CASE REPORT

Profound bilateral visual loss after hysterectomy indicated for severe postpartum haemorrhage

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SUMMARY

We present a case of a patient with bilateral posterior ischaemic optic neuropathy in the previously unreported setting of hysterectomy indicated for severe postpartum haemorrhage. The diagnosis was based on clinical and paraclinical examinations, including MRI of the head, electroretinography (ERG) and visual evoked potentials (VEP) testing. During 1 year of follow-up, repeated optical coherence tomography (OCT) scans demonstrated optic disc atrophy, which was interpreted as a sign of direct retrograde ganglion cell degeneration after ischaemic damage to the retrolaminar part of the optic nerves. The diagnosis of perioperative posterior ischaemic optic neuropathy is mostly a clinical diagnosis. However, MRI plays a major role in excluding other causes of visual loss, and VEP, ERG and OCT are valuable supplemental diagnostic tools.

BACKGROUND

Posterior ischaemic optic neuropathy (PION) is characterised by abrupt and severe loss of visual acuity and/or visual field, initially normal appearing optic disc and subsequent development of optic atrophy.^{1 2} The diagnosis of PION is one of exclusion and remains speculative unless ischaemia or a past ischaemic event can be documented. We present a case of bilateral perioperative PION with profound visual loss occurring in the previously unreported setting of hysterectomy indicated for severe postpartum bleeding. The case illustrates the value of a thorough neuro-ophthalmological examination and offers important learning points concerning optic nerve disease.

CASE PRESENTATION

A healthy 33-year-old woman suffered substantial blood loss after vaginal delivery. In the delivery room, vaginal bleeding was estimated to 2 L, and the patient showed clinical signs of severe systemic hypotension, including somnolence, unmeasurable blood pressure and tachycardia. The patient was placed in a supine position, anaesthetised, and underwent emergent hysterectomy. The operation lasted 4 h. During the surgery, the patient lost 14 L of blood, and, although substituted by blood transfusions, systemic hypotension, moderate hypothermia and metabolic acidosis (pH=7.1) were noted in the charts. There was no mechanical pressure on the eyes during surgery. The patient was eventually transferred to intensive care for recovery and dialysis. The patient stabilised and was taken out of sedation after 2 days. Upon awakening, the patient had poor vision in both eyes.

INVESTIGATIONS

At neuro-ophthalmological examination, visual acuity was hand motion in the right eye and 1/24 with eccentric fixation in the left eye. A relative afferent papillary defect (RAPD) was present in the right eye. The optic disc and posterior pole appeared normal in both eyes, but the visual fields were severely affected, especially on the right side (figure 1). An MRI of the head and neck was normal, and there were no focal changes in and around the pituitary gland and optic chiasm. The full-field electroretinography (ERG) was normal. The visual evoked potentials (VEP) demonstrated reduced amplitudes in both eyes and a delayed binocular peak latency of 130 ms. The electronic signal from the right eye was very weak (figure 2). The peripapillary retinal nerve fibre layer (RNFL) was imaged using spectral domain optical coherence tomography (OCT). At presentation, the average RNFL thickness was 87 micrometres in both eyes, and, during follow-up, a progressive optic disc atrophy developed (figure 3).

DIFFERENTIAL DIAGNOSIS

- PION
- Postpartum pituitary infarction
- Occipital infarction
- Reversible posterior leukoencephalopathy syndrome

OUTCOME AND FOLLOW-UP

The patient was eventually diagnosed with bilateral perioperative PION secondary to hysterectomy indicated for early postpartum haemorrhage with severe systemic hypotension. At follow-up 18 months after delivery, visual acuity was 1/24 in the right eye and 0.5 in the left eye, and visual fields had improved.

DISCUSSION

Visual loss after non-ocular surgery is relatively rare but can be devastating to the patient.³ Any portion of the visual pathways may be involved, but the most common site of permanent injury is the optic nerves. Bilateral PION after hysterectomy for postpartum haemorrhage has not been reported before, and we made major efforts to exclude other causes of visual loss, eventually verifying the PION diagnosis on all recognised criteria points.¹

PION is thought to be caused by critically reduced perfusion of the retrolaminar portion of the optic nerve and may be classified in the following subtypes: arteritic, caused by giant cell arteritis or rarely other vasculitides; non-arteritic, sharing risk factors with non-arteritic anterior ischaemic

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Figure 1 Fundus photographs and automated visual fields (Octopus 900, G Dynamic, Humphrey printout option), grey-scale and pattern deviation plots, except for the right eye at baseline, where only grey-scale and total deviation were applicable.

optic neuropathy; perioperative, occurring within hours to days after major surgery, most commonly spinal procedures. Multiple factors have been proposed as risk factors for perioperative ischaemic optic neuropathy, including long duration of surgery, prone position, excessive blood loss, hypotension, anaemia and hypoxia.³ Consistently, our patient was hypoxic and hypotensive for a long period because of the critical blood loss, which alone may cause profound visual loss.⁴

It is important to notice that, in the acute phase, an RAPD was present, and the optic discs appeared normal. This strongly

suggested a retrolaminar optic nerve lesion, which prompted neuro-imaging of the head. Bearing the differential diagnosis in mind, the RAPD makes occipital infarction and reversible posterior leukoencephalopathy syndrome very unlikely, and MRI corroborated that fact and ruled out pituitary oedema. Orbital MRI, especially with diffusion-weighted images, could potentially have helped confirming optic nerve ischaemia, but this was not performed in the present case. Electrophysiological examinations proved valuable in terms of lesion localisation; the ERG was normal, which ruled out an occult retinal cause of

Figure 2 Chequerboard visual evoked potentials of right eye and left eye (top to bottom). The column 'LatIII' indicates time from light stimulus to P100. In our laboratory, a P100 value above 108 ms is considered abnormal and the corresponding amplitude is considered abnormal when below 8 μ V.

Figure 3 Optical coherence tomography scans of the peripapillary retina and thickness maps for the peripapillary retinal nerve fibre layer (RNFL) in false-colour code. Numbers indicate peripapillary RNFL thickness (μm). The green colour corresponds to RNFL thickness within the 5 and 95 centiles, yellow represents the 1–5 centile interval and red 1 centile or lower thickness.

visual loss, and the abnormal VEP examination supported the presence of an optic nerve lesion. Since VEP measures the conduction time for a visual stimulus to reach the occipital cortex, the latency of the electrical signal is prolonged and the amplitude is depressed in case of optic nerve damage.

In case of severe ischaemic injury to the retrolaminar part of the optic nerve, the retinal ganglion cell bodies and axons undergo retrograde degeneration within about 6–8 weeks.

Clinically, optic atrophy may be recognised as optic disc pallor, but pallor may be difficult to assess objectively in some cases, which is why OCT imaging of the peripapillary RNFL is a valuable supplement to funduscopy, for example, in patients with optic neuritis and multiple sclerosis.^{5–6} The optic atrophy in our case was interpreted as a sign of direct retrograde ganglion cell degeneration after ischaemic damage to the retrolaminar part of the optic nerves for two reasons. First of all, MRI of the brain showed no signs of damage to the retrogeniculate pathways. Second, no significant optic atrophy was present when visual loss was detected shortly after delivery. Trans-synaptic retrograde degeneration in humans after occipital lobe damage has been reported in a longitudinal OCT study of seven patients, but peripapillary RNFL thinning was discrete and slow, ranging from 0.9 to 6.3 μm over 100 days.⁷ In contrast, optic atrophy was profound and developed fast in our case, which is illustrated in figure 3. Thus, OCT ultimately reinforced the diagnosis of PION.

The diagnosis of perioperative posterior ischaemic optic neuropathy is mostly a clinical diagnosis. However, MRI plays a major role in excluding other causes of visual loss, and VEP, ERG and OCT are valuable supplemental diagnostic tools.

Learning points

- ▶ Excessive blood loss and hypotension during surgery may cause profound visual loss.
- ▶ A relative pupillary afferent defect is a strong sign of optic nerve disease, and the normal appearance of the optic disc localises the lesion to the retrolaminar part of the optic nerve.
- ▶ Structural damage to the intracranial visual pathways needs to be ruled out.
- ▶ Visual evoked potentials (VEP), electroretinography (ERG) and optical coherence tomography (OCT) examinations are valuable as supplemental diagnostic tools.

Contributors All the authors have contributed equally to the conception and design, acquisition of the data and analysis and interpretation of the data; drafting the article and revising it critically for important intellectual content; and final approval of the version published.

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