

Letter to the Editor

## Missing the 'window' might shut the light forever: Central retinal artery occlusion following spine surgery

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Dear Editor,

The occurrence of postoperative visual loss (POVL) after spine surgery in prone position, although rare, has been described.<sup>[1,6,7]</sup> Various pathophysiologic mechanisms have been proposed for the cause of visual loss and risk factors associated with it.<sup>[1]</sup> The visual loss is permanent in most of the cases. However, the loss may recover to some extent in cases especially if detected and treated early.<sup>[6]</sup>

We present a case with unilateral visual loss due to central retinal artery occlusion (CRAO) after surgery in prone position that was detected a few hours after surgery and improved only partially. Apart from various causes and preventive measures, this manuscript highlights the factors that may delay the detection of POVL following spinal surgery, making the treatment less effective.

A 13-year-old child presented 4 weeks posttrauma with complaints of gradually progressive spastic quadriparesis and neck pain. On neurological examination, patient had spastic quadriparesis with grade 3/5 power in all four limbs. Radiological examination revealed nonunited C2-dens fracture with cord compression, which could not be reduced on traction [Figure 1a-c]. Computed tomography (CT) angiogram revealed normal vertebral arteries on either side. Patient underwent direct posterior reduction of the fractured segment from posterior approach, in prone position. The head was supported in a horse-shoe intraoperatively, with extra precaution of preventing external pressure on the globe. The surgical time was approximately 2.5 h, with an estimated blood loss of 200 ml. The surgery required intrafracture distraction with facet manipulation while safeguarding the vertebral arteries [Figure 1d and e].<sup>[4,5]</sup> Postoperatively

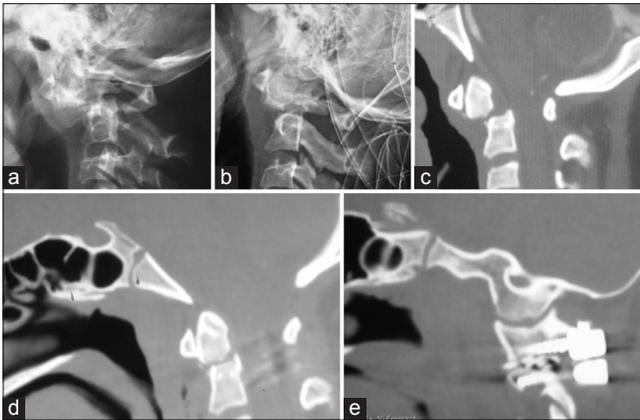
patient was extubated on table, and received opioid analgesia.

Three hours later when patient recovered from sedative effect, he complained of complete vision loss in the right eye. There was no peri-orbital swelling, edema, ecchymosis, proptosis, or any other sign of venous fullness. Ocular examination revealed no perception of light in the right eye and 20/20 in the left eye. Lids and adnexa were normal, with intraocular pressure of 12 and 14 mmHg in right and left eye, respectively, by Perkins applanation tonometer. There was presence of relative afferent pupillary defect (RAPD) in the right eye, with normal direct and weak consensual reflex in the left eye. Posterior segment examination in the right eye revealed the presence of cherry red spot with pale retina and gross retinal vascular attenuation [Figure 2a]. Left eye fundus examination was within normal limits [Figure 2b]. Extra-ocular movements were normal on both sides. The findings suggested CRAO.

Patient was immediately given a digital massage and inhalation in a plastic bag. Anterior chamber paracentesis was done bedside to restore blood flow to the retina and patient was given oral acetazolamide 500 mg stat.

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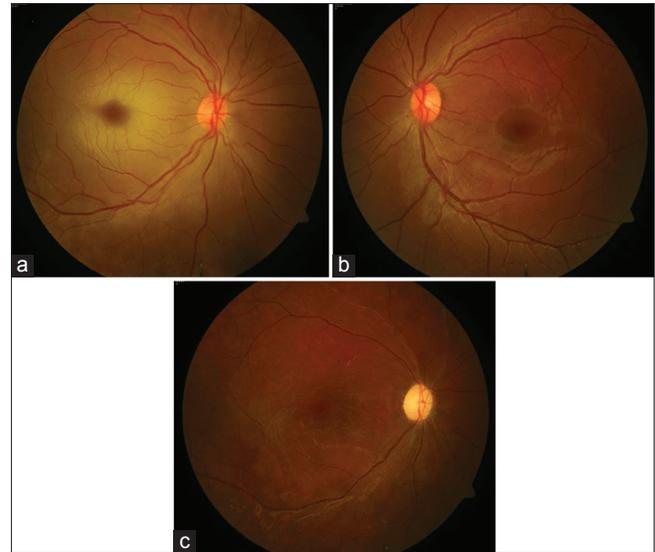


**Figure 1:** (a) X-ray Cranio-vertebral junction lateral view showing type II odontoid fracture with atlantoaxial dislocation. (b) Incomplete reduction of dislocation despite traction. (c) Midsagittal CT image showing fracture and dislocation. (d and e) Postoperative midsagittal and parasagittal images showing complete reduction and the strong construct

After the emergency measures, there was no change in the symptoms of the patient. Patient was kept under follow up on serial fundus imaging. The systemic work up of the patient was normal and there was no evidence of any hypercoagulopathy (blood profile, coagulogram and serum homocysteine levels were normal). Patient could count fingers close to the face at follow-up examination at 3 weeks. There was presence of RAPD, with disc pallor and severe arterial attenuation, and resolution of cherry red spot. At the last follow-up examination at 6 weeks, patient is reading 20/120 in the right eye [Figure 2c].

The incidence of POVL after surgery in prone position ranges from 0.028% to 0.2%, and is a devastating complication with debilitating consequences for the patient.<sup>[6]</sup> Spine surgery in prone position remains the most common procedure associated with POVL, with an estimated incidence of 65%. The various ophthalmologic diagnosis associated with spine surgery cases include anterior ischemic optic neuropathy (AION), posterior ischemic optic neuropathy (PION), CRAO, and cortical blindness.<sup>[1]</sup> Risk factors noted in the patients included hypertension, smoking, diabetes, vascular disease especially atherosclerosis, sickle cell disease, polycythemia and embolism, anemia, large operative time, and intraoperative blood loss.<sup>[1]</sup> Direct pressure upon the eye, increasing intraocular pressure (IOP), has been documented as a possible factor resulting in visual loss, owing to venous congestion and arterial occlusion.<sup>[1]</sup>

The present case had CRAO with partial improvement in vision over 6 weeks, starting from 48 h postsurgery. The cause of CRAO in this patient remains elusive as none of the risk factors described in literature were evident in our case. The surgical time and intraoperative blood loss in the present case were significantly low, along with no signs suggestive of direct pressure over the globe. There



**Figure 2:** (a) Fundus picture of the right eye on presentation showed the presence of normal disc and vasculature but pale retina with cherry red spot on the macula. (b) Left eye examination was normal. (c) Fundus picture of the right eye 6 weeks later with pale disc and sclerosed attenuated retinal vessels. The retina had regained its normal color but the foveal reflex was dull

were no intraoperative events leading on to systemic hypotension and patient had no previous cardiac history as well.

A remote possibility is of a thrombus in vertebral artery (VA), due to trauma that can throw emboli during manipulation of facets. A normal VA on preoperative CT angiogram almost rules out this possibility. There is a possibility of fat embolism that might have occurred during the intrafracture distraction. Fat embolism has been described as a cause of CRAO.<sup>[3]</sup>

The treatment of CRAO is digital massage, carbonic anhydrase inhibitors, and anterior chamber paracentesis. These measures are known to alter the natural course of CRAO but only if implemented within the correct time window of 2–4 h. Irreversible retinal damage occurs after the retina is ischemic for 90–100 min.<sup>[2]</sup> With opioid analgesia, the patient is sedated and does not complain of any visual symptoms till the effect of drug weans off. Additionally, the pupils are usually pin point after institution of opiates masking the involvement of optic nerve or nerve head. Such instances caution the use of opioid analgesia especially for patients operated in prone position. This would help in early detection and treatment of such complications in the appropriate window period.

POVL remains an unfortunate and infrequent morbid event occurring in patients undergoing spine surgery. Despite taking all precautions like proper positioning and avoiding blood loss, the surgeon may encounter such a dreaded complication in few cases. In certain instances the

visual loss may be reversible, provided it is detected early. Caution needs to be practiced before instituting opiate analgesia especially in spinal surgeries in prone position, lest such complications be missed. Treatment after the window period has elapsed may not bear desirable results.

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