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Unilateral visual loss after spine surgery: Lesson to be learnt from unexpected devastating complication

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ABSTRACT

Visual loss following spinal surgery is a potentially devastating and rare complication. Spinal surgery is the leading cause of POVL. Although the etiology of POVL is not clearly understood, multiple risk factors have been proposed. The horseshoe is no longer an appropriate device for prone spinal surgery and its use should not be supported. Awareness, evaluation and timely management of this rare devastating complication is crucial. It is advisable to inform high-risk patients that there is a small, unpredictable risk of perioperative visual loss. We discuss a case of 32 year old lady; who had experienced unexpected visual loss after elective spine surgery.

1. Introduction

Postoperative visual loss (POVL) is an unexpected, rare but potentially devastating complication with a reported incidence of 0.01 to 0.1% after prone spinal surgery [1]. It has gained increasing recognition in the recent literature and spinal surgery is the leading cause of POVL, replacing cardiac surgery [2]. The main causes of visual loss in these patient populations include ischemic optic neuropathy (ION), central retinal artery occlusion (CRAO), and retinal vein occlusion (RVO) [1,3]. Recent studies have shown that visual loss may be reversible in the early stages; awareness, evaluation and timely management of this rare devastating complication is crucial.

We report a case of 32 year old lady; who had experienced unexpected, unilateral visual loss after elective spine surgery. Ophthalmological evaluation showed ischemic optic neuropathy as a possible cause for her visual loss. At 6 months follow up, her vision is 6/9 in affected eye.

2. Case report

32 years old lady presented with progressive weakness and stiffness of both lower limb of 3 months duration. She had no visual complaints prior to surgery. Imaging study showed D2 D3 giant cell tumour involving all 3 columns with spinal cord impingement. Wide local excision of the lesion, transpedicular D3 corpectomy and posterior instrumentation with expandable cage was done in prone position. During surgery patients head was rested on horse shoe heading rest. Total duration of surgery was 7 h. Estimated blood loss during surgery was 1400 cm^3. Throughout surgery, mean arterial blood pressure was maintained around 90 mm Hg. According to the anaesthetist, there were no reports of untoward events such as hypotension, arrhythmias, cardiac arrest, or oxygen desaturation. During surgery, she received 3000 ml of fluids. Postoperative blood investigations showed decrease in haemoglobin and was transfused with two units of blood. Other routine blood investigations were normal.

In the immediate postoperative period, the patient reported visual loss in the left eye, with severe pain. Urgent ophthalmological consultation was sought and complete standardized neuro-ophthalmic examination, including distance visual acuity measurement, pupillary testing, color vision assessment, visual field testing, fundus examination was conducted. On examination, puffiness of eyelids and conjunctival congestion was seen in left eye. Left pupil was moderately dilated with Relative Afferent Pupillary Defect (RAPD), clear cornea and clear lens bilaterally. Visual acuity was CF 2 ft. in the left eye, while in the right eye it was normal (6/6). Fundus examination of left eye revealed temporal pallor with macular edema. Retinal arteries were normal. Fundus examination of right eye was normal. In view of the above findings, a presumptive diagnosis of left ischaemic optic neuropathy was made. We started her on intravenous methylprednisolone 1 g daily for 3 days. Her visual acuity in the left eye improved to counting fingers

Abbreviations: POVL, postoperative visual loss; CRAO, central retinal artery occlusion; ION, ischemic optic neuropathy

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at 3 m on third post op day, 6/9 at three post op weeks and 6 months follow up. Possible explanation for her visual improvement could be either due to the effect of steroid therapy or may have occurred spontaneously.

3. Discussion

Visual loss following spinal surgery is a potentially devastating and rare complication. Although the etiology of POVL is not clearly understood, multiple risk factors have been proposed which include patient head positioning, long duration of surgery, excessive blood loss, intraoperative hypotension, excessive hydration, hypoxia, elevated venous pressure, decreased ocular perfusion pressure and patient-specific vascular susceptibility or combination of these factors [3]. Normalisation of visual acuity to baseline levels seems to be the exception rather than the rule. POVL due to ischemic optic neuropathy is typically noticed within the first 24–48 h, often when the patient awakes after surgery. The most common cause of perioperative retinal arterial occlusion is improper patient positioning resulting in external compression of the eye. External compression of the eye produces sufficient intraocular pressure (IOP) to stop flow in the central retinal artery. It is seen in spine surgery performed with the patient in prone position. Various factors which increase the vulnerability for external compression include altered facial anatomy, osteogenesis imperfecta and exophthalmos. Patients belonging to Asian descent tend to have lower nasal bridges, which may add to the risk of external compression [4].

For the patient positioned prone for the complex cervical and upper dorsal spine surgery, the horseshoe-type headrest is not advised as direct pressure on the eye, especially as a result of patient malposition and greater chance of head movement by the surgeon has been cited as a factor contributing to visual loss in several published reports [5]. Lee et al. were able to demonstrate that the lack of use of Mayfield pins and ipsilateral periocular trauma were statistically significant findings in the CRAO group. They also reported that Mayfield pins were not used in any of the 10 patients with CRAO [6]. Asok et al. concluded that use of Mayfield clamp during spinal surgeries can help to reduce the occurrence of visual loss by avoiding external ocular compression [7]. Roth et al. found that using a horseshoe head rest during cervical spine surgery increases the risk of position change due to frequent movement of the head and in turn resulting in increased orbital pressure. He suggested a square foam headrest for positioning during cervical spine surgery [8]. The use of Mayfield clamp ensures that there is no direct pressure on eyes and eyes can be checked intermittently by palpation or visualization. The horseshoe is no longer an appropriate device for prone surgery and its use should not be supported.

Finally, in light of the major impact that blindness has on affected patients, surgeons may consider including a discussion of a theoretical risk of perioperative vision loss in their consenting process. Rarity of the condition as well as lack of definite causal risk factors may be responsible for inability to prevent the occurrence of this complication. Measures such as thorough preoperative evaluation and preparation, intraoperative patient positioning, proper management of intravenous fluids, correction of anemia, use of vasopressors, maintaining blood pressure during surgery, and optimization of duration of surgery should be taken into consideration to avoid perioperative blindness in patients undergoing spine surgery under general anesthesia. Eyes should be checked throughout the case to avoid direct pressure on the globe.

In a retrospective analysis, Myers et al. compared data obtained in 28 patients in whom visual deficits developed after prone spine surgery and 28 controls matched for age, operative approach, type of surgery, number of spinal levels operated, instrumentation and primary versus revision surgery. They found statistically significant differences between the 2 groups in the areas of intraoperative blood loss (3600 ml in patients with POVL and 880 ml in controls) and duration of operative procedure (430 and 250 min, respectively). Interestingly, the hematocrit and hypotension may not be the main culprits in POVL as hematocrit and blood pressure values were nearly matching in both groups [5].

In 2011, a study was done to evaluate the need to discuss this unanticipated complication with the patient and family before the surgery, concluding that 80% of outpatients wanted to talk about such topics with the surgeon and recommended that it should be included in the consent form [9]. High-risk patients should be considered for staged procedures, whenever possible in case of complex and anticipated long duration surgery.

4. Conclusions

Visual loss needs to be considered as one of the post-operative complications with complex spinal surgery and advisable to inform high-risk patients that there is a small, unpredictable risk of perioperative visual loss. Preoperative identification of patients with risk factors, preoperative patient counselling, proper positioning, intraoperative close monitoring, maintaining hemodynamic stability and postoperative follow up of such cases is advised. The horseshoe is no longer an appropriate device for prone spinal surgery and its use should not be supported. The radical increase in spinal surgeries performed and the significant correlation between spinal surgery and postoperative vision loss emphasize the need for further research on this area.

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