Intraoperative rise in intraocular pressure in the prone position

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BACKGROUND

Recent studies described visual loss after spine surgery in the prone position (1). Possible causes include ischemic optic neuropathy induced by high intraocular pressure (IOP) (1, 2). However, little information is available on changes in IOP during prone surgery. Here, we measured changes in IOP during spine surgery at prone and supine positions, and also analyzed the risk factors associated with high IOP.

METHODS

One Day Before Surgery

Measurement of IOP at both of sitting and supine position

- Iridocorneal angle
- Fundus examination

Day of Surgery

- Measurement of IOP at:
Prone position: S1 (intubation), P1 (0.5 hr after prone), P2 (1 hr), P3 (2 hr), P4 (closing suture)
S2 (at turning to supine) S3 (supine 5 min later)
Supine position: SS1 (intubation), SS2 (0.5 hr after intubation), SS3 (1 hr), SS4 (2 hr),
SS5 (closing suture), SS6 (end of operation)
- Age, BMI, operation time, dose of vasopressors, Amount of bleeding, Amount of transfusion

RESULTS

< IOP at different time points and positions >

Maximum IOP :
Supine: 26 mmHg, Prone: 55.4 mmHg.
In prone position, IOP was >40 mmHg in 7 patients.
However, none complained of visual impairment

< Difference in IOP relative to that at intubation (set to zero) >

IOP gradually decreased after intubation

IOP was significantly higher at 30 min after intubation.
IOP transiently decreased after turning to supine.

< Effects of various factors on IOP at intubation (S1) and closing suture (S4) >

Iridocorneal angle, blood sugar level and arterial blood pressure had no effect on IOP

	Correlation coefficient	P value
Age	-0.38	0.08
BMI	0.12	0.58
Operation time	-0.08	0.70
Time in supine position	0.02	0.92
Ephedrine	0.05	0.80
Phenylephrine	0.28	0.34
Amount of bleeding	0.28	0.20
Amount of transfusion	0.27	0.21

DISCUSSION

- Normal IOP is <21 mmHg, but the upper limit of normal that can cause visual impairment was not determined. Because the strength of optic nerve fibers vary individually, high IOP does not always induce symptoms of glaucoma.
- The highest IOP value recorded in the present study was 55 mmHg, and was >40 mmHg in 7 patients, though none suffered visual disorder. This finding is similar to a previous study in which none of the participating patients suffered from visual impairment even at a mean IOP of 40 mmHg after prone surgery (3).
- IOP is constantly high at prone position though this is not related to visual problems.
- In retrospective study (IOP was not measured) of prone surgery, 80 of 319 patients suffered ischemic optic neuritis (4). The risk factors were male gender, obesity, Wilson frame, long operation time, excessive bleeding and transfusion (4). However, our analysis did not find any risk factor despite the high IOP.

CONCLUSION

- Our results showed a time-dependent decrease in IOP during supine surgery, increase in IOP during prone surgery, with immediate decrease upon turning to supine position.
- Our study could not identify significant risk factors associated with high IOP.