A comparison of the effects of desflurane and propofol on the optic nerve sheath diameter during robot-assisted laparoscopic radical prostatectomy

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Background: Use of the steep Trendelenburg position and high pressure CO2 pneumoperitoneum in patients undergoing robot-assisted laparoscopic radical prostatectomy (RALP) increase intracranial pressure (ICP). Volatile anesthetics including desflurane and propofol have different effects on ICP, cerebral blood flow. In this study, we measured sonographic Optic Nerve Sheath Diameters (ONSD) in patients undergoing RALP to evaluate intracranial pressure and compared the effects of desflurane and propofol.

Materials and Methods: Sixty patients scheduled for RALP were randomly assigned to undergo desflurane with remifentanyl (desflurane group) or propofol with remifentanyl (TIVA group) anesthesia. We measured both ONSDs and recorded the average of values. Sonographic ONSDs and hemodynamic parameters were measured at specific time points: in the supine position after induction of anesthesia (T0), 10 min after the steep Trendelenburg position with pneumoperitoneum (T1), one hour after the steep Trendelenburg position combined with pneumoperitoneum (T2), two hour after the steep Trendelenburg position combined with pneumoperitoneum (T3), 10 min after in the supine position after desufflation of the pneumoperitoneum (T4) and 20 min after arrival in the post anesthetic care unit (T5).

Results and Discussion: Patient characteristics were similar between the two groups. Preoperative and intraoperative data associated with underling diseases, anesthesia time, operating time were not significantly different between the two groups (table 1). The MAP and ETCO2 at defined moments were comparable between two groups (table 2). The mean ONSD at time points (T1, T2, T3, T4, and T5) after anesthesia significantly increased compared with that before induction of anesthesia (T0). The change of ONSD at T1, T2, T3, T4 were significantly less in the TIVA group compared to the DES group (Fig 1). Neurological complications were not observed in any of the enrolled patients during the perioperative period of RALP.

Fig. 1. Changes in optic nerve sheath diameter (ONSD) values between the two groups (TIVA group vs. desflurane group)

Conclusion(s): Trendelenburg position and carbon dioxide pneumoperitoneum in RALP increased the diameter of optic nerve sheath. The change of ONSD in TIVA group was significantly less than that in desflurane group during operation time in RALP. Through this results, TIVA could be a better choice for patients with the risk of cerebral hypoperfusion or with increased intracranial pressure.

References: Kim MS et al. J Endourol. 2014;28:801-6.

Table 1. Patient Characteristics

	Desflurane group	TIVA group	
Age	66.0 ± 6.0	66.4 ± 8.2	0.860
Height	165.4 ± 7.0	166.2 ± 4.5	0.585
Weight	66.8 ± 6.1	67.1 ± 7.2	0.895
BMI	24.2 ± 1.7	24.4 ± 2.5	0.636
ASA			
Total IV infused fluid			
Operation time	173.9 ± 40.7	173.3 ± 27.2	0.950
Anesthetic time	217.6 ± 43.1	214.5 ±27.8	0.744
DM	24	26	0.731
HTN	18	20	0.789
Lung disease	28	28	1.000

Table 2. Changes of MBP and ETCO2

	Desflurane group (n=29)	TIVA group (n=30)	P value
MBP (mmHg)			
T0	68.6 ± 10.0	65.0 ± 6.0	0.098
T1	95.0 ± 18.0	91.5 ± 11.8	0.376
T2	77.8 ± 15.1	75.4 ± 13.4	0.527
T3	70.8 ± 22.2	77.4 ± 9.0	0.135
T4	79.0 ± 9.7	81.3 ± 11.9	0.414
T5	87.9 ± 13.2	85.7 ± 12.8	0.512
ETCO2 (mmHg)			
T0	30.7 ± 2.0	30.2 ± 1.6	0.339
T1	31.7 ± 3.2	32.0 ± 2.5	0.613
T2	32.9 ± 3.6	32.8 ± 2.2	0.937
T3	30.2 ± 10.9	33.7 ± 5.2	0.057
T4	33.7 ± 2.5	33.8 ± 3.4	0.911