Acute visual loss with ophthalmoplegia after spinal surgery: Report of a case and review of the literature

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We report a case of a 15-year-old boy who presented with profound visual loss and complete ophthalmoplegia after an uneventful spinal surgery for removal of cervical osteoblastoma. Postoperative visual loss following nonocular surgery is, fortunately rare, yet a devastating complication. The most common cause is ischemic optic neuropathy, but it can also be due to central retinal occlusion or cortical blindness. Visual loss in conjunction with ophthalmoplegia is rarely seen, and there are very few reports in the literature. We also review the related literature and highlight the mechanism and preventive measures.

Key words: Central retinal artery occlusion, ischemic optic neuropathy, postoperative visual loss, spinal surgery

The risk of visual impairment after orbital surgeries is well-known, and the reported incidence varies from 0.6% to 1%.[1] Hence, these patients undergo preoperative counseling regarding this possibility as a routine. Unforeseen visual loss after nonocular surgery can be devastating for the patient as well as the surgeon. According to the reported literature, incidence of postoperative visual loss (POVL) following spinal surgery is 0.1-0.2%.[2,3] The most common cause of visual loss is ischemic optic neuropathy (ION), followed by central retinal artery occlusion (CRAO) and cortical blindness.[4] The exact etiology of loss of vision remains debatable. Intraoperative volume loss, hypotension, and raised intraocular pressure (IOP) due to prolonged prone positioning are some of the proposed mechanism.[4]

Ophthalmoplegia along with POVL has been infrequently mentioned in the literature.[5]

We report a case of a young boy, who underwent uneventful surgery on his cervical spine, and presented with complete loss of vision and ophthalmoplegia.

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Case Report

A 15-year-old boy presented with complaints of complete loss of vision in the right eye of 1-week duration. He gave a history of having undergone surgery in a multidisciplinary hospital a week back for removal of cervical spinal osteoblastoma. Following surgery, he developed visual complains on regaining consciousness and was given intravenous antibiotics after a presumptive diagnosis of orbital cellulitis. He was referred to us when he failed to regain vision.

On examination, there was no perception of light in the right eye. Left eye vision was 20/20; J1 (Jaeger). External examination revealed ptosis and 2 mm of axial proptosis in the right eye. Conjunctival congestion and inferior conjunctival chemosis were noted [Fig. 1]. Extraocular movements were limited in all directions of gaze [Fig. 2]. Relative afferent pupillary defect was present in the right eye. Fundus examination showed gross retinal vascular attenuation with optic atrophy, suggestive of CRAO [Fig. 3]. Anterior and posterior segment examination of the left eye did not reveal any abnormality.

Both computerized tomography scan and magnetic resonance imaging (MRI) were suggestive of an inflammatory process with peri and retrobulbar soft tissue involving the lacrimal gland, extraocular muscles, and optic nerve sheath extending up to the orbital apex [Fig. 4a and b]. In the acute presentation of a CRAO, interventions such as ocular-digital massage, anterior chamber paracentesis, intravascular thrombolysis, and medications like vasodilators or acetazolamide to lower the IOP may help to relieve compression on the vasculature and restore blood flow to the retina. We did not attempt any surgical or medical therapy in this patient as he presented to us after a week of onset of his symptoms. For any treatment to be effective; it had to be initiated within 6 h.[6]

Discussion

The American Society of Anesthesiologists (ASA) POVL Registry established in 1999 by the ASA committee on professional liability provides an in-depth analysis of 93 cases associated with spine surgery.[7]

According to their data, ION was the most common cause of visual loss (89%), and CRAO accounted for the rest.

Figure 1: External face photograph showing right eye ptosis and proptosis

The ION can be either anterior or posterior (PION). PION is more common as its vascular supply is derived from small pial vessels which are incapable of autoregulatory control.[8] The risk factors for the development of ION include male sex, prolonged surgery in the prone position, anemia, hypotension, and raised IOP.[4,9]

The mechanisms which explain IOP rise in a patient undergoing spinal surgery could be direct pressure on the globe, raised central venous pressure, and prone positioning.[8] Raised IOP superimposed with intraoperative anemia and hypotension can lead to ischemia of the optic nerve.

Central retinal artery occlusion may result from extrinsic ocular pressure caused by head rest or anesthetic mask malposition in the presence of hypotension, shock, or prolonged anesthesia.[5]

Vision loss (either due to ION or CRAO) following nonocular surgeries has been rarely reported in the literature, and visual loss with ophthalmoplegia is even rarer. Till date 13, cases of vision loss along with ophthalmoplegia following nonocular surgeries have been described in the literature [Table 1]. There is only one case report which mentions MRI abnormalities in extraocular muscles following nonocular surgery.[5]

An ischemic orbital compartment syndrome like condition due to periorbital edema may also result in ophthalmoplegia as described by Leibovitch *et al*.[10]

Hollenhorst *et al*. reproduced visual loss and ophthalmoplegia experimentally in seven rhesus monkeys using orbital compression for 60 min in the presence of hypovolumia and hypotension.[11] The suggested mechanism was that the collapsed arterial and venous channels of the orbit dilated on the subsequent release of the external pressure which led to the transudation of fluid through the permeable walls into the tissue spaces. This accumulation of fluid resulted in orbital edema, proptosis, paresis of ocular movement, and retinal edema. We believe that the visual loss and ophthalmoplegia in our patient were caused by the prolonged spinal surgery in the prone position, due to a similar mechanism.

Both the anesthetist and surgeon need to be aware of the positioning of the patient, time taken during surgery, and any external ocular compression during surgery should be avoided. Intraoperative blood loss and hypotension also need to be watched closely. Bradyarrhythmias during surgery should be carefully monitored as these episodes may indicate vagal stimulation induced by increased intraorbital pressure.[12] Each patient, with or without preexisting risk factors or intraoperative complications, should undergo ophthalmic examination including vision, pupillary reaction, extraocular movements, IOP, and fundus in the immediate postoperative period. A timely lateral canthotomy with cantholysis may have helped to prevent such a devastating complication in this young man.

Figure 2: Extraocular movements in nine cardinal positions of gaze showing complete ophthalmoplegia of the right globe

Table 1: Reported cases of postoperative visual loss with ophthalmoplegia

Author	Total number of cases (type of surgery)	Cases with visual loss	Cause of visual loss	Cases with ophthalmoplegia
Hollenhorst *et al.* 1954[11]	Neurosurgery (3) and spine (5)	8	CRAO	5
West *et al.* 1990[12]	1 (spine)	1	CRAO	1
Wolfe *et al.* 1992[13]	1 (spine)	1	CRAO	1
Halfon *et al.* 2004[5]	2 (spine)	2	CRAO	2
Asok *et al.* 2009[14]	1 (spine)	1	CRAO	1
Bhatti *et al.* 2003[15]	1 (shoulder)	1	ION	1
Leibovitch *et al.* 2006[10]	1 (spine)	1	ION	1
Chung *et al.* 2006[16]	1 (spine)	1	CRAO	1

CRAO: Central retinal artery occlusion, ION: Ischemic optic neuropathy

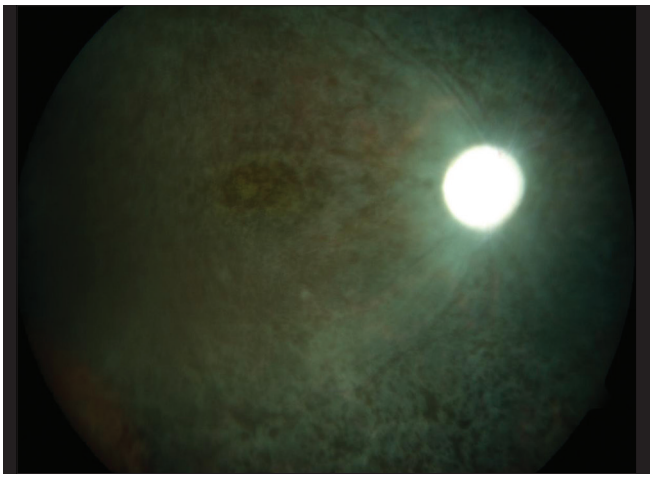

Figure 3: Fundus photograph of the right eye showing gross retinal vascular attenuation with optic atrophy

Figure 4: (a) Axial computerized tomography scan, (b) Postcontrast magnetic resonance imaging scan showing right periorbital and retrobulbar soft tissue swelling involving the lacrimal gland, extraocular muscles, and optic nerve sheath extending up to the orbital apex

Conclusion

Postoperative visual loss following spinal surgery is rare, but a grave complication. All patients should be counseled about this unlikely peril well before the surgical procedure is undertaken. Both the anesthetist and the surgeon need to be vigilant regarding development of such a situation and aware of the possible risk factors. Early diagnosis and prompt intervention by an ophthalmologist may prevent this devastating complication.

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