Case Report

Visual loss after spine surgery: Case report

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ARTICLE INFO

Article history:

Received 3 March 2016

Accepted 29 May 2016

Available online 24 June 2016

Keywords:

Visual loss

Amaurosis

Spine surgery

Complications

Posterior Ischemic Optic Neuropathy

ABSTRACT

The presence of postoperative visual loss is a well-known complication, and described in various reports, its low incidence (0.028–0.2%) makes it extremely rare. Two main causes have been determined: Posterior Ischemic Optic Neuropathy and central Retinal Artery Occlusion. The following is a case report of a 52-year-old patient that presented visual loss after elective spine surgery that had no complications that could initially explain this complication. Studies were performed and evaluations by ophthalmologists determined that the cause of Posterior Ischemic Optic Neuropathy due to multiple risk factors that the patient had previously and during the surgery. After 3 year follow-up the patient still has total visual loss and no other complications were reported.

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1. Introduction

The presence of postoperative visual loss is a well-known complication, and described in various reports; however, its low incidence (0.028–0.2%) makes it extremely rare. Still, it is expected to rise because of the constant increase in spinal surgeries being performed worldwide. The most common etiologies are as follows: Posterior Ischemic Optic Neuropathy (POIN) and Central Retinal Artery Occlusion (CRAO).^{1,2}

A multicenter multivariate analysis was reported, based on diagnostic coding, describing that spine surgery was the most highly associated surgical intervention with postoperative visual loss, and within these, scoliosis (0.28%) and lumbar fusion (0.14%) were the highest. Cardiac and spinal fusion surgery had the highest rates of perioperative visual loss (POVL). The national estimate in cardiac surgery was 8.64/10,000 and 3.09/10,000 in spinal fusion. Pediatric patients (age <18) and geriatric (age >84) patients were 5.8 and 3.2 times more liable to loss of vision, non-POIN and non-CRAO, after spine surgery. The risk factors found were as follows: peripheral vascular disease (OR = 2.0), arterial hypertension (OR = 3.0), and blood transfusion receptors (OR = 2.2), which were more liable to non-POIN and non-CRAO vision loss. POIN was present in patients with arterial hypertension (OR = 10.1), systemic vascular disease (OR = 6.3), and anemia (OR = 5.9).^{3,4}

2. Case

A 52-year-old female patient presented with radicular pain, corresponding to L4–L5 segment. Gait difficulties were seen on heels and toes. She had a history of fibromyalgia and depression. The results of the blood tests taken prior to surgery are listed in Table 1. The surgery was performed with laminectomy and discectomy of L4–L5 and spondylolisthesis L4–L5. She had been previously managed with Gabapentin, Dextropropofol, and Pantoprazole. She is allergic to Penicillin, and has been a smoker for approximately 4 years, with 1–2 cigarettes a day.

3. Surgery

General anesthesia was given with the help of Midazolam 3 mg, Fentanyl 500 µg, Vencuron 6 mg, and Propofol 200 mg; Cephalothine 1 g was given as prophylaxis; in addition, Furosemide 20 mg was administered, along with Metamizole 2 g for complimentary analgesia. Orotracheal intubation was with no complications. The following intravenous fluids were administered: Hartmann 1000 cc, Saline 0.9% 1000 cc, Voluven 500 cc, repeating dosage of fentanyl 250 µg, 1 and 2 h after surgery, 100 µg each, mean oxygen saturation of 99%, and Furosemide 20 mg IV that was given again at 1 h 30 min into surgery. Posterior instrumentation and posterolateral fusion with intersomatic fusion (PLIF) were performed. Total surgical time was 4.5 h; blood loss was 600 cc and mean arterial blood pressure was 90 mmHg. Mean cardiac frequency was 70 bpm, and no surgical complications were reported. According to the anesthetist, there was no report of a

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Table 1

Blood tests prior to surgery.

Leucocytes	7.8 miles/ μ l
Hematocrit	40.6%
Platelets	305 miles/ μ l
Glucose	88 mg/dl
Creatinine	0.7 mg/dl
Total cholesterol	256 mg/dl
Triglycerides	102 mg/dl
CRP	6.29 mg/l
Sedimentation rate	18 mm/h
Hemoglobin	14.0 g/dl

Table 2

Postop blood tests.

Leucocytes	14.0 miles/ μ l
Hematocrit	26.2%
Platelets	191 miles/ μ l
Tp	11.7 seg
Tpt	27.0 seg
Hemoglobin	9.5 g/dl

“unusual” complication (i.e., unusual length, unusual bleeding, arrhythmias, cardiac arrest, and unusual oxygen desaturation). Postop blood tests show a decrease in hemoglobin (Table 2).

Swelling on lower limbs was reported in the recovery room. In the immediate postoperative state, the patient reports visual loss in the right eye, with severe pain. An ophthalmologist evaluates the patient with complete standardized neuro-ophthalmic examination, including distance visual acuity measurement, pupillary testing, color vision assessment, visual field testing, fundus examination, and ultrasound of the eye (Fig. 1), and reports bad functional prognosis, initial clinical diagnosis of PION with incomplete ophthalmoplegia secondary to third cranial nerve palsy, visual field defects including altitudinal defect, and concentric loss of vision. Neuroimaging was performed and showed no pathology along the visual pathways. On 3-year follow-up, there was no recovery of visual loss.

4. Discussion

Eye injuries after nonocular surgery are most often benign and transient, consisting mainly of corneal lesions. Rarely, PVL may be present, resulting in a dramatic permanent visual loss. This case presents a patient with postoperative visual loss. The patient was intervened in prone position. Based on a report from the American Anesthesiologist Society, postoperative visual loss was found in 83 patients of the 93 reported, and had strong correlation to spine surgery. Multiple risk factors were described^{5–10} (Table 3).

Known causes of postoperative amaurosis are as follows: PION (approximately 89%) with incidence reported between 1/60,000 and 1/125,000, and CRAO (approximately 11%). Minimum percentages can be attributed to other causes.^{11–13}

The incidence in spine surgery has been reported between 0.01% and 0.06%. Optic nerve perfusion is directly related to mean arterial systemic pressure (MASP) and inversely related with venous drainage. Intraocular pressure augmentation can cause anterior optic nerve infarction, but will have no effect on the posterior portion. PION diagnosis requires imaging, because there

Fig. 1. Ultrasound of the right eye of the patient.

are no visible structures to be evaluated with clinical examination.^{14–17}

Generally, CRAO is caused by direct pressure over the eye, augmenting intraocular pressure and compromising perfusion. In prone position, which is the most common position for the patients in spine surgery, the head should be at the same level as the heart. Despite having various approaches in the treatment of this pathology, there is no consensus on which is best. There are reports describing good outcomes in patients treated with Erythropoietin, restoring visual loss in less than 60 h, although there is still much research to be done to recommend this treatment. The visual loss prognosis is bad in these cases.¹⁸

Patients submitted to spine surgery make up the largest group (67%) of patients reported with visual loss in the postoperative setting. Among these, the most common cause is still PION. The recovery prognosis reported in various publications is close to none. There are cases in which the onset of visual loss initiated 48–72 h after surgery, but the visual loss was not absolute.¹⁹ There are no specific risk factors that could help the surgeon or anesthesiologist to identify patients who are at risk to develop PVL.

In 2011, a study was made to evaluate the need to discuss this rare complication with the outpatient and family before the surgery, concluding that 80% of outpatients wanted to talk about such topics with the surgeon. The general recommendation is that it should be included in the consent form, and always be part of the risks discussed with the patient, prior to surgery.²⁰

5. Conclusions

Posterior Ischemic Optic Neuropathy is a complication directly related to spine surgery, which is a major risk factor. Even though the initial clinical impression is that the visual loss was caused by direct pressure over the eye, this complication can be foreseen by the addition of risk factors in the outpatient, even though this is not always the case. The low incidence of this complication may be overlooked and not included in the information given to the patient; we suggest that this be included as part of every consent form, because of its devastating consequences. Nowadays, the rate at which spine surgery is being performed is on the rise, and this complication, because of its direct relationship with this type of

Table 3

Risk factors.

Perioperative anemia Blood loss >1 l Hypertension	Perioperative hypotension Surgical time >6 h Morbid obesity	Rise in central venous pressure Smoker Age >50 and women	Head below heart level Diabetes mellitus Hemodilution	Rise in CSF pressure Periorbital edema Vasopressors
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surgery, will be seen more often. The treatment currently available for PION and CRAO is not encouraging. Spine surgery planning should be very detailed, taking to account every risk factor, to be able to lower as much as possible the incidence of complications. An adequate and detailed medical record is the key, as well as transoperative monitoring and previous management of comorbidities.

Conflicts of interest

The authors have none to declare.

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