retinal artery after a closed head injury is described by Cullen (1964). In this case, the blow to the forehead with a blunt instrument also caused a linear skull fracture in the frontal region, extending to the floor of the anterior fossa. The diagnosis was made in this case, and in the three others from the literature to which he refers, on the classical fundus findings of oedema of the posterior pole with a macular cherry-red spot.

Diagnosis of injury to the posterior ciliary arteries is less clear-cut and has been made in the past on the basis of a report by Hirsch (1896) of a patient who had been struck in the eye by a cow's hoof and in whom histology supported the diagnosis. Vision was reduced to perception of light. Yellowish map-like areas with overlying pigment clumps were described in the fundus. Histology showed degeneration of the retina around the optic disc, and absence of pigment in the pigment epithelial layer with anterior migration of pigment. Huguenin (1916) and Macfadyen (1940) described further cases with similar fundus changes after ocular contusions. These patients were left with a central or para-central scotoma. Macfadyen alone referred to the disc appearance in one patient as being pale 2 weeks after the injury.

Avulsion of the optic nerve, a rare and gross injury, is probably always associated with rupture of the posterior ciliary arteries. Proliferation of connective tissue around the disc seems the most prominent feature in these cases, as reported by von Szily (1918).

In the patient described above, the optic disc was noted to be pale and swollen at the first examination, 3 days after the injury. Rupture or contusion of the nerve was considered to be an unlikely cause for such clinical findings. The absence of posterior polar oedema and of a cherry-red spot indicated that the central retinal artery was not affected. That the retrobulbar vessels were ruptured is confirmed by the total sub-conjunctival haemorrhage, the proptosis, and the defective eye movements, which all rapidly cleared. Pallor and swelling of the disc, which showed late increased fluorescence and dye leakage, indicated damage to the nerve head. The electro-oculographic findings indicated pigment epithelial damage, while optic nerve damage was indicated by the electroretinogram. These findings are compatible with posterior ciliary artery ischaemia, which we think more likely in this case than direct injury to the nerve and pigment epithelium.

### Summary

A case of traumatic ischaemic optic neuropathy is presented. The trauma consisted of a direct blow to the affected eye by a blunt object. The diagnosis is supported by fluorescein angiography and electrophysiological studies. The relative literature is reviewed.

**References**

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