Lo SCALPELLO Journal (2024) 38:50-53
doi number: 10.36149/0390-5276-309

Simultaneous bilateral vision loss after total hip arthroplasty: what an orthopedic surgeon has to worry about

Marco Focaccia[1], Luca Cevolani[1], Eric Loedewijk Staals[1], Fabiana Necci[2], Nikolin Alì[1]

[1] Oncology Unit – IRCCS Istituto Ortopedico Rizzoli, Bologna, Italy; [2] UO Ortopedia e Traumatologia, Ospedale Umberto I Lugo, Ausl Romagna, Ravenna, Italy

Summary

Introduction. Perioperative visual loss (POVL) is a rare and unpredictable complication of non-ocular surgical procedures.
Case report. Here we report a case of visual loss after a routine orthopedic procedure. After a surgical procedure of total hip arthroplasty, sudden visual loss was referred by the patient and anterior ischemic neuropathy was diagnosed. Despite treatment, the patient has not regained his sight after more than a year.
Discussion. Multiple studies have tried to identify pre-existing conditions or intra-operative factors that may contribute to ischemic optic neuropathy. Age, sex, intraoperative anemia, and acute blood loss seems to predispose patients to POVL, even if no cut-off values have been defined. Preoperative anemia and peripheral vascular disease may be risk factors for this condition. Prone position and prolonged operative time are intraoperative risk factors. However, the development of POVL remains unpredictable and a multi-factorial etiology seems to be the most plausible explanation.
Conclusions. POVL is a rare and unpredictable complication that can occur in patients of all ages, even in routine uncomplicated orthopedic procedures. Pathogenesis and etiology are still to be defined and no preventive or treatment guidelines had been established.

Key words: total hip arthroplasty, surgical complications, postoperative visual loss, ischemic optic neuropathy

Received: March 19, 2024
Accepted: September 5, 2024

Correspondence
Marco Focaccia
E-mail: marco.focaccia@ior.it

How to cite this article: Focaccia M, Cevolani L, Loedewijk Staals E, et al. Simultaneous bilateral vision loss after total hip arthroplasty: what an orthopedic surgeon has to worry about. Lo Scalpello Journal 2024;38:50-53. https://doi.org/10.36149/0390-5276-309

Introduction

Perioperative vision loss (POVL) is a rare but devastating complication of non-ocular surgical procedures. Ischemic optic neuropathy (ION) has been implicated as the most frequent cause of POVL [1]. The incidence varies from 0.0008 to 0.2% depending on the type of surgery [1,2]. It occurs mostly after spinal surgery, cardiac surgery, gastrointestinal surgery, and neck surgery. Only a few cases are reported in the literature after routine orthopedic surgery [2,3].
Here we report a case of bilateral visual loss within the first days after a routine total hip arthroplasty (THA). At one year of follow-up, the patient has not shown any clinical improvement.

Case presentation

A 65-year-old patient was admitted for scheduled right total hip replacement for primary osteoarthritis. The surgery had a duration of approximatively 60 minutes without intraoperative complications, and the peri-operative and immediate post-operative course were regular. Routine exams on the first post-operative day showed n hemoglobin (Hb) value of 11.0 mg/dl and the drain was removed. Six hours after drain removal the patient complained a profuse blood loss from the wound. Clinical evaluation was performed and the bleeding was controlled. Complete blood count was repeated urgently showing Hb values had dropped to 7.7 mg/dl. Plasma expander (500 + 500 cc) was administered and 2 units of red blood cells (RBCs) were transfused.

The following morning, on the second postoperative day, low levels of Hb persisted (7.4 mg/dl); the patient was asymptomatic, with arterial pressure values and blood oxygen saturation within normal values and minimal tachycardia.

The third day post-operatively Hb dropped to 7.1 mg/dl and the patient was administered another unit of RBCs. The same evening the patient reported bilateral blurring of vision, which progressively worsened during the night. In the morning urgent ophthalmological and neurological evaluation were performed. A brain CT scan showed no signs of acute ischemia or hemorrhage. Intravenous corticosteroid therapy was started and prolonged for 10 days.

On the fifth postoperative day bilateral vision loss was almost complete. A brain MRI showed no acute lesions and the ophthalmological examination was repeated: bilateral edema of the papilla was found without signs of hemorrhage. Hb values were still low (7.7 mg/dl) and further transfusion of one unit of RBCs was performed, even if vital parameters were still in range without any clinical symptoms from anemia. Postoperative x-ray showed well-implanted and stable prostheses and the patient started assisted ambulation with physiotherapists.

On the seventh day after surgery the low Hb value persisted (7.9 mg/dl), an additional unit of RBCs was administered with gradual resolution of the post-operative anemia.

Based on a previous report[4], a week after the surgery the patient started hyperbaric oxygen therapy and completed 20 sessions during the following weeks. A functional MRI was performed almost one month from surgery showing no activities in the cortical areas and no response of the optic nerve. After more than one year of follow-up, the patient has not shown improvement in vision from both eyes.

Discussion

POVL is a rare but serious complication of non-ophthalmic surgery. ION has been reported as the most frequent cause of POVL. It can be an anterior ION (AION), with acutely swollen ophthalmic nerve (ON) head, or posterior ION (PION) with a normal ON head in the acute state [2]. Less frequently POVL can be caused by a central retinal artery occlusion or more rarely by a cortical ischemia.

The literature on this extreme infrequent pathology is based on case reports, reviews of case reports, and retrospective studies. Numerous factors have been proposed to contribute to its pathogenesis: hypotension, anemia, prolonged surgery, globe compression, prone positioning, and volume/type of fluid administrated [2,5].

POVL as a complication of orthopedic surgery occurs mainly after spine surgery. In this field, the incidence of POVL is slightly higher than non-spinal orthopedic surgery [1,3], and the extreme rarity of this complication does not allow us to fully understand its etiology and risk factors. From analysis of the literature and the case series available, some authors have described risk factors and guidelines. Kla and Lee[5] suggest that for patients undergoing a long duration spinal surgery in prone position, the risk of visual loss needs to be considered and the patient should be adequately informed. They suggest to perform periodic eye checks throughout the operation and avoid headrests that do not allow adequate assessment of eyes, on order to decrease the risk of a direct pressure on the globe that can cause POVL by central retinal artery occlusion.

Male sex, obesity, use of the Wilson frame, longer surgical duration, larger blood loss, and a lower percentage of colloid in the non-blood fluid administration significantly and independently increased the risk of ION associated with spine surgery in the prone position and should be avoided[5].

Considering hip replacement/femur fracture treatment and knee arthroplasty, which are two of the most commonly performed non-spinal orthopedic surgical procedures, the reported rate of POVL is between 0.01 and 0.02% [3].

Kaeser et al.[3] reported 6 consecutive patients with POVL secondary to orthopedic procedures: visual loss was bilateral in 5 patients and unilateral in one case (11 affected eyes). Three underwent a THA and ION was reported in all three cases. All surgical procedures were reported to be uncomplicated, and neuroimaging was performed in all patients and showed no abnormalities. Visual acuity improved in 3 eyes (27%), worsened in one eye (9%), and remained stable in the remaining 7 eyes after a mean follow-up of 11.8 months. Analyzing only POVL after THA, the literature reports only 9 cases which are summarized in Table I. AION was the most frequent mechanism described (4/9), and in one of these patients a unilateral central retinal artery occlusion was also present.

Multiple clinical studies have tried to identify pre-existing conditions or intraoperative factors that may contribute to ION. It seems that male patients aged 50 year and older may be more likely to develop ION or central retinal artery occlusion. As for spinal surgery, it has been hypothesized that intraoperative anemia or acute blood loss with consequent hypotension during surgery or immediately postoperatively predisposes patients to POVL [1,3]. Preoperative anemia is more frequently present in

Table I. Case of Visual Loss after THA.

Author/year pubblication	Type of Article	No. of patients	Causes of visual Loss
Rizzo, 1987 [1]	Case report	1	PION
Gelinas, 2000 [2]	Case report	1	Cortical blindness
Warner, 2001 [3]	Case series	1/4	Cortical blindness
Pandey, 2008 [4]	Case report	1	CRAO
Kaese, 2011 [5]	Case series	2/6	AION
Yazgan, 2014 [6]	Case report	1	AION + CRAO (LE)
Janarek, 2014 [7]	Case series	1/2	AION
Manzott, 2019 [8]	Case report	1	AION

CRAO: central retinal arterial occlusion; PION: posterior ischemic optic neuropathy; AION: anterior ischemic optic neuropathy; LE: left eye.

patients with POVL than in patients without POVL and is suggested as a notable risk factor. In patients with peripheral vascular disease, the risk of POVL is twice as high as in patients without. Other common medical conditions such as coronary artery disease, diabetes mellitus, cerebral vascular disease, hyperlipidemia and renal disease, do not appear to increase the risk of POVL [1,3,5]. However, the impression is that the development of POVL remains unpredictable and a multi-factorial etiology seems to be the most plausible explanation.

In orthopedic surgery there are no clear guidelines or a successful therapeutic approach due to the lack of large case-controlled studies. Different treatments and preventative strategies have been reported, but with poor results demonstrating the devastating nature of this complication. Precautions such as careful patient positioning, optimizing perioperative hemodynamic conditions, and minimizing surgical time as appropriate, may decrease the risk for patients. Since hypotension and anemia are theoretical risk factors, their treatment and prevention, either pharmacologically or with blood transfusions, may improve vision[5]. In the case we presented, despite multiple transfusions treatment Hb remained persistently low and this may have affected the onset and maintenance of the visual disturbance.

A combination of hyperbaric oxygen therapy and steroids was also successful in a previous case [4]: in our experience no benefit was seen with this treatment. The rarity of the disease, the poor literature on the subject, and the scarce awareness of surgeons make this complication fearful and potentially devastating for patients. For the same reasons, no gold standard therapy has been defined and the prognosis of POVL remain unpredictable but generally poor.

Conclusions

POVL is a rare and unpredictable complication that can occur after surgeries in patients of all ages, either healthy or with medical comorbidities. The prognosis remains very poor and no treatment guidelines have been established. Although a defined threshold for blood pressure or Hb cannot be identified, their rapid correction to normal values could help prevent the onset of POVL. Further studies are necessary to completely identify its etiology, pathogenesis, and individual risk factors and to define treatment guidelines. The orthopedic surgeon should be aware of this rare condition in order to inform patients about the possible risk and to implement preventive measures to avoid this insidious complication.

Conflict of interest statement

The Authors declare no conflict of interest.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author contributions

MF: wrote the paper, editing text; LCevolani Luca: editing text; ELS: editing text; FN: conceived and designed the analysis; NA: conceived and designed the analysis, wrote the paper.

Ethical consideration

Although IRB or ethical committee approval is not requested for a single case report according to Italian rules, we have collected a written informed consent from the patient to publish his medical history and images from his radiological studies.

References

[1] Goyal A, Elminawy M, Alvi MA, et al. Ischemic optic neuropathy following spine surgery: case control analysis and systematic review of the literature. Spine (Phila Pa 1976) 2019;44:1087-1096. https://doi.org/10.1097/BRS.0000000000003010

2 Roth S, Moss HE. Update on perioperative ischemic optic neuropathy associated with non-ophthalmic surgery. Front Neurol 2018;9. https://doi.org/10.3389/FNEUR.2018.00557

3 Kaeser PF, Borruat FX. Visual loss after orthopedic procedures. J Arthroplasty 2011;26:338.E17-338.E19. https://doi.org/10.1016/j.arth.2009.11.010

4 Allashem HM, Sward DG, Sethuraman K, et al. Hyperbaric oxygen therapy for perioperative posterior ischemic optic neuropathy: a case report. Undersea Hyperb Med J Undersea Hyperb Med Soc Inc 2019;46:701-707.

5 Kla KM, Lee LA. Perioperative visual loss. Best Pract Res Clin Anaesthesiol 2016;30:69-77. https://doi.org/10.1016/j.bpa.2015.11.004