Comparison of the incidence rates of postoperative nausea and vomiting between sevoflurane anesthesia with continuous propofol infusion and total intravenous anesthesia in gynecological laparoscopic surgery

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Background

- It is well-known that the incidence of postoperative nausea and vomiting (PONV) is higher in inhalational maintenance of anesthesia than in total intravenous anesthesia (TIVA).
- This difference may be caused by both the emetic effects of inhalational anesthesia and the antiemetic effect of propofol.
- We hypothesized that the rate of PONV would be comparable to TIVA when using propofol in combination with inhalational anesthesia.

Methods

Inclusion criteria

- Duration August 2016-February 2017
- Surgery gynecologic laparoscopic surgery
- Age 20-60 [mean 40.9]
- Gender female

Exclusion criteria

- ASA-PS III or IV
- Pregnant
- Cognitive impairment
- Transition to open surgery
- Invalid case of epidural anesthesia
- Questionnaire can not be collected

Anesthesia

General anesthesia + epidural anesthesia

Induction :

- Fentanyl; 0.5-1 µg/kg
- Rocuronium; 0.6-0.9 mg/kg
- Remifentanyl; 0.1-0.5 µg/kg/min
- Propofol; target-controlled infusion (TCI) 3-5 µg/ml

Maintenance :

- Maintenance drug; See intervention
- Addition of rocuronium : Train-of-four ratio (TOF)>1
- No antiemetic drugs or NSAIDs were given
- No addition of fentanyl

Emergence :

- All anesthetics stopped ; when the surgery end
- Reversed by Sugammadex (TOF>90%)

Intervention

Patients were randomly assigned into two groups

- **Group T** : received propofol (regulated to maintain the BIS 40-60)
- **Group SP** : received sevoflurane (et Sev0.8%) and propofol (TCI 1.2 µg/ml)

Evaluation : POD1

PONV score ¹⁾:

- 0 = no nausea
- 1 = mild nausea, recover without antiemetics
- 2 = severe nausea requiring antiemetics
- 3 = retching and/or vomiting, or both

PONV risk score :1 point each

- Non smoking
- PONV history
- Motion sickness

Clinical research registration

- Ethics approval : IRB of Hakodate Central General Hospital
- Written informed consent
- Registered with UMIN-CTR (UMIN000023647)

Statistics : JMP, version 12.0.1

- Parametric data; Independent t test
- Nonparametric data ; Mann-Whitney U test
- Categorical variables ; Fisher's exact test
- P< 0.05 was considered statistically significant

Figure 1. Flow diagram

Results

Table 1. Demographic data

Characteristic	Group T [N=36]	Group SP [N=36]	P value
	Mean±SD or Number [%]		
Age (y)	41.8±8.0	40.0±8.7	0.24
Height (cm)	158.7±5.5	157.8±6.2	0.80
Weight (kg)	56.3±7.7	57.4±10.2	0.92
BMI (kg/m ²)	22.4±3.3	23.0±3.6	0.51
ASA class [n(%)]			
I	20 [55.6%]	19 [52.8%]	1.00
II	16 [44.4%]	17 [47.2%]	
PONV risk score	1.1±0.6	1.1±0.7	0.70
Type of surgery (n)			
Ovarian cystectomy/tumorectomy	7	17	
Oophorectomy	1	1	
Myomectomy	8	5	0.089
Endometriosis lesion removal	2	2	
Tubectomy	1	0	
Hysterectomy	16	8	
Adhesion exfoliation	1	3	

Table 2. Anesthesia related parameters/ recovery profiles

Characteristic	Group T [N=36]	Group SP [N=36]	P value
	Median (IQR)		
Duration of anesthesia (min)	200.5 (143, 233.75)	154 (118, 202)	0.034
Duration of surgery (min)	155 (110.5, 194.5)	120 (86.5, 219.7)	0.13
Total dose of rocuronium (mg)	100 (70, 163)	80 (60, 97.5)	0.029*
Dose of remifentanyl per hour (mg/h)	0.0083 (0.0077, 0.013)	0.0092 (0.0071, 0.012)	0.78
Blood loss (ml)	67.5 (10, 145)	50 (10, 75)	0.10
Fluid volume (ml)	700 (512.5, 1012.5)	450 (312.5, 550)	<0.001*
Total of PONV score	0 (0, 1)	0 (0, 2)	0.64
Time to extubation (min)	10 (6, 12)	9 (7, 11)	0.37
NRS score of wound sight	6 (3, 8)	5 (4, 7.75)	0.68
NRS score of shoulder	2.5 (0, 5.75)	0 (0, 4)	0.030*

Figure 2. PONV incidence / Usage rate of antiemetics

Figure 3. PONV score by PONV risk score

Discussion

- The reasons for the absence of significant differences in the incidence of PONV included the following:
 - Small dose of sevoflurane had less emetic effect
 - The use of propofol which has an antiemetic effect
- The severity of PONV in the sevoflurane/propofol combination anesthesia did not increase in either of the low or high risk groups of PONV.
- Significant differences in shoulder pain may be related to muscle relaxation effects of sevoflurane, however further study is needed to verify this.

Conclusion

The incident rate of PONV shows no significant difference in sevoflurane/propofol combination anesthesia compared to TIVA.