THE EFFECTS OF LATERAL 45° DOWNWARD POSITION AND CARBON DIOXIDE PNEUMOPERITONEUM ON THE OPTIC NERVE SHEATH DIAMETER IN PATIENTS UNDERGOING LAPAROSCOPIC TRANSPERITONEAL NEPHRECTOMIES: A PROSPECTIVE OBSERVATIONAL STUDY

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Background: Trendelenburg position and carbon dioxide (CO₂) pneumoperitoneum are in association with increased intracranial pressure (ICP) reflected by the optic nerve sheath diameter (ONSD). Measurement of ONSD by ultrasound-guidance can be used in the diagnosis of ICP (1, 2). We investigated the effects of lateral 45° downward position and CO₂ insufflation on ONSD in patients undergoing laparoscopic transperitoneal nephrectomy.

Materials and Methods: Twenty-four patients undergoing laparoscopic nephrectomy were included in this study after obtaining Institutional Ethics Board approval (2016/1283). Standard general anaesthesia induction, maintenance and extubation techniques were applied to all patients. Longitudinal and transverse ONSDs were measured for each eye by placing a 7.5-10 Hz linear ultrasound probe over the eyeball, and the calculated mean values were noted at each time point: T0: supine position after induction of general anaesthesia, T1: lateral 45° downward position, T2: after CO₂ pneumoperitoneum, T3, T4, T5: at 30-minute intervals during surgery, T6: lateral 45° downward position after CO₂ exsufflation, T7: supine position at the end of surgery, T8: at postoperative 24th hour. Insufflation pressure was limited to 12 mm Hg during the surgery. Hemodynamic and respiratory parameters were also recorded at the measurement time points.

Results: Both eye ONSD values were found significantly higher than T0 in all time points, except T8 (p<0.001) (Figure). Hemodynamic and respiratory data were similar (p>0.05).

Conclusion: Ultrasound-guided ONSD measurements revealed increment within minutes after both lateral 45° downward position and CO₂ pneumoperitoneum in laparoscopic transperitoneal nephrectomies as the early diagnosis of ICP increase.

References:

1. Blecha S et al. Changes in intraocular pressure and optic nerve sheath diameter in patients undergoing robotic assisted laparoscopic prostatectomy in steep 45° Trendelenburg position. BMC Anesthesiol. 2017;17:40.
2. Kim MS et al. Increase in intracranial pressure during carbon dioxide pneumoperitoneum with steep trendelenburg positioning proven by ultrasonographic measurement of optic nerve sheath diameter. J Endourol. 2014;28:801-6.