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Research Article

Study on Effect of Laryngeal Mask Anesthesia and Endotracheal Intubation Anesthesia on Elderly Patients Undergoing Laparoscopic Gallbladder Surgery

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Abstract: ***Objective:*** To analyze the effect of laryngeal mask anesthesia and endotracheal intubation anesthesia in elderly laparoscopic gallbladder surgery. ***Methods:*** 100 subjects of the experiment came from elderly patients with gallbladder stones admitted from September 2016 to September 2019 in our hospital. There were group A and group B of 50 cases each, and were used tube anesthesia and laryngeal mask anesthesia, then comparing the anesthesia effect. ***Results:*** Statistical significance($P<0.05$): Air pressure and end-respiratory carbon dioxide partial pressure index changes when immediately after insertion, immediately after removal, 3 minutes after removal; heart rate, mean arterial pressure, airway pressure, and end-expiratory carbon dioxide index changes when 3 minutes after insertion and immediately before removal; blood glucose and cortisol changes when after insertion, immediately before removal and min after removal. No statistical significance($P>0.05$): Changes in heart rate, mean arterial pressure, airway pressure, and end-expiratory carbon dioxide indexes before insertion; changes in blood glucose and cortisol indexes before insertion. **Conclusion:** It is more ideal for elderly patients with abdominal cavity and gallbladder surgery to have laryngeal mask anesthesia, which can effectively keep blood circulation stable and have promotion value.

Keywords: Laryngeal mask anesthesia; Endotracheal intubation anesthesia; Elderly; Laparoscopic stones; Gallbladder surgery

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The best treatment for gallbladder stones and gallbladder polyps is gallbladder surgery and its successful implementation is closely related to anesthesia. Laparoscopic surgery has the advantages of minimally invasive and good prognosis, and has been recognized by clinical and patients[1]. Compared with young and middle-aged patients, elderly patients have the characteristics of poor constitution and many basic diseases with low tolerance for surgery and extremely high requirements for anesthesia. In this study, elderly patients undergoing abdominal cholecystectomy in our hospital were given laryngeal mask anesthesia and endotracheal intubation anesthesia respectively, and the anesthesia results were compared. The details are as follows.

1 Patient data and methods

1.1 Patient data

There were 100 experimental subjects in group A and group B, who were elderly patients with gallbladder stones admitted to our hospital from September 2016 to September 2019. Inclusion criteria; All meet the relevant diagnostic criteria in "Surgery"[2]; Patients and the families are signed on the informed notice; Consistent with the surgical indications. Exclusion criteria: Suffering from organic diseases; Suffering from mental diseases; Have a history of abdominal surgery. 26 cases of male and 24 cases of female formed group A, the youngest was 61 years old, the oldest was 84 years old, and the median age is (72.5±8.5) years old; 27 cases of male and 23 cases of female formed group B, the youngest was 62 years old, the oldest patient was 84 years old, and the median age was (73.0±8.7)

years old. There was little obvious difference in clinical data between the two groups of patients is not, so the targeted clinical comparison can be performed (P>0.05).

1.2 Methods

1.2.1 Preanesthetic medication

The selected patients received intravenous injection of scopolamine 20 min before induction of anesthesia with a dose of 0.3 mg.

1.2.2 Preanesthetic preparation

When the patient was sent to the operating room, the venous channel was opened in time, and the fluid is appropriately supplemented according to the actual situation of the patient.

1.2.3 Anesthesia induction

The selected patients were given 0.1 mg/kg of intravenous midazolam, 0.3 mg/kg of etomidate, 0.3 mg/kg of cis-atracurium, and 0.3-4 mg/kg of fentanyl. According to the actual situation of Group B, choose No. 3 or No. 4 laryngeal mask and place No. 14 gastric tube along the patient's esophagus into the stomach. When checking the position of the gastric tube, place the stethoscope on the patient's upper abdomen and connect the end of the gastric tube to the syringe and inject 10 ml of gas. If there is the sound of gas passing through the water and the syringe draws gastric juice when auscultating, then the stomach tube is in the correct position. Cases in group A were used a single-lumen endotracheal tube with an internal diameter of 7.5 mm but no gastric tube placed. After the tube was connected to anesthesia, selected the mode of positive pressure intermittent ventilation. Fresh air flow, tidal volume, ventilation frequency, oxygen inhalation oxygen concentration, ratio of inspiratory to respiratory frequency and end-expiratory carbon dioxide partial pressure were kept respectively at 2/Lmin, 8-10 ml/kg, 10-12 times/min, 50%, 2:1 and 35~40 mm Hg. During the anesthesia induction period, ephedrine was given in time if the patient had hypotension, and atropine would be given if the patient's heart rate got slow.

1.2.4 Maintenance of anesthesia

The anesthetic maintenance medications of the selected patients were all 1.5 mg kg-1 min-1 of propofol, 0.1 pg kg-1 min-1 of remifentanil, and 1~2% concentration of sevoflurane. In addition, gave intermittent intravenous bolus injection of cis-atracurium according to the patient's actual situation.

1.2.5 Removing standard

When the operation was done, tapped and called the patient's name, making the patient open eyes. When the CV value was> 6 ml/kg, respiratory rate was > 12 times/min, and blood oxygen saturation after removing the ventilator was > 95% and the hemodynamic index was within the normal range, the laryngeal mask and tracheal tube can be removed. After removal, the patient should be observed in the anesthesia recovery room for a period to ensure the patient safe.

1.3 Evaluation indicators

Compare the circulation status (including heart rate and average arterial pressure), respiratory function (including air pressure and PETCO2) changes in level of each group of cases before insertion, immediately after insertion, 3 minutes after insertion, immediately before removal, immediately after removal, and 3 minutes after removal. ② Compare the occurrence of adverse reactions during anesthesia among the patients in each group. ③ Compare the changes of stress indexes (including blood glucose and cortisol) of cases in each group.

1.4 Application of statistics

SPSS 20.0 statistical software was used to deal with the data in this article. The measurement data of the patient's circulatory status, respiratory function, and stress indicators were expressed as mean ± standard deviation （$\bar{x} \pm s$） with the t-test method, the percentage (%) stands for adverse reaction counting data with the χ^2 test. P<0.05 was considered as statistical significance.

2 Results

2.1 Comparison of changes in circulatory status and respiratory function indexes of patients in all groups at different time periods

There was no difference in the changes of heart rate, mean arterial pressure, airway pressure, and end-expiratory carbon dioxide indexes between group A and group B before insertion(P>0.05); there was no difference in the changes of air pressure and $PETCO_2$ of patients in group A and group B immediately after insertion, immediately after extraction, and 3 minutes after extraction; the difference in the changes of the air pressure and $PETCO_2$ index of the patients in group A and group B immediately after insertion, immediately after extraction and 3 minutes after extraction was significant(P>0.05); The difference in heart rate, mean arterial pressure, airway

Table 1. Comparison of changes in circulatory status and respiratory function indexes of patients in all groups at different time periods ($\bar{x} \pm s$)

Time	Heart rate（times/min）		Mean arterial pressure（mm Hg）		Airway pressure（cm H_2O）		$PETCO_2$（mmHg）	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
before insertion	71.9±4.1	70.3±4.3*	10.1±1.3	9.7±1.1*	7.8±0.3	7.7±0.2*	31.7±1.9	33.4±2.0*
Immediately after insertion	90.4±5.6	74.2±4.6#	12.7±1.8	10.0±1.2#	8.6±0.5	8.4±0.5*	34.0±2.2	33.8±2.1*
3min after insertion	86.4±5.2	71.6±4.0#	11.7±1.6	9.6±1.0#	8.4±0.5	7.8±0.3#	37.9±2.9	34.8±2.4#
Immediately before removal	88.0±5.3	72.7±4.4#	13.9±1.9	10.2±1.4#	10.3±1.0	9.1±0.8#	37.7±2.8	35.1±2.6#
Immediately after removal	89.6±5.4	73.2±4.5#	13.9±1.9	10.3±1.5#	9.3±0.9	9.1±0.8*	35.7±2.7	35.0±2.5*
3min after removal	84.5±5.1	70.2±4.2#	12.4±1.7	10.1±1.2#	8.7±0.7	8.8±0.6*	34.0±2.2	34.7±2.3*

Note：Compared with group A，*P ＞ 0.05；Compared with group A，#P ＜ 0.05.

Table 2. Comparison of the adverse reaction occurrence during anesthesia among the groups of patients（%，n=50）

Group	Choking	Sore throat	Flatulence	Body movement	In total
Group A	4（8.0）	5（10.0）	5（10.0）	5（10.0）	19（38.0）
Group B	2（4.0）	2（4.0）	3（6.0）	1（2.0）	8（16.0）
X^2					6.139
P					＜ 0.05

Table 3. Comparison of changes in stress indicators in various groups at different time ($\bar{x} \pm s$)

Group	Blood sugar（mmol/L）				Cortisol（ng/L）			
	Before insertion	3min after insertion	Immediately before removal	3min after removal	Before insertion	3min after insertion	Immediately before removal	3min after removal
Group A	4.7±0.2	5.7±0.4	6.6±0.6	7.0±0.8	353.4±5.9	391.4±6.6	408.4±8.0	393.2±6.7
Group B	4.6±0.1	5.1±0.3	5.5±0.5	6.0±0.7	353.3±5.8	408.1±7.8	383.4±6.2	380.1±6.0
t	2.000	5.366	6.298	4.207	0.054	7.309	11.046	6.513
P	＞ 0.05	＜ 0.05	＜ 0.05	＜ 0.05	＞ 0.05	＜ 0.05	＜ 0.05	＜ 0.05

pressure and $PETCO_2$ in group A and group B patients 3 minutes after insertion, immediately before removal was significantly different(P<0.05). See Table 1 for details.

2.2 Comparison of the adverse reaction occurrence during anesthesia among the groups of patients

There was a significant difference in the data of total adverse reaction rate in patients of group A and group B(P<0.05). See Table 2 for details.

2.3 Comparison of changes in stress indicators in various groups at different time

There was no difference in the blood sugar and cortisol indexes before insertion between group A and group B(P>0.05); and there was a significant difference in that of the patients between the two groups after insertion, immediately before removal, and after removal(P<0.05). See Table 3 for details.

3 Discus1sion

The laryngeal mask was first proposed by a British biomedical engineer which has advantages of convenient operation and little impact on the body[3]. With the increasing development of medical technology, the laryngeal mask technology is becoming more and more perfect and has been currently widely used in clinical practice. In surgery, laparoscopy is already a kind of extremely mature treatment plan, its

effect has been recognized by medical practitioners and patients[4]. Before the laparoscopy operation, it needs to place CO_2 into the abdominal cavity to produce pneumoperitoneum, which causes a large amount of gas accumulated there, so diaphragm lift and tidal volume reduction coming after will be a significant effect on the patient's circulation and respiratory function. For elderly patients, their physical constitution is relatively poor with some basic diseases, in this case it will increase the difficulty of laparoscopic surgery, so effective anesthesia is more conducive to maintaining breathing and stable circulation. It is more ideal for laparoscopic surgery to have general anesthesia with endotracheal intubation mechanical ventilation, but it cannot be ignored that this anesthesia will cause cardiovascular adverse reactions[5]. When performing endotracheal intubation anesthesia, it needs to place a laryngoscope, exposing the glottis, and then performing the tracheal intubation. All these operations will mechanically stimulate the patient's respiratory tract and cause damage, thus activating adrenal energy and angiotensin, synthesis and release Large amounts of catecholamines. Clinical studies have found that intra-organ intubation will have a greater impact on hemodynamics. When patients have a faster heart rate and increased blood pressure, especially when the laryngoscope is placed in the oral cavity, and the vital signs fluctuate significantly[6]. At present, laparoscopic cholecystectomy is performed by endotracheal intubation for general anesthesia, and stress effects will occur during tube placement and extubating. Even if the stress effect continues short, the impact on patients is also extremely great.

There were also some differences in the changes of airway pressure and end-expiratory carbon dioxide pressure at 3 min after insertion and immediately before extraction. Laryngeal mask complete mah-jong gastric tube placed in the stomach, not only the drainage of gastric contents, but also to avoid the occurrence of aspiration.

In the above, elderly patients with intraperitoneal gallbladder surgery were treated with endotracheal intubation anesthesia and laryngeal mask general anesthesia, and it is found that the safety of laryngeal mask general anesthesia was higher by comparison. There was no difference in heart rate and average arterial pressure before catheterization, that is to say, endotracheal intubation anesthesia and laryngeal mask general anesthesia can maintain the patient's circulation state before surgery, but it will be a certain difference in the change of average arterial pressure index after insertion, 3 minutes after insertion, immediately before removal, immediately after extraction, and 3 minutes after extraction. Therefore, it can be seen that laryngeal mask anesthesia maintains blood flow and blood more stable, which is not only simple to operate, but also will not directly contact the glottis and organs during catheter placement with low mechanical damage caused by tracheal mucosa. The laryngeal mask was designed humanly, which can reduce the irritation generated when foreign substances enter the throat and make sure the safety of the patient's anesthesia. There is also a certain difference between the changes in the airway pressure and $PETCO_2$ index when 3 minutes after insertion and immediately before removal. The gastric tube of laryngeal mask will be put in the stomach during general anesthesia, draining the stomach contents and preventing accidental aspiration.

In a word, it is better for elderly patients with abdominal gallbladder surgery to have laryngeal mask anesthesia, which can effectively maintain stable blood circulation with the promotion value.

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