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Application comparison of laryngeal mask airway and endotracheal intubation in infant anaesthesia.

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Abstract

Purpose: This study investigated the clinical effects of laryngeal mask and tracheal intubation on infant anaesthesia.

Methods: A total of 60 cases of children undergoing surgery were selected in our hospital from September 2013 to June 2015. They were randomly divided into two groups: study and control groups. The study group underwent laryngeal mask anaesthesia, whereas the control group underwent tracheal intubation anesthesia. Extubation and waking time were observed in the two groups. Cases of postoperative hoarseness, vomiting, dysphoria, bucking, and other complications were determined in the two groups.

Results: The extubation and waking time in the study group were significantly less than those in the control group, and the difference was statistically significant (P<0.05). Cases of postoperative hoarseness, vomiting, dysphoria, bucking, and other complications in the study group were less than those in the control group, and the difference was also statistically significant (P<0.05). After administration of the study group with laryngeal mask anesthesia for 3 and 10 min, the Heart Rate (HR) scores were 76.5 ± 8.8 and 77.4 ± 6.9, respectively; the postoperative HR score was 80.7 ± 9.5. These HR scores were significantly superior to those of the control group, and the difference was statistically significant (P<0.05). The SPO_2 score (97.7 ± 2.9) after administration with laryngeal mask anesthesia for 3 min of the study group was significantly superior to that of the control group (93.3 ± 3.2). The postoperative sedation score of the study group was superior to that of the control group, and the difference was statistically significant (P<0.05).

Conclusion: Laryngeal mask anesthesia can significantly reduce the extubation and waking time, as well as the postoperative complications. Its clinical effect is significantly superior to that of tracheal intubation anesthesia and is thus worth promoting.

Keywords: Laryngeal mask anesthesia, Tracheal intubation anesthesia, Curative effect comparison.

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Introduction

An infant's body is not fully developed; thus, treatment compliance is poor. The anesthesia requirement of an infant is higher than that of an adult [1]. The common clinical anesthesia method is tracheal intubation anesthesia, which is carried out by inserting a tube to the infant's oral cavity. This method of administration often damages the tissue during the operation and induces a variety of medical disputes [2,3]. Moreover, stability is relatively low. Laryngeal mask anesthesia, as a new type of anesthesia method, basically presents no stimulation on the infant respiratory tract. Thus, reduced trauma or few complications are observed compared with those in traditional endotracheal intubation anesthesia [4]. It is recognized by the majority of family member. The effects of laryngeal mask and tracheal intubation anesthesia on infants were compared in this study.

Materials and Methods

General data

A total of 60 cases of children undergoing surgery in our hospital were selected from September 2013 to June 2015. They were randomly divided into two groups: study and control groups. The 30 cases in the study group comprised 17 males and 13 females, aged 3 weeks to 4 years old, with a mean age of 2.24 ± 0.37 years old. The operation types were 20 cases of inguinal hernia repair and 10 cases of appendectomy. The 30 cases in the control group comprised 16 males and 14 females, aged 4 weeks to 4 years old, with mean

age of 2.16 ± 0.11 years old. The operation types were 19 cases of inguinal hernia repair and 11 cases of appendectomy. Gender composition, age, operation type, and other aspects showed no significant difference between the two groups; thus, these two groups were comparable (P>0.05).

Inclusion criteria: All patients presented surgical indications. Parents or legal guardians signed the informed consent and participated in the study voluntarily.

Exclusion criteria: All patients did not suffer from heart, liver, kidney, and other diseases. Moreover, they presented no coagulation disorder.

Methods

Before surgery, all the patients were intramuscularly injected with atropine (0.1 mg/kg) and ketamine (4 mg/kg). The patients underwent anesthesia induction to maintain a 3-7 L/min of oxygen supply. The children underwent laryngeal mask anesthesia in the study group, and the specific operational procedure was conducted as follows: after anesthesia induction for 1 min, the children were administered with 5%–7% sevoflurane. Afterward, sevoflurane was reduced by half (oxygen flow was controlled at 3 L/min). Laryngeal mask was placed in each patient, fixed, and then regulated. The laryngeal mask air impermeability and thoracic elevation degree were observed through manual ventilation. If a patient's thorax elevated in the normal range without leakage, the laryngeal mask intubation was successful. The intraoperative oxygen flow was controlled at 1-2 L/min, and the sevoflurane concentration was controlled at 1%-3%. The children underwent mechanical ventilation and can spontaneously breathe; the drugs were withdrawn after the operation. The control group underwent tracheal intubation anesthesia. The specific operational procedure was as conducted as follows: 0.1 mg/kg cisatracurium, a muscle relaxant, was administered to the children after anesthesia induction. After 1 min, tracheal intubation was performed. If a patient's thorax elevated in the normal range without leakage, the tracheal intubation was successful. The intraoperative oxygen flow was controlled at 1-2 L/min, and sevoflurane concentration was controlled at 1%-3%. The children underwent mechanical ventilation and can spontaneously breathe; the drugs were withdrawn after the operation.

Observation index

The extubation and waking time of the children in the two groups were observed. Cases of postoperative hoarseness, vomiting, dysphoria, bucking, and other complications were compared between the two groups.

Statistical analysis

Data were analysed using SPSS18.0 statistical software. The data on extubation and waking time in the two groups were expressed as mean ± standard deviation (± s). The measurement data were analysed using t-test. The data on postoperative complications were analysed with χ^2 test between the two groups. A value of P<0.05 indicated statistically significant difference.

Results

Comparison of extubation and waking times between the two groups

The extubation and waking times in the study group were significantly less than those in the control group; the difference was statistically significant (P<0.05), as shown in Table 1.

Table 1. *Comparison of extubation and waking times between the two groups ($\bar{x}$ ± s, s).*

Group	Case	Extubation time/s	Waking time/min
Study group	30	127.32 ± 97.68	28.45 ± 10.46
Control group	30	159.26 ± 86.52	31.89 ± 11.28
t		2.4231	2.2137
P		0.0163	0.0280

Postoperative heart rate (HR), oxygen saturation (SPO_2), and sedation scores in the two groups

After administration of the study group with laryngeal mask anesthesia for 3 and 10 min, the Heart Rate (HR) scores were 76.5 ± 8.8 and 77.4 ± 6.9, respectively; the postoperative HR score was 80.7 ± 9.5. These HR scores were significantly superior to those of the control group, and the difference was statistically significant (P<0.05). The oxygen saturation (SPO_2) scores (97.7 ± 2.9) of the study group after administration for 3 min was significantly superior to that of the control group (93.3 ± 3.2). The postoperative sedation score of the study group was superior to that of the control group, and the difference was statistically significant (P<0.05), as shown in Table 2.

Table 2. *Comparison of the intraoperative Heart Rate (HR), oxygen saturation (SPO_2), and sedation score between the two groups.*

Indicator	Group	Preoperative	After administration for 3 min	After administration for 10 min	Postoperative
HR	Study group	78.2 ± 9.6	76.5 ± 8.8*	77.4 ± 6.9	80.7 ± 9.5
	Control group	75.5 ± 9.0	71.4 ± 6.9*	73.9 ± 9.5	75.8 ± 7.5

SPO_2	Study group	99.2 ± 0.1	97.7 ± 2.9*	98.9 ± 0.7	98.6 ± 0.2
	Control group	98.2 ± 0.4	93.3 ± 3.2*	98.4 ± 0.6	98.5 ± 0.1
Sedation score	Study group	2.3 ± 0.3	3.3 ± 0.3*	4.1 ± 0.4*	3.9 ± 0.9*
	Control group	2.2 ± 0.2	4.9 ± 1.2*	5.2 ± 0.5*	4.9 ± 0.5*

Compared with the preoperative group, *P<0.05; Compared with the control group, P<0.05

Comparison of postoperative complications between the two groups

Cases of postoperative hoarseness, vomiting, dysphoria, bucking, and other complications in the study group were less than those in the control group; the difference was statistically significant (P<0.05), as shown in Table 3.

Table 3. *Comparison of postoperative complications between the two groups.*

Item	Case	Hoarseness	Vomiting	Dysphoria	Bucking
Vaginal two-dimensional ultrasonography	30	1 (3.33)	2 (6.67)	1 (3.33)	1 (3.33)
Vaginal two-dimensional ultrasonography	30	3 (10.00)	4 (13.33)	4 (13.33)	3 (10.33)
χ^2		4.6915	4.0370	5.2172	4.6915
P		0.0303	0.0445	0.0224	0.0303

Discussion

As an infant grows, tolerance and immunity become poor; thus, a high dose of clinical anesthesia is required. In addition to the requirements of hospital facilities and updated technology, poor prognosis and complications should be lessened [5]. Clinical trials showed that laryngeal mask anesthesia and endotracheal intubation anesthesia are common clinical anesthesia methods. The current research found that the accuracy and safety of laryngeal mask anesthesia were higher than those of endotracheal intubation anesthesia. Moreover, the operation of laryngeal mask anesthesia was simple; the postoperative damage was minimal in children, and the complications were less. Laryngeal mask offers many advantages [6,7]: the operation is easy, and an artificial airway can be quickly established; the success rate is high, with 87% for untrained staff, and the total success rate was 99.81%; ventilation is reliable; throat and trachea mucosa can be avoided; stimulation and cardiovascular reaction is minimal; and the method can be used for emergency treatment. However, the traditional first- and second-generation laryngeal masks demonstrate incomplete sealing with the respiratory tract. Oral secretion increases, and the laryngeal mask easily shifts, thereby preventing effective isolation of the respiratory tract from the digestive system; consequently, gaseous distention and reflux or inhalation may occur. These drawbacks have limited the clinical application of laryngeal mask anesthesia. However, a third-generation laryngeal mask was designed by Brain. With material and technical progress in recent years, a variety of improved third-generation laryngeal masks have emerged, such as TUOREN double-barrelled laryngeal mask and Jin Erkang Splendid laryngeal mask [8,9]. The third-generation laryngeal mask inherited many advantages of the first- or second-generation laryngeal mask and also presents own characteristics, which mainly include the following: the main tube bends to 90°, and ventilation and drainage tubes were devised. The drainage tube can be inserted into the stomach tube, preventing gaseous distention and reflux inhalation; double gasbags were also devised. The ventilation mask became more matched with the throat anatomy [10]. The sealing is better because the distal end of the laryngeal mask is located in the oesophageal opening. Fixation is also good; thus, the devise does not shift easily.

Clinical studies have shown that the third-generation laryngeal mask provides many advantages, including simple operation, high success rate of catheterization, stable hemodynamics, less medication in the induction period, less complications, and improved efficacy and safety. Thus, this third-generation laryngeal mask is easily popularized and applied in clinical anesthesia. The current study showed that the extubation and waking times in the study group were significantly less than those in the control group, and the difference was statistically significant (P<0.05). Cases of postoperative hoarseness, vomiting, dysphoria, bucking, and other complications in the study group were less than those in the control group, and the differences were statistically significant (P<0.05). The HR score after administration for 3 and 10 min, as well as the postoperative score of the study group were significantly superior to those of the control group, and the differences were statistically significant (P<0.05). The SPO_2 score after administration for 3 min of the study group was significantly superior to that of the control group. Moreover, the postoperative sedation score of the study group was superior to that of the control group, and the difference was statistically significant (P<0.05). The results showed that the extubation and waking times of the children administered with laryngeal mask anesthesia were significantly less than those observed in endotracheal intubation anesthesia administration. Cases of postoperative hoarseness, vomiting, dysphoria, bucking, and other complications were less than those of tracheal intubation anesthesia. This observation suggests that the cardiovascular response of children in the tracheal intubation anesthesia group was stronger, given that the waking time was significantly longer than that of laryngeal mask anesthesia. Furthermore, the children in the tracheal intubation anesthesia group suffered from dysphoria, vomiting, bucking, and other symptoms.

Conclusion

Laryngeal mask anesthesia can significantly reduce the extubation and waking times of children undergoing surgery. Moreover, this method can decrease the incidence of postoperative complications in children. Its clinical effect is significantly superior to that of tracheal intubation anesthesia and is thus worth promoting.

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