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CLINICAL INFORMATION

Unilateral mydriasis: a complication of spine surgery in prone position

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Abstract
Prone position though is commonly used for better access to surgical site, but may be associated with a variety of complications. Perioperative Visual Disturbances or loss is rare but a devastating complication that is primarily associated with spine surgeries in prone position. In this case we report a 42 year old ASA-II patient who developed anisocoria with left pupillary dilatation following lumbar microdiscectomy in prone position. Following further evaluation of the patient, segmental pupillary palsy of the left pupillary muscles was found to be the possible cause of anisocoria. Anisocoria partially improved but persisted till follow up.

PALAVRAS-CHAVE
Decúbito ventral;
Microdiscectomia lombar;
Distúrbio visual no perioperatório;
Anisocoria;
Midríase;
Paralisia pupilar segmentar

Midríase unilateral: uma complicação da cirurgia de coluna em decúbito ventral

Resumo
O posicionamento em decúbito ventral, embora comumente usado para melhor o acesso ao local cirúrgico, pode estar associado a uma variedade de complicações. Distúrbios ou perda visual no Perioperatório é uma complicação rara, mas devastadora, que está principalmente associada a cirurgias de coluna vertebral em decúbito ventral. Relatamos aqui o caso de um paciente de 42 anos de idade, ASA-II, que desenvolveu anisocoria com dilatação pupilar esquerda após microdiscetomia lombar em decúbito ventral. Após uma avaliação adicional do paciente, observamos que a paralisia segmentar dos músculos pupilares esquerdos seria a possível causa de anisocoria. A anisocoria melhorou parcialmente, mas persistiu até o acompanhamento.

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Introduction

Prone position is a surgical position commonly used to access posterior cranial fossa, spine, retroperitoneal structures and surgeries involving gluteal region and lower limbs. However prone positioning may be associated with variety of complications including hemodynamic instability, ophthalmological complications, central nervous system complications, peripheral nerve compression injuries, compartment syndrome and pressure ulcers.[1]

In 1948 ophthalmologic complication following prone positioning was first reported by Slocum et al.[2] Among ophthalmological complications Perioperative Visual Loss (POVL) is a relatively uncommon but devastating complication of spine surgery, particularly when spine fusion is performed. Reported incidence of visual disturbances ranges from 0.028 to 0.2% after spine surgery.[3] Corneal and scleral injuries are the most common ophthalmologic injuries. However, they are usually self-limiting.

There is no current literature about development of unilateral pupillary dilatation leading to anisocoria as a complication of spine surgery performed under prone position. Here, we report a case of middle-aged patient who developed dilated left pupil following lumbar microdiscetomy in prone position.

Case report

A 48 year old male patient with history of hypertension (ASA-II) presented with multiple level prolapsed intervertebral disc (L4–L5, L5–S1) with radicular pain in both the lower extremities, was planned for microdiscectomies. General and systemic examinations was within normal limits. He was a known hypertensive on tablet Amlodipine 5 mg once daily since 10 years. All laboratory investigations were within normal limits. Premedication was given in the form of tablet Ranitidine 150 mg and tablet Alprazolam 0.25 mg, the night before and on the day of surgery. On the day of surgery patient was taken into Operation Theatre after confirming the Nil Per Oral (NPO) status. All the standard ASA monitors were attached and peripheral Intra Venous (IV) line was secured. Patient was induced with fentanyl 1.5 mcg.kg^{-1} IV, propofol 2 mg.kg^{-1} IV and vecuronium 0.1 mg.kg^{-1} IV and intubated with 8.0 mm cuffed flexometallic/armored endotracheal tube. Anesthesia was maintained with oxygen, nitrous oxide, sevoflurane and vecuronium as muscle relaxant. Following induction of anesthesia, the patient was turned into prone position with body being supported on gel bolsters and head was kept on head rest with eyes at the same level of heart. Eyes were checked and there was no direct pressure on eyes. All the vulnerable pressure points were padded. Abdomen was free. The surgery continued for four hours. Intraoperative period was uneventful and there was minimal blood loss of approximately 200–300 mL. After completion of surgery patient was turned into supine position. Residual neuromuscular paralysis was reversed with 2.5 mg of neostigmine and 0.5 mg of glycopyrrolate. During extubation to assess depth of anesthesia, pupils were checked and patient was found to have left sided dilated pupil (5 mm) which was not reacting to light. Right pupil was about 2 mm in size and briskly reacting to light. As the patient fulfilled extubation criteria, trachea was extubated and shifted to Post Anesthesia Care Room (PACU). Postoperative vitals were stable. Neurological examinations of the patient were within normal limit except presence of left sided dilated pupil leading to anisocoria. There was no associated periorbital oedema, conjunctival chemosis or lacrimation. To rule out any intracranial cause, noncontrast CT scan of head was done after 2 h, but no pathology could be detected.

Patient complained of diplopia, blurring of vision and pain around the eyes in postoperative period. Ophthalmology consultation was done next day. Patient was found to have left sided superior quadrant of pupil normally reacting to light both directly and consensually, however inferior quadrant of pupil was not reacting to light. Visual acuity was also checked and patient was found to have normal vision (6/6) in right eye and diminished vision (6/18) in left eye. The left pupillary dilatation was due to the segmental pupillary palsy of left eye. It was advised to wait for spontaneous recovery and meanwhile to use correcting spectacles. Patient was kept under observation for 10 days. During this period, patient’s vision improved and there was no diplopia, however mild anisocoria (left pupil ∼3 mm) persisted till then. Patient was discharged from hospital on 11th day postoperatively.

Discussion

Though there is less evidence, several important causes of POVL has been mentioned, which includes anterior and posterior ischemic Optic Neuropathy (ION), Central Retinal Artery Occlusion (CRAO), cortical blindness, supraorbital neuropraxia, transient and permanent ophthalmoplegia, cavernous sinus thrombosis, central retinal vein occlusion, orbital haemangioma, orbital compartment syndrome, bilateral angle closure glaucoma, non-traumatic subperiosteal orbital haemorrhage, amaurosis, dislocated intraocular lens and fixed mydriasis.[4]

Pupillary muscles are innervated by the autonomic nervous system. Sympathetic nerve fibres supply dilator pupillae via superior cervical ganglion which enters the eye through long cilliary nerves of the first division of trigeminal nerve. Parasympathetic nerve fibres supply sphincter pupillae via Edinger-Westphal nucleus near occulomotor nerve and enter the eye through short cilliary nerves.

Meticulous ophthalmological examination especially pupillary examination plays an important role in diagnosis and management of neurological disease. Normally an adult’s pupil size is approximately 3.5 mm, which can vary from 1.0 mm to 10 mm.[5] Anisocoria is defined as a difference of 0.4 mm or greater between the 2 eyes. In case of anisocoria bilateral pupil size should be examined in both bright and dark illumination to differentiate the involvement of parasympathetic and sympathetic pathways, respectively. If the difference between pupil sizes becomes greater in the bright illumination, the larger pupil is the abnormal one, indicating parasympathetic denervation. If the anisocoria is prominent in the bright illumination, the larger pupil is the abnormal one, which indicates parasympathetic denervation. Similarly if anisocoria is prominent in dark illumination, the smaller pupil is the abnormal

and indicates abnormal sympathetic innervation.[6] Segmental pupillary palsy may result as a consequence of any injury to occulomotor nerve in its course. Injury to the ciliary ganglion or short ciliary nerves can lead to a tonic pupil, characterized by poor light reaction with segmental palsy of the iris sphincter.

The differential diagnosis of unilateral mydriasis leading to anisocoria includes acute intracranial mass lesion including haemorrhage, direct trauma to eye, past medical or surgical illness, stellate ganglion block, impaired venous return and effect of different pharmacological agents including alpha-adrenergic agents, anticholinergic agents.[7–11] In this case to rule out any intracranial pathology non-contrast CT head was done, which was within normal limit. There was no history of past medical, surgical illness or direct trauma to the eye. There was no evidence of perioperative administration of any sympathomimetic or anticholinergic drugs or block. Impaired venous drainage (of the head and neck) due to malposition of head & neck on head rest could be a possibility, which is commonly associated with exophthalmos, however exophthalmos was not present in this patient.

Spine surgeries require frequent adjustments in operating table position in order to obtain desired fluoroscopic images intra-operatively. As the prone head rest used in this patient is commercially available one, it may not suit to all head sizes in adults and slight intra-operative displacement of head could lead to direct pressure on eye. Prolonged duration of direct pressure on the globe resulted in parasympathetic postganglionic nerve injury leading to the anisocoria,[9] which could be the possible explanation of segmental pupillary palsy leading to unilateral mydriasis in this patient. Thus we report this rare case of segmental pupillary palsy leading to anisocoria as a complication of prone position. Due to close observation we could identify the anisocoria early, hence ophthalmological intervention was performed and vision improved.

Conclusion

To best prevent permanent ophthalmologic complications associated with prone positioning during spine surgery, surgeons and anesthesiologists should be aware of pathophysiology and related risks.[12] Patient’s head and eye should be intermittently checked at regular intervals throughout the surgery, as surgical manoeuvres and frequent change in operating table inclinations may lead to malposition of head and direct pressure over the eye and subsequent ophthalmic injuries. Although there are many commercially available prone head rests, but envy of patient safety it would be better to customize it according to each patient’s head size. Pre-operative counselling along with adequate preventive measures plays a key role in managing such complications.

Conflicts of interest

The authors declare no conflicts of interest.

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