Ischemic optic neuropathy following lumbar spine surgery

Case report

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This 48-year-old hypertensive man, a cigarette smoker, awoke in the recovery room with visual loss in the right eye after uncomplicated lumbar spine surgery. His intraoperative blood pressure had been maintained at relatively low levels to reduce bleeding; a loss of 1500 cc of blood was reported. Postoperative hemoglobin was 4.2 g/dl less than the preoperative hemoglobin; however, the patient did not receive a blood transfusion. A postoperative ophthalmological examination revealed decreased visual acuity, color vision, and visual field in the right eye. The right optic nerve and retina were initially normal but the patient eventually developed optic nerve atrophy consistent with the clinical diagnosis of ischemic optic neuropathy.

Neurosurgeons should be aware that this condition may follow uncomplicated lumbar spine surgery and should obtain prompt ophthalmological consultation when patients develop postoperative visual loss. Aggressive and rapid correction of blood pressure and hematocrit may be helpful in individuals who develop ischemic optic neuropathy after lumbar spine surgery.

KEY WORDS • ischemic optic neuropathy • blood pressure • blood transfusion • lumbar spine surgery

Case Report

Clinical and Surgical History

This 48-year-old hypertensive man presented to the neuroophthalmology service on September 7, 1994. Historically the patient had smoked 50 packs of cigarettes per year and had long-standing hypertension that was well controlled with diuretics. One year prior to presentation, he had undergone lumbar spine surgery that included an anterior lumbar fusion of L2–3, L3–4, and L4–5 through a retroperitoneal approach; a transverse process fusion of L2–3, L3–4, L4–5, and L5–S1; decompression of L4 and L5 nerve roots; total facetectomies at L3–4 and L4–5; insertion of pedicle screws at L3–5 and facet screws at L2–3; and spinal fusion at L3 to S1. This procedure was uncomplicated and intraoperative blood loss was 1500 cc.

Preoperatively the patient had a systolic blood pressure of 140 mm Hg and a diastolic blood pressure of 80 mm Hg. The intraoperative systolic blood pressure was maintained in the 80- to 85-mm Hg range with a diastolic pressure in the 40- to 45-mm Hg range. Preoperative hemoglobin was 15.6 g/dl and the postoperative hemoglobin was 11.4 g/dl but the patient did not receive a blood transfusion. On awakening in the recovery room, the patient...
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noted poor vision and a central “dark spot” in his right eye. An ophthalmological examination 2 days later revealed a visual acuity in the right eye of counting fingers, with a dense right central scotoma on visual field testing but a normal appearing retina and optic nerve in the right eye; the left eye was completely normal. One month later, the patient had not improved and had a visual acuity in the right eye of counting fingers, a right central scotoma extending into the superotemporal field on visual field testing, a right afferent papillary defect, a severe color vision deficit, and optic atrophy of the right optic nerve. One year later his ophthalmological examination revealed that his condition was stable and unchanged.

Discussion

This patient experienced acute unilateral loss of visual acuity, color vision, and visual field after lumbar spine surgery. The right optic nerve was initially normal but he eventually developed optic nerve atrophy consistent with the diagnosis of ischemic optic neuropathy. Katz, et al., described four individuals with this condition after lumbar spine surgery. All four had uncomplicated surgery but the systolic blood pressure was intentionally maintained in the 85- to 100-mm Hg range with diastolic pressures maintained between 45 and 60 mm Hg to decrease intraoperative bleeding. The hemoglobin values in these four patients fell 3.0 to 7.8 g/dl during surgery, and estimated blood loss was 2000 cc for three of the four and 500 cc in one. Vasculopathic risk factors, including hypertension, diabetes, coronary artery disease, and smoking, were present in three of four cases but intraoperative anemia and hypotension were believed to be the main contributing factors for ischemic optic neuropathy in these patients.

Brown, et al., reported on six patients who demonstrated ischemic optic neuropathy after general surgical procedures. All six had a hemoglobin count of less than 8.0 g/dl over periods of time ranging from 30 minutes to 72 hours and all experienced episodes of decreased mean blood pressure ranging from 24% to 46% of preoperative levels over 15- to 120-minute periods. These authors suggested that “even a short episode of hypotension in an already anemic patient may predispose the patient to ischemic optic neuropathy,” and they emphasized that acceptable thresholds for transfusion may be too low, thus “predisposing a larger portion of the anesthetic patient population to temporary or permanent visual loss.”

In this report, the patient’s systolic blood pressure was maintained in the 80- to 85-mm Hg range with diastolic blood pressures in the 40- to 45-mm Hg range. The estimated blood loss was 1500 cc and the postoperative hemoglobin dropped 4.2 g/dl, but this patient did not receive a blood transfusion.

The criteria for transfusion of blood in the perioperative period continue to be somewhat controversial. In the past, a hemoglobin level of 10 g/dl was considered by some surgeons to be the threshold for perioperative blood transfusion; however, the theoretical risk for transmission of infectious diseases such as the human immunodeficiency virus (HIV) and hepatitis has led to reluctance on the part of many surgeons to transfuse blood until the hemoglobin level is much lower. Indeed, the Transfusion Practice Committee of the American Association of Blood Banks recommended an even lower hemoglobin transfusion threshold of 8 g/dl. The National Institutes of Health Consensus Conference on Perioperative Blood Transfusion suggested that otherwise healthy individuals with a hemoglobin level of 10 g/dl or greater rarely require perioperative transfusion, but individuals with hemoglobin levels of less than 7 g/dl frequently require transfusion. If this transfusion criterion had been used, three of six patients with postoperative ischemic optic neuropathy reported by Brown, et al., two of four patients reported by Katz, et al., and the individual in this case report would not have been transfused.

In certain situations, the recommended hemoglobin thresholds for transfusion may be too low; the combination of hypovolemia and anemia places postsurgical patients at special risk for ischemic optic neuropathy and surgeons should not rely on an absolute threshold hemoglobin value when considering the individual patient for possible blood transfusion.

Unfortunately, delay in the diagnosis of this condition after surgery is quite common. Several factors contribute to this delay including a lack of recognition of visual complaints in sedated or medically unstable patients, the presence of more severe or more emergent systemic postoperative problems, the mistaken impression by the patient that poor vision is an expected postoperative occurrence, and the often normal initial optic nerve examinations.

The surgeon’s early recognition of visual loss due to this condition and prompt ophthalmological consultation is important if intervention and possible salvage of vision are to be successful. Connolly, et al., reported the treatment and partial return of vision after hypotension-induced ischemic optic neuropathy in three patients and suggested that rapid, aggressive, and early increase in blood pressure or hematocrit may also benefit patients who suffer from this condition after surgical procedures.

References


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