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Influence of sevoflurane anesthesia on postoperative recovery of the cognitive disorder in elderly patients treated with non-cardiac surgery.

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Abstract

Objective: This study investigated the influence of sevoflurane anesthesia on postoperative recovery of cognitive disorder in elderly patients treated with non-cardiac surgery.
Methods: A total of 112 elderly patients treated with non-cardiac surgery from January 2015 to January 2016 were chosen, and then divided into the observation group (n=56) and the control group (n=56) randomly. The control group was treated with propofol and remifentanil anesthesia, whereas the observation group was treated with sevoflurane anesthesia. The postoperative cognitive functions of the two groups were compared.
Results: The two groups have no statistically significant differences in terms of heart rate and blood pressure before anesthesia, before the surgery, 30 min in the surgery, and after the surgery (P>0.05). The Mini-Mental State Examination (MMSE) score (26.44 ± 0.76) 24 h after the surgery of the observation group is significantly lower than that of the control group (27.18 ± 0.72), showing statistically significant difference (P<0.05). However, no statistically significant differences of the MMSE scores before anesthesia and 6, 24, and 72 h after the surgery between the two groups have been observed (P>0.05). The observation group has lower incidence of cognitive disorder at 6 (3.57%) and 12 h (3.57%) after the surgery than the control group (P<0.05). Nevertheless, the two groups have no statistically significant difference in the incidence of cognitive disorder at 24 and 72 h after the surgery (P<0.05).
Conclusion: Sevoflurane anesthesia can shorten anesthesia time for elderly patients in non-cardiac surgery and reduce postoperative dysfunction in patients.

Keywords: Sevoflurane anesthesia, Non-cardiac surgery, Postoperative cognitive function.

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Introduction

Postoperative cognitive disorder refers to complications of the central nervous system after surgery, manifested by anxiety, insanity, personality changes, and sociability changes. It is related with age, cardiovascular and cerebrovascular diseases, malnutrition, and psychological factors of the patients [1]. The current study evaluates the influences of different methods of anesthesia on postoperative cognitive functions of elderly patients treated with non-cardiac surgery, aiming to reduce the incidence of postoperative cognitive disorder. Results are introduced in the following text.

General Data and Methods

General data

Chosen randomly from January 2015 to January 2016 were 112 elderly patients treated with laparoscopic colorectal resection in our hospital. The study was conducted with the consent of the Medical Ethics Committee of the hospital and the patients. The patients were asked to sign the informed consent and were randomly divided into the observation and the control group with 56 patients to each group. The observation group has 31 males and 25 females, aged 66 to 86 years old (75.82 ± 4.17) in average. Anesthesia time was 2.67 ± 0.29 h, and the amount of bleeding during surgery was 321.14 ± 41.08 ml. The control group has 31 males and 25 females, aged 65 to 85 years old, (74.16 ± 4.21) in average. Anesthesia time was 2.76 ± 0.18 h, and the amount of bleeding during surgery was 320.44 ± 41.68 ml. The two groups have no statistically significant differences in gender, age, anesthesia time, and amount of bleeding during the surgery (P>0.05) indicating that these two groups are comparable.

Therapy

The control group was treated with propofol anesthesia: 1.5 mg/kg propofol+2 μg/kg remifentanil+0.1 mg/kg vecuronium bromide intravenous induction of trachea cannula for mechanical ventilation. Tidal volume was controlled at 8~10 mg/kg. Breathe ratio and respiratory rate were 1:2 and 12~16 times/min. Abdominal gas was maintained at PECO2 35~45 mm Hg. During the anesthesia stage, 3 ng/ml propofol and 4 ng/ml remifentanil were given. The observation group was treated with 2 mg/kg propofol+2 μg/kg remifentanil+0.1 mg/kg vecuronium bromide for anesthesia induction. Subsequently, the same respiratory parameters were set the same for mechanical ventilation. During the anesthesia stage, 2 mg/kg/h propofol+2 μg/kg/min remifentanil were continuously given through intravenous injection and vecuronium bromide was discontinuously given in the surgery to maintaining muscle relaxant [2].

Observation indexes

Stress indexes of the two groups before anesthesia, before surgery, 30 min in the surgery, and after the surgery were observed. The cognitive functions of the patients before anesthesia and 6, 12, 24, and 72 h after the surgery were evaluated by a simple intelligent evaluation scale.

Statistical analysis

Data were processed by SPSS22.0, and the measurement data were expressed in "$\bar{x} \pm S$". The t-test between the two groups was carried out and "%" represented enumeration data. The χ^2 test between the two groups was implemented, and $P<0.05$ indicated a statistically significant difference between the two groups [3].

Results

Comparison of stress indexes before anesthesia, before surgery, 30 min in the surgery, and after the surgery between the two groups

The differences of heat rate and blood pressure before anesthesia, before surgery, 30 min in the surgery, and after the surgery between the two groups have no statistical significance (P>0.05). Results are shown in Table 1.

Table 1. *Stress indexes before anesthesia, before surgery, 30 min in the surgery, and after the surgery between the two groups.*

Groups	Heart rate (time /min)				Blood pressure (KPa)			
	Before anesthesia	Before surgery	At 30 min in the surgery	After the surgery	Before anesthesia	Before surgery	At 30 min in the surgery	After the surgery
Observation group (56)	85.71 ± 6 .24	84.02 ± 5.75	62.33 ± 3.78	84.07 ± 5.57	17.44 ± 0.72	17.17 ± 0.83	17.49 ± 0.81	15.74 ± 0.56
Control group (56)	86.18 ± 5.82	83.87 ± 5.94	63.17 ± 3.49	83.88 ± 6.04	17.28 ± 0.66	17.22 ± 0.78	17.41 ± 0.69	15.78 ± 0.63
t	0.412	0.136	1.222	0.173	1.225	0.328	0.563	0.355
P	0.681	0.892	0.224	0.863	0.223	0.734	0.575	0.723

Comparison of MMSE scores before and after anesthesia between the two groups

The Mini-Mental State Examination (MMSE) score 24 h after the surgery (26.44 ± 0.76) of the observation group is lower than that of the control group (27.18 ± 0.72), showing statistically significant difference (P<0.05). However, they have no statistically significant difference in MMSE scores before anesthesia and 6, 24, and 72 h after the surgery (P>0.05). Results are shown in Table 2.

Table 2. *Comparison of MMSE scores before and after anesthesia.*

Groups	Before anesthesia	6 h after the surgery	12 h after the surgery	24 h after the surgery	72 h after the surgery
Observation group (56)	29.24 ± 1.37	26.38 ± 0.92	25.45 ± 0.75	26.44 ± 0.76	29.44 ± 0.86
Control group (56)	28.91 ± 1.74	26.44 ± 0.76	25.37 ± 0.63	27.18 ± 0.72	29.22 ± 1.08
t	1.115	0.376	0.611	5.289	1.192
P	0.267	0.707	0.542	0	0.235

Comparison of postoperative cognitive disorder and anesthesia time between the two groups

The incidences of cognitive disorder at 6 (3.57%) and 12 h (3.57%) after the surgery of the observation group are significantly lower than those of the control group (P<0.05). However, the two groups have no statistically significant difference in the incidences of the cognitive disorder 24 and 72 h after the surgery (P>0.05). Patients of the observation group woke up earlier than the patients of the control group (P<0.05). Results are shown in Table 3.

Table 3. *Comparison of postoperative cognitive disorder and anesthesia time.*

Groups	6 h after the surgery	12 h after the surgery	24 h after the surgery	72 h after the surgery	Anesthesia time
Observation group (56)	2 (3.57%)	2 (3.57%)	1 (1.78%)	1 (1.78%)	20.46 ± 6.16
Control group (56)	15 (26.78%)	17 (30.36%)	3 (5.36%)	2 (3.57%)	28.35 ± 7.79
t	20.925	25.474	1.862	0.615	5.945
P	0	0	0.172	0.433	0

Discussions

Intestinal cancer is a tumor disease in the intestinal tract. It is a common malignant tumor in the gastrointestinal tract and its incidence is only next to stomach and oesophagus cancer. Intestinal cancer is the most common type of colorectal cancer and is mainly treated by excision [4]. Whether narcotic application in the surgery will cause lasting influences on the intellectual development and personality formation of patients still remains unknown [5]. However, several studies demonstrate that clinical isoflurane concentration can eliminate morphological changes of the dendritic spines of neuron by interdicting the polymerization of actins. Inhalation anesthetics influence the morphological plasticity of excitatory synapse in the brain [6]. Some scholars believed that anesthesia, anoxia, and low temperature can stop the activity of nerve cells, but generally influences the short-term memory only [7]. Some clinical research alleged that operative treatment, narcotic drugs, and amount of bleeding in surgery are related with postoperative cognitive disorder. Intestinal cancer excision takes a long time and will cause great damages to the physical health of the patients. With respect to elderly patients, the functions of different body organs decline. Most elderly patients have cardiovascular and cerebrovascular diseases. These factors significantly increase the probability of postoperative cognitive disorder of the elderly patients [8].

Sevoflurane is an inhalation narcotic which is widely used in clinical anesthesia. It has a quick and stable induction, short anesthesia time, and thorough anesthesia [9]. The current study determines the influences of sevoflurane anesthesia on the postoperative cognitive functions of elderly patients with intestinal cancer excision. Results showed that the control and the observation groups have no statistically significant difference in terms of heart rate and blood pressure before anesthesia, before surgery, 30 min in the surgery, and after surgery (P>0.05). The MMSE score 24 h after the surgery of the observation group is significantly lower than that of the control group (P<0.05). However, no statistically significant differences in MMSE scores before anesthesia and 6 and 72 h after the surgery are observed between the two groups (P>0.05). The observation group significantly suffers a lower incidence of cognitive disorder at 6 (3.57%) and 12 h (3.57%) after the surgery compared with the control group (P>0.05). However, no statistically significant differences in the incidence of the cognitive disorder at 24 and 72 h after the surgery have been observed between the two groups (P>0.05). The patients of the observation group woke up earlier than the patients of the control group (P<0.05). This indicates that sevoflurane anesthesia can reduce a patient's brain damages and shorten anesthesia time [10].

Conclusion

To sum up, sevoflurane anesthesia for non-cardiac surgery of elderly patients can shorten anesthesia time and reduce postoperative dysfunction of patients after the surgery. It is safe and is worthy of promotion in clinical applications.

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References

1. Khamesipour F, Tajbakhsh E. Analysed the genotypic and phenotypic antibiotic resistance patterns of Klebsiella pneumoniae isolated from clinical samples in Iran. Biomed Res India 2016; 27: 1017-1026.
2. AL-Yahya AAI, Asad M. Antiulcer activity of gum Arabic and its interaction with antiulcer effect of ranitidine in rats. Biomed Res India 2016; 27: 1102-1106.
3. Aono J, Ueda W, Mamiya K, Takimoto E, Manabe M. Greater incidence of delirium during recovery from sevoflurane anesthesia in preschool boys. Anesthesiology 1997; 87: 1298-1300.
4. Kuratani N, Oi Y. Greater incidence of emergence agitation in children after sevoflurane anesthesia as compared with halothane: a meta-analysis of randomized controlled trials. Anesthesiology 2008; 109: 225-232.

5. Isik B, Arslan M, Tunga AD, Kurtipek O. Dexmedetomidine decreases emergence agitation in pediatric patients after sevoflurane anesthesia without surgery. Pediatr Anesth 2006; 16: 748-753.
6. Kadioglu Y, Gulaboglu M, Ozturk M, Dogan N. Determination of fluoride by using Ion Selective Electrode (ISE) method in urine of healthy volunteer and patients before-after sevoflurane anesthesia. Lat Am J Pharm 2015; 34: 1658-1663.
7. Hu J, Yue Q, He S, Tan Y, Wang F, Li X, Qiu X. Effects of sevoflurane on the activities of CYP450 in rats using a cocktail approach. Lat Am J Pharm 2013; 32: 1053-1057.
8. Bito H, Ikeda K. Long-duration, low-flow sevoflurane anesthesia using two carbon dioxide absorbents. Quantification of degradation products in the circuit. Anesthesiology 1994; 81: 340-345.
9. Ibacache ME, Muñoz HR, V Brandes, AL Morales. Single-dose dexmedetomidine reduces agitation after sevoflurane anesthesia in children. Anesth Analg 2004, 98: 60-63.
10. Peltier SJ, Kerssens C, Hamann SB, Sebel PS, Byas-Smith M, Hu X. Functional connectivity changes with concentration of sevoflurane anesthesia. Neuroreport 2005; 16: 285-288.

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