Central Retinal Artery Occlusion and Ophthalmoplegia Following Spinal Surgery in the Prone Position

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SUMMARY

A 14 Year old boy underwent a 7 hour long spinal surgery for scoliosis in the prone position. In the immediate post-operative period, he developed right proptosis, periorbital swelling, chemosis and total ophthalmoplegia. The vision in his right eye was only counting fingers and the intraocular pressure was 68 mmHg. Fundus examination revealed occlusion of the right central retinal artery. A rare manifestation of both vein and artery occlusion was possible in this patient as a result of external ocular compression due to a prolonged period in the prone position. This report highlights the importance of being aware of the possible complications of external ocular compression in non-ocular surgery.

KEY WORDS:
Visual loss, Central retinal artery occlusion, Ophthalmoplegia, Spinal surgery, Prone position

INTRODUCTION

Postoperative visual loss after non-ocular surgery is a rare but devastating complication with an estimated incidence varying from 0.01 to 1% depending on the type of surgery[1,2]. The three recognized causes of postoperative visual loss are ischaemic optic neuropathy, central retinal artery occlusion and cortical infarction. However, ischaemic optic neuropathy is the most frequently cited cause of postoperative visual loss following general anaesthesia[1]. Several patient risk factors have been identified such as chronic hypertension, diabetes mellitus, smoking, vascular disease and other disorders that result in increased blood viscosity[3]. Visual loss with total ophthalmoplegia as a surgical complication is very uncommon and not many cases have been reported in the literature.

CASE REPORT

A 14 year old boy underwent spinal surgery for scoliosis under general anaesthesia. During this 7 hour procedure the patient was positioned on the operating table in a prone position with his face resting on a padded, gel filled horse-shoe headrest. Both eyes were taped shut and padded with gauze. Continuous intraoperative monitoring recorded a regular heart rate and stable blood pressure. The circulating blood volume was well maintained. Immediately after recovery from anaesthesia, the patient complained of right ocular pain and was unable to open his right eye. Ocular examination of the right revealed marked periorbital swelling, proptosis, ptosis of the upper eyelid, chemosis, corneal edema, a relative afferent pupillary defect (RAPD) and total ophthalmoplegia. The vision in the right eye was reduced to counting fingers. The intraocular pressure was 68 mmHg (normal 15-21 mmHg). Fundus examination of the right eye revealed retinal edema, a central cherry-red spot at the macula and attenuated arteries, suggestive of central retinal artery occlusion (CRAO). The general neurological examination was normal. Anterior chamber paracentesis was done immediately and the patient was started on intravenous acetazolamide 500mg Stat followed by oral acetazlamide 250mg four times a day. The intraocular pressure came down subsequently and there was also reduction in the periorbital and eyelid swelling, however his visual acuity did not show improvement.

Swelling of the eyelids, chemosis and increase intraocular pressure suggest orbital and facial venous occlusion while the fixed dilated pupil, positive RAPD, CRAO and total ophthalmoplegia suggest retinal and orbital arterial occlusion, indicating the presence of co-existence of both arterial and venous occlusion in this patient most probably due to external compression during the surgical procedure. A shift in the head position during surgery might have trapped the patient's head within the headrest. This would have caused impingement of the right eye on the inner edge of the headrest, thereby causing compression of the globe.

Magnetic Resonance Imaging studies showed oedema of the extraocular muscles in the right orbit with sparing of their tendons (Figure 1) and right globe proptosis in the T2 weighted images (Figure 2). Examination of the patient two weeks later showed regression of the periorbital swelling and corneal edema; however his vision remained at counting fingers. Fundoscopic examination of the right eye showed a pale optic disc and attenuated arteries. There was no improvement in the extraocular movements.

DISCUSSION

Central retinal artery occlusion following surgery is very uncommon complication and not many cases have been reported in the literature. Central retinal artery occlusion is a disease entity that usually occurs after embolic phenomenon, thrombotic episodes or trauma both in children and adults[4]. CRAO as a result of external compression during surgical procedure has rarely been reported in the literature. In our

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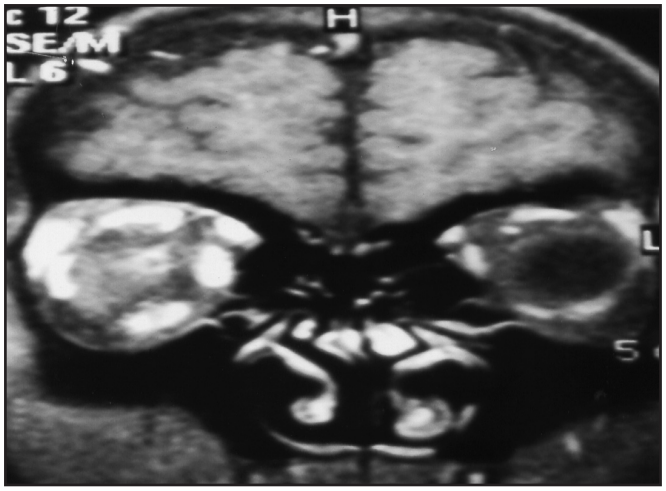

Fig. 1: MRI picture of the orbit, coronal view reveals gross enlargement of all the extraocular muscles of the right eye

Consent was obtained from the patient for publication.

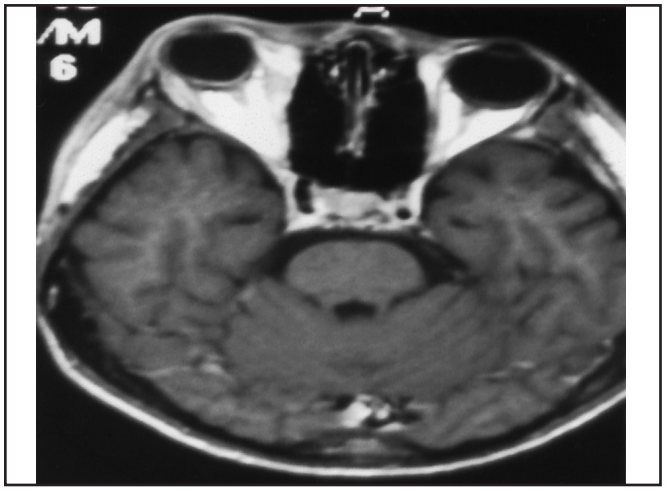

Fig. 2: MRI of the orbit, axial view reveals proptosis of the right eye

case, the postoperative signs of orbital swelling, chemosis, total ophthalmoplegia and CRAO in the affected eye clearly indicate the possibility of external ocular compression.

Hollenhorst *et al* [5] reported eight cases of CRAO followed neurosurgical procedures perfomed in the prone position using a padded headrest that resulted from the inadvertent application of pressure to the orbital contents by the headrest. The mechanism of visual loss after spinal surgery in prone position is due to retinal ischaemia secondary to external ocular compression. External ocular tamponade causes partial or complete collapse of the arterial and venous channels of the orbit and when this external pressure is released in the immediate post-operative period, the ischaemic vascular channels dilate causing increased transudation of fluid into the tissue spaces [5]. The reversibility of the ophthalmoplegia probably depends on the degree of ischaemia suffered by both the extraocular muscles and the 3rd, 4th and 6th cranial nerves. Orbital imaging of this patient showed no evidence of cavernous sinus thrombosis but showed mild periorbital swelling and enlargement with hyperintensity of the extraocular muscles probably due to post-ischaemic edema.

External ocular compression can be avoided by using a Mayfield clamp to position the head of the prone patient during spinal surgeries. The Mayfield clamp is positioned before putting the patient in the prone position. Using this method, the neck will be maintained in the midline position with slight flexion so that the back of the patient is in a neutral/horizontal position, resulting in the head being slightly dependent. The Mayfield clamp thus supports the head without any pressure on the orbits. At the end of the surgery, the patient will be placed in the supine position and disconnected from the Mayfield pins. This method may prevent potential pressure over the eyeball during prolonged prone position. Nevertheless, other causes of postoperative visual loss like anterior or posterior ischaemic optic neuropathy may still occur in prolonged prone positioned surgeries even with Mayfield clamp[4]. In the case reported by Kamming and Clarke, the patient's visual acuity was only detection of Hand motions which was due to posterior ischaemic optic neuropathy and not CRAO as reported by Hollenhorst. It was attributed to the presence of several risks factors in that patient such as hypotension, anaemia, an increase intraocular pressure due to the dependent head position. Hence they recommend a 10 degree reverse Trendelenberg position to the reduce intraocular pressure if the patient is in prone position for longer duration. In the eight cases reported by Hollenhorst, [5] the final visual outcome was better than 6/36 in three cases, hand movements (HM) in two cases and no light perception (NPL) in three cases. In our patient the final visual acuity was counting fingers (CF), which was better than those fives cases reported by Hollenhorst.

CONCLUSION

Although postoperative vision loss can occur in the absence of external ocular compression, avoidance of mechanical injury to the globe is very important. The operating surgeon and the anesthetist should be aware of this fact and every attempt should be taken to minimize this dreadful complication. Using a Mayfield clamp during spinal surgeries can help to reduce the occurrence of visual loss by avoiding external ocular compression.

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REFERENCES

1. Roth S, Thisted RA, Erickson JP, Black S, Schreider BD. Eye injuries after non-ocular surgery. A study of 60,965 anesthetics from 1988 to 1992. Anesthesiology 1996; 85: 1020-7.
2. Warner ME, Warner MA, Garrity JA, MacKenzie RA, Warner DO. The frequency of perioperative vision loss. Anesth Analg. 2001; 93: 1417-21.
3. Brown RH, Schauble JF, Miller NR. Anemia and hypotension as contributors to perioperative loss of vision. Anesthesiology 1994; 80: 222-6.
4. Kamming D, Clarke S. Postoperative visual loss following prone spinal surgery. Br J Anaesth. 2005; 95: 257-60.
5. Hollenhorst RW, Svien HJ, Benoit CF. Unilateral blindness occurring during anesthesia for neurosurgical operations. Arch Ophthalmol 1954; 52: 819-30.