

Gastroesophageal reflux during anesthesia and controlled ventilation with seven Airway devices

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Abstract

We investigated the incidence of gastroesophageal reflux (GER), and respiratory mechanics during positive pressure ventilation using six supraglottic devices or endotracheal tube (ETT). In a prospective, randomized study, 70 patients undergoing peripheral surgery under general anesthesia were allocated to seven groups of ten patients each, according to the airway device employed: group 1 perilaryngeal airway or CobraPLA, group 2 laryngeal mask airway classic (LMAC), group 3 Fastrach, group 4 ProSeal, group 5 laryngeal tube, group 6 cuffed oropharyngeal airway (COPA) and group 7, ETT. Anesthesia was induced with propofol. After insertion of the device, the lungs were mechanically ventilated. Hypopharyngeal pH, peak inspiratory pressures (PIP), leak pressures, lung compliance, end tidal CO₂ and oxyhemoglobin saturation were measured. A pH<4 was considered as a reflux event. Twenty-two percent of patients with supraglottic devices had reflux events with the highest incidence recorded with the LMAC and COPA (40% each) and none with the ETT. Peak inspiratory pressures were lower with LMAC and ProSeal ($P = 0.014$). Leak (seal) pressures were higher with ProSeal ($P < 0.01$). There were neither failures of the device insertion, nor perioperative complications. The new airway device, CobraPLA performed as well as the Fastrach and ProSeal and better than the LMAC, COPA and laryngeal tube with regard to the hypopharyngeal pH and respiratory mechanics during positive pressure ventilation (Table 1). Among the supraglottic devices, the lowest incidence (10%) of reflux was recorded with the CobraPLA, Fastrach and ProSeal. The incidence of reflux with the endotracheal tube was zero.

Conclusions: We assessed the hypopharyngeal pH and respiratory mechanics of patients ventilated with six supraglottic devices and the endotracheal tube. Although the incidence of reflux with the use of supraglottic devices was high (especially with LMAC and COPA), the clinical significance of this finding is uncertain.

Table 2 – Univariate analysis of pH and ventilation variables

Device	Cobra	LMA	Fastrach	ProSeal	Laryngeal	COPA	Tracheal	P
Variable	N=10	classic N=10	N=10	N=10	Tube N=10	N=10	Tube N=10	
SpO ₂ %	99±1.2	97.7±1.2	98.8±0.8	98.8±1	98.2±1.2	97.7±2.1	99±0.4	0.029
baseline	98.8±0.8	97.9±1.1	98.3±0.5	98.8±0.6	98.6±0.5	98.1±1.4	98.8±0.9	0.1
1	98.5±0.7	97.3±1.4	98.2±0.8	98.6±0.8	98.5±1	97.9±0.9	98.6±0.7	0.014
2								
EtCO ₂								
1	38.3±4.4	38.9±4.2	39.2±4	38.9±4.8	38.1±3.9	36.3±4.6	37.1±4.6	0.7
2	37.5±5.4	35.8±3.6	37.9±4	38±4.7	34.9±6	36.6±4.2	34.6±5.1	0.5
pH Average	6.02±1.1	5.5±2.1	6.2±1.2	6.6±1	6.5±0.9	7.1±1.1	6.9±1.3	0.1
Minimum	5.5±1.1	5±1.9	5.7±1.2	5.6±1.6	5 ±1.4	4.7±2.1	6.2±1.2	0.3
value*	1	4	1	1	2	4	0	0.08
Episodes of pH<4**								
PIP – cmH ₂ O								
1	21.1±6.9	16±2.3	21.3±4.8	24.6±6.2	18.2±2.4	21.8±3.2	22.4±7.4	0.014
2	21.8±7.7	16.5±1.3	22.9±3.4	22±6.9	18.8±5.5	21.5±6	20.8±6.4	0.2
Compliance- mL/cmH ₂ O								
1	40.9±13.1	42.6±11.5	42±11.8	43.1±14.7	43.4±18.5	37±20.8	43.8±18.9	0.9
2	42.9±14	40.3±11.7	40.5±11.8	43.4±14.8	40.4±16.6	37.6±15.7	43.7±16	0.9
Seal pressure- cmH ₂ O								
	25.6±3.5	23±1.2	23.1±0.9	30.4±6.4	26.1±1.7	25.4±2.2		0.01

PIP = peak inspiratory pressure * Average of the pH minimum values of all the patients.

**Number of patients who had episode(s) of pH<4. 1 – after the insertion of the airway device. 2 – 15 min. later.