A Comparison to Facilitate Insertion of the Laryngeal Mask: Term of Recovery and Postoperative Nausea and Vomiting after Anesthesia with Propofol-Atracurium and Thiopental-Atracurium

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Abstract- Laryngeal mask is a supraglothic instrument for ventilation of patients who are under anesthesia. Insertion of laryngeal mask requires maintaining sufficient depth of anesthesia to avoid airway reflex (gagging, coughing and spasms). The present study investigated two techniques of anesthesia with propofol-atracurium and thiopental-atracurium to facilitate insertion of the laryngeal mask, term of recovery and postoperative nausea and vomiting. In this prospective, randomized and double-blinded clinical trial, 224 patients undergoing elective laparoscopic class ASA one and two were studied. Patients were divided into two groups of 112 patients – one group with propofol anesthetic and thiopental-atracurium. Then after the induction of anesthesia neuromuscular hemodynamic changes, airway reflex (gagging, coughing and spasms), the ease of insertion of laryngeal mask and the frequency of patient movements' were recorded. The data were analyzed by SPSS V.18. Results indicated that anesthetic technique with propofol-atracurium provides better and more comfortable condition for insertion of laryngeal mask significantly (P<0.05). Hemodynamic changes during induction of anesthesia and five minutes after insertion of the laryngeal mask in first group was more than second one (P<0.05), and nausea and vomiting during recovery in propofol group was significantly lower than thiopental group (P<0.05). Using techniques of anesthesia with propofol - atracurium in inserting laryngeal mask airway in patients who have an indication for the use of this technique is better than anesthesia with thiopental –atracurium.

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Introduction

Laryngeal Mask Airway (LMA) is a relatively new supraglottic device to keep the airway and ventilation for patients in anesthesia and its insertion requires sufficient depth of anesthesia to prevent airway reflex (gagging, coughing and spasms) (1). LMA in most of the patients and surgeries is a suitable alternative to endotracheal tubes (2,3). Furthermore, insertion of LMA is easier and less complicated than intubation (because of decreasing risk of pulmonary infection and atelectasis) and requires no special tools such as laryngoscope (4,5). LMA is a less invasive procedure than intubation. In many cases, possibility of intubation or mask ventilation is poor; using LMA to control airway and make an adequate airway is effective in 94% of cases in patients (6). Also, complications of failed intubation such as damage to the soft tissues and teeth, cough, laryngospasm, bronchospasm, hypoxia and hypercarbia in LMA are lower (9-7). Risks and contraindications of LMA including dilated stomach, esophageal reflux and aspiration of gastric contents and insufficient ventilation throat and discomfort while swallowing, and postoperative pain have been reported (10,11). Adequate and appropriate relaxation can reduce many complications of LMA.

Many studies have performed on the efficacy of LMA with different drug regimens to compare non-depolarize and depolarize relaxants and also opioids (12,13). Present study investigated two techniques of anesthesia which are the propofol-atracurium and nesdonal®–atracurium. These regimens are used to facilitate laryngeal mask insertion, duration of recovery, postoperative nausea and vomiting.

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Atracurium is a non-depolarize muscle relaxant, which is in competes with acetylcholine in connecting to cholinergic receptors of driving trailing plate and reduces the response of driving trailing plate to acetylcholine by Inhibition of nerve transport , causing paralysis in skeletal muscle .

Nesdonal® is an anesthetic of barbiturates category with short term effect and acts by increasing response to GABA decrease, response to glutamate and direct reduction in irritability by increased excitability of membrane and thereby acts reduce the excitability of nerve cells and let to anesthesia.

Propofol is a phenol isopropyl derivative that acts by stimulating receptors of GABA and blocking sodium channels, causing anesthesia within 40-30 seconds.

Materials and Methods

In this prospective randomized double-blinded study, 224 candidates for laparoscopic surgery in Tizro surgery center, who were in Class ASA one and two according to American Society of Anesthesia physical status classification, were selected. There were no patients age limitation for entry into the study but patients with a history of difficult intubation and intraoperative nausea and vomiting and aspiration, patients with full stomach like pregnant women, patients with reflux and digestive problems esophageal reflux into the esophagus, diseases such as asthma, heart disease and high blood pressure, respiratory tract infections, previous surgery in the area of the mouth, pharynx, larynx and mallampati III and IV and those prone to spasm like obese people were excluded.

Patients in both groups of anesthesia with propofol - atracurium (group A) and nesdonal®-atracurium (group B) were divided equally. Placement of patients in both groups was by using odd and even days of the week and was completely randomized, and patients did not receive any treatment previously. Induction of anesthesia was as follows:

Group A: 2.5 mg / kg propofol, low dose 0.15 mg / kg atracurium 1 micro g / kg fentanyl and 2 mL of %2 lidocaine (40 mg).

Group B: 5 mg / kg nesdonal®, low dose 0.15 mg / kg atracurium 1 micro g / kg fentanyl and 2 mL of %2 lidocaine (40 mg).

Laryngeal mask 3 or 4 which was tested previously and stained by lubricants gels was placed 90 to 120 seconds after anesthesia induction, based on weight of patients, The recommended classic method by the inventor of the device was used for placement LMA (1). If the placement of LMA succeeds in more than two times a failure, was recorded, and the other method was used to maintain the patient's airway. To determine the proper location of LMA, placement was checked and confirmed by observing bilateral chest movements, ET CO 2 - O 2 Saturation and listening to breathing sounds with a stethoscope. Following criteria were evaluated and scored for facility of LMA insertion: jaw relaxation (good (3), moderate (2), poor (1)), coughing or gagging (absence (3), moderate (2), severe (1)), patient motion (without moving (3), moderate (2), severe (1)), laryngospasm (absence (3), moderate (2), Full (1)) (14). For anesthesia maintenance in both groups, minimum density of alveolar 1.2 isoflurane and mixture of oxygen and nitrogen monoxide with the same amount (4 liters oxygen and 4 liters nitrogen monoxide) was used. The gasses closing time was when the last stitch was stitched by surgeon, and all patients were extubated after last stitch and were returned to spontaneous breathing. Hemodynamics times in both groups were evaluated and recorded before and after induction of anesthesia and five minutes after laryngeal mask insertion.

Data were analyzed statistically by SPSS V.18 and *P*-values less than 0.05 were assigned as significant ($P<0/05$).

Results

All participating patients in this study were women, and their average age in group A (propofol - atracurium) was 28 ± 3.21-year-old and in group B (nesdonal®-atracurium) was 25 ± 2.64 year-old with no statistically significant difference between groups ($P>0.05$).

One of the studied variables was hemodynamic (blood pressure and heart rate) before the induction of anesthesia, after induction of anesthesia and five minutes after insertion of the laryngeal mask (Table 1). This table shows hemodynamic changes; there are significant differences between the two study groups ($P<0.05$).

Also, another variable, which was examined during the recovery period, was nausea and vomiting and facility of laryngeal mask insertion in both groups A and B that are listed in tables 2 and 3. The results in Tables 2 and 3 show that the two groups were statistically different in the terms of the recovery period, nausea and vomiting, and facilitate criteria of laryngeal mask insertion ($P<0.05$). Such that anesthetic technique with propofol–atracurium has easier conditions for the insertion of laryngeal mask, also airway reflexes, patient motions and number of tries to insertion laryngeal mask

in anesthetic with propofol-atracurium were less than anesthesia with nesdonal®-atracurium. Recovery duration and incidence of nausea and vomiting in anesthesia with propofol - atracurium was less than anesthesia with nesdonal®-atracurium.

Table 1. Comparing the Mean of data on blood pressure and heart rate between the two study groups

Variable		Time		
		Before induction of anesthesia	After induction of anesthesia	5 minutes after placing the mask
Heartbeat	**Group A**	87 ± 17	72 ±8	75 ± 14
	Group B	90 ± 13	84 ± 6	86 ± 11
	P-Value	0.652	0.012	0.031
Systolic blood pressure	**Group A**	123.17 ± 21.02	104.76 ± 9.15	115.52 ± 13.26
	Group B	118.23 ± 16.29	111.26 ± 11.72	8.44 ± 120.12
	P-Value	0.108	0.001	0.015
Diastolic blood pressure	**Group A**	74.19 ± 7.11	63.23 ± 4.47	65.63 ± 3.17
	Group B	80 ± 6.59	74.03 ± 7.31	73.82 ± 5.77
	P-Value	0.441	0.016	0.028

Table 2. Comparing the of data on criteria for laryngeal mask insertion facilitate in two study groups

Criteria	Rate	Group A	Group B	*P*-Value
Jaw relaxation	Good (3)	108 patients (96.43%)	99 patients (88.39%)	0.012
	Medium (2)	4 patients (3.57%)	10 patients (8.93%)	
	Inadequate (1)	0	3 patients (2.68%)	
Coughing or gagging	Absence (3)	109 patients (97.32%)	100 patients (89.28%)	0.036
	Medium (2)	3 patients (2.68%)	10 patients (8.93%)	
	Severe (1)	0	2 patients (1.79%)	
Laryngeal spasm	Absence (3)	112 patients (100%)	110 patients (98.21%)	0.231
	Moderate (2)	0	2 patients (1.79%)	
	Complete (1)	0	0	
Patient movement	No motion (3)	110 patients (98.21%)	102 patients (91.07%)	0.008
	Medium (2)	2 patients (1.79%)	6 patients (5.36%)	
	Severe (1)	0	4 patients (3.57%)	
Number of placement	First time (3)	108 patients (96.43%)	90 patients (81.26%)	0.003
	The second time (2)	4 patients (3.57%)	15 patients (14.29%)	
	More than two times (1)	0	5 patients (4.45%)	

Table 3. Comparing mean data on nausea and vomiting in the recovery period in two study groups

	Group A	Group B	P-Value
Nausea and vomiting	9 patients (8.04%)	26 patients (23.21%)	0.014
Long-term recovery	20/07 ± 3.42	26.23 ± 2.19	0.001

Discussion

This study showed that injection of 2.5 mg / kg propofol combined with low-dose 0.15 mg / kg of atracurium provide easier and better condition than injections 5 mg / kg nesdonal® and low dose 0.15 mg / kg atracurium in placement of LMA in patients who have an indication for use of such devices. Also, nausea and vomiting in patients during the recovery period in the propofol group (Group A) significantly is lower than the group who received the thiopental (Group B). Hypotension and decreased heart rate in the current

study were high in patients who were anesthetized with propofol rather than nesdonal® group. In many studies, hypotension and decreased heart rate caused by anesthesia induction by propofol are more than anesthesia induction by thiopental Sodium (15,16). Induced bradycardia and hypotension of propofol injection are caused by direct depression of myocardial and environmental vessels resistance reduction that in young adults without underlying disease (cardiac and cerebrovascular diseases and the elderly) with proper hydration, the above effects will not be observed in patients. Also, fortification reflex of propofol mechanisms increases less heart beat at the presence of blood pressure reduction (17). Laryngeal mask insertion in group A (Anesthesia with propofol) is better and easier than group B (anesthesia with nesdonal®) and the laryngeal mask ventilation was possible in all patients. Ahsan and colleagues study that focused on facilitate in laryngeal mask insertion technique in anesthesia with propofol - remifentanil (Group I) and nesdonal®-remifentanil (Group II) indicated that the mask insertion in patients of group I is 95.2 % and in group II is 71.4% (17). Koay in his study came to the conclusion that the number of failures in propofol anesthesia with laryngeal mask airway placement was lower than other methods (18). In one study that compared atuomidat and propofol due to facility of laryngeal mask placement success rate in the first try for propofol is 93.3% and for atuomidat is 36.7% respectively (19).

The incidence of coughing and gagging, movement of patients and the frequency of the laryngeal mask airway insertion in group A (2.5 mg/kg propofol combined with low-dose 0.15 mg/kg atracurium) significantly is lower than group B (injection of 5 mg/kg thiopental and low dose 0.15 mg/kg, atracurium). Yeo in his paper that studied propofol mixed with nesdonal®, fentanyl and propofol alone, fentanyl effects in laryngeal mask insertion; showed that the incidence of coughing and gagging in anesthetized with a mixture of propofol and nesdonal® is higher than anesthesia with propofol alone about 32 percent (20). In another study those three anesthetic techniques, I: 2.5 mg/kg propofol without muscle relaxants. II: 6 mg/kg nesdonal® without muscle relaxant and III: 7 mm pawn/Kg nesdonal® without muscle relaxants, were studied there was a significant association between groups I and III due to ease of laryngeal mask airway insertion, lack of patient movement, coughing and gagging. Due to lack of adequate jaw relaxation there was a significant association with group II so that anesthesia technique in group I and group III provide easier condition for laryngeal mask insertion (21) which is consistent with the results of current study.

In present study, the incidence of vomiting in the recovery room and in the recovery period for group A was significantly less than group B. Several studies proved the antiemetic effects of propofol such as Qezri research that showed administration of 0.5 mg/kg propofol to prevent nausea and vomiting during the first hour after operation is more effective than metoclopramide (22,23).

Using the technique of anesthesia with propofol–atracurium for laryngeal mask insertion airway in patients who have an indication of this device due to ease of insertion, loss of airway reflexes and decreasing incidence of nausea and vomiting during the recovery period is much better than anesthetic techniques with nesdonal®-atracurium.

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