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Comparison of post-anesthesia delirium in elderly patients treated with dexmedetomidine and midazolam maleate after thoracic surgery.

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Abstract

Objective: This study compared the post-anesthesia delirium in elderly patients treated with Dexmedetomidine and Midazolam Maleate after thoracic surgery.
Methods: A total of 92 elderly patients treated with thoracic surgery in our hospital from June to September 2015 were selected. Digital random method was used to equally divide them into group A (n=46) and group B (n=46). Both groups were given with a continuous intravenous pumping of fentanyl for analgesia. Dexmedetomidine for group A and Midazolam Maleate for group B, and the delirium occurrence rates of patients in the two groups after the surgery were compared.
Results: Awaking time 4.92 ± 1.18 min, breathing recovery time 10.53 ± 2.25 min, and extubation time 11.36 ± 2.63 min of patients in group A were significantly shorter than those in group B (P<0.05). Postoperative delirium occurrence rate of 6.52% in group A was significantly lower than that in the control group, and the difference between the two groups had statistical significance (P<0.05). Difference between two groups before surgery in Mini-Mental State Evaluation (MMSE) scores was not significant without statistical significance (P>0.05). The MMSE scores 27.01 ± 0.46, 27.22 ± 0 .50, 27.73 ± 0.54 and 28.62 ± 0.63 of patients in group A and 6 h and 1, 2 and 3 d after the surgery were significantly higher than those in the control group, and comparative difference between the two groups had statistical significance (P<0.05). In comparison between group A and group B in visual analog scale scores at time nodes before induction, after intubation, and upon surgery completion, the difference did not have statistical significance (P>0.05).
Conclusion: Dexmedetomidine can improve the postoperative cognitive functions of elderly patients treated with thoracic surgery and reduce postoperative delirium.

Keywords: Elderly patients, Thoracic surgery, Dexmedetomidine, Midazolam maleate, Delirium.

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Introduction

Postoperative delirium pathogenesis is not quite clear, and it is believed nowadays that it is related to age, anesthesia, surgical stress, and rising inflammation factors [1]. Elderly patients feature poor resistivity, large thoracic surgical trauma, and strong stress reaction. Thus, the postoperative delirium occurrence, invalidism, and death rates of patients are increased [2,3]. Therefore, appropriate surgical analgesic and sedative drugs should be selected. Midazolam Maleate is clinically used as common sedative hypnotics with strong and short-term effect and short action time [4]. Dexmedetomidine is a new-type sedative drug with sedative and analgesic functions. However, a few researches on postoperative delirium are being conducted. Therefore, the comparison of the post-anesthesia delirium of elderly patients treated with thoracic surgery between Dexmedetomidine and Midazolam Maleate was discussed in this paper, expecting to provide clinical references.

General Information and Method

General information

A total of 92 elderly patients treated with thoracic surgery in our hospital from June to September 2015 were selected. Criteria include more than 60 y old patients with I-II ASA grading. They were treated with elective thoracic surgery. The patients were also informed, and they signed written consent in this research. Exclusion criteria include patients with senile dementia, coronary heart disease, hypertension, severe hepatic and renal dysfunction, and other diseases. Digital random method was used to equally divide these patients into group A (n=46) and group B (n=46). Group A: 25 males and 21 females with ages ranging from 60-78 and with an average age of 68.69 ± 4.27 y old. Group B: 26 males and 20 females with ages ranging from 60-80 and with an average age of 69.12 ± 4.86 y old. Comparative difference between the two groups in general

data was not significant without statistical significance and comparability (P>0.05).

Method

Patients in the two groups were given with conventional preoperative preparation. Venous channels were opened. Then, conventional detections of indicators, including electrocardiogram, blood pressure, heart rate and repetition, were implemented. Continuous intravenous pumping of 0.2-0.7 μg/(kg.min) fentanyl for analgesia was given to both groups. A group was given with an intravenous injection of Dexmedetomidine and then intravenous injection of 0.2-0.7 μg/(kg.h) Dexmedetomidine to maintain anesthesia. Group B was given with an intravenous injection of 0.05 μg/(kg.h) Midazolam Maleate and then intravenous injection of 0.02-0.08 μg/(kg.h) Midazolam Maleate to maintain anesthesia. After the surgery, all narcotic drugs were stopped, tracheal catheter was replaced, and sufficient analgesia was given. Then, the patients were sent to their wards after they woke up.

Observation indexes

Confusion assessment method for the diagnosis of delirium was used to assess delirium occurrence rate among patients 1-3 d after the surgery. Mini-Mental State Evaluation (MMSE) was used to evaluate mental status before the surgery and 6 h and 1, 2 and 3 d after the surgery. The lower the score was, the lower were the cognitive functions. The awaking time, breathing recovery time, and extubation time of patients in the two groups were observed.

Statistical analysis

SPSS22.0 was used to process data in this paper. $\bar{x} \pm s$ represents measurement data. T-test between groups was carried out. % represents enumeration data. X^2 test between groups was implemented. P<0.05 indicated that comparative difference was significant with statistical significance.

Results

Comparison between the two groups in awaking status and postoperative delirium

The awaking time 4.92 ± 1.18 min, breathing recovery time 10.53 ± 2.25 min, and extubation time 11.36 ± 2.63 min of patients in group A were significantly shorter than those in group B (P<0.05). The postoperative delirium occurrence rate of 6.52% in group A was significantly lower than that in the control group, and comparative difference between the two groups had statistical significance (P<0.05, Table 1).

Table 1. Comparison of awaking status and postoperative delirium between the two groups.

Group	Awaking time/min	Breathing recovery time/min	Extubation time /min	Delirium occurrence rate (%)
Group A (n=46)	4.92 ± 1.18	10.53 ± 2.25	11.36 ± 2.63	3 (6.52%)
Group B (n=46)	6.57 ± 1.35	13.85 ± 2.76	13.81 ± 2.82	10 (21.74%)
t	6.241	6.323	4.309	9.546
P	0	0	0	0

Comparison of MMSE scores between the two groups

Comparative difference between the two groups in MMSE scores was not significant without statistical significance (P>0.05). The MMSE scores 27.01 ± 0.46, 27.22 ± 0.50, 27.73 ± 0 .54 and 28.62 ± 0.63 of patients in group A, 6 h and 1, 2 and 3 d after the surgery were significantly higher than those in the control group. Thus, comparative difference between the two groups had statistical significance (P<0.05, Table 2).

Table 2. Comparison of MMSE scores between the two groups.

Group	Preoperation	6 h after surgery	1 d after surgery	2 d after surgery	3 d after surgery
Group A (n=46)	29.77 ± 0.65	27.01 ± 0.46	27.22 ± 0.50	27.73 ± 0.54	28.62 ± 0.63
Group B (n=46)	29.81 ± 0.68	21.42 ± 0.37	22.24 ± 0.41	22.94 ± 0.46	26.21 ± 0.58
t	0.288	64.228	52.235	46.798	19.087
P	0.774	0	0	0	0

Comparison of VAS scores between the two groups at different time points

In comparison between group A and group B in Visual Analog Scale (VAS) scores at time nodes before induction, after intubation, and upon surgical completion, their differences were not significant (P>0.05, Table 3).

Table 3. *Comparison of VAS scores at time points between the two groups ($\bar{x} \pm s$).*

Group	n	Before induction	After intubation	Upon surgical completion
Group A	42	2.51 ± 0.71	2.44 ± 0.65	2.55 ± 0.51
Group B	42	2.54 ± 0.67	2.51 ± 0.77	2.65 ± 0.57
t		1.325	1.145	1.378
P		>0.05	>0.05	>0.05

Discussion

With aggravated aging phenomenon in China, the thoracotomy rate of elderly people is increasing day by day. Elderly patients feature poor body functions and degrading immunological functions. Thus, postoperative delirium occurrence rate increases, which affects the life safety of patients [5]. As an acute encephalopathy status, delirium features conscious and cognitive dysfunctions, which can be caused when the disease is accompanied by functional disorder. Delirium is a common clinical manifestation. About 15%-60% of hospitalized patients and those treated with surgery each year in America have been suffering from delirium, and hospitalized elderly patients are more commonly seen. Delirium results in increased morbidity and mortality of other relevant diseases of patients and the prolongation of length of stay and degradation of cognitive functions [6,7]. Different reports indicated that postoperative delirium occurrence rate is mainly within 10%-51% and risks occurring after cardiac surgery are high. About 15%-53% people among elderly patients experience postoperative delirium, and study shows that the delirium occurrence rate of elderly patients in intensive care unit can reach as high as 80%. The death rate of elderly delirium patients after the surgery within 6 months can reach as high as 25% should be taken seriously [8]. The pathology and physiology of delirium are related to all kinds of etiological foundations. If possible, the first step of clinical treatment is to define pathogenesis and treat potential etiological factors. Postoperative delirium may have positive correlation with anesthesia-induced vasodilation function and hypermetabolic inflammatory status. Furthermore, it is also related to the severity of surgical trauma. The course of postoperative delirium is generally consistent with the severity of its clinical manifestation, including relatively short but with great fluctuation [9].

As a benzodiazepine drug, Midazolam Maleate can act upon GABA receptor and BDZ receptor. In addition, Midazolam Maleate has the antagonistic central action of Midazolam, as well as sedative and analgesic effects. However, patients may suffer from adverse reactions, including fatigue, ataxia and respiratory depression after the surgery [10]. These complications may affect the operative effect of patients. As an imidazole derivative, Dexmedetomidine is of high selectivity, and its action position is blue patch nucleus. Through excitation and by using presynaptic membrane A2 receptor, Dexmedetomidine can inhibit the release of noradrenaline and terminate pain signal transduction. It can also stabilize hemodynamics, reduce the dosages of general anesthesia and analgesic drugs, and relieve cardiovascular stress reaction with light respiratory depression. In this paper, the awaking time, breathing recovery time, and extubation time of patients in group A were significantly lower than those in the control group (P<0.05). Postoperative delirium occurrence rate in group A was significantly lower than that in the control group (P<0.05). The comparative difference of preoperative MMSE scores between the two groups was not significant without statistical significance (P>0.05). The MMSE scores of patients in Group A: 6 h and 1, 2 and 3 d after the surgery were significantly higher than those in the control group (P<0.05) because Midazolam Maleate had high affinity to γ-aminobutyric acid receptor in the central nervous system. Meanwhile, Dexmedetomidine had low affinity to γ-aminobutyric acid receptor in the central nervous system, which reduced the occurrence of postoperative delirium while exerting analgesic and sedative effects.

Conclusion

In conclusion, Dexmedetomidine can improve the postoperative cognitive functions of elderly patients after thoracic surgery. It also contributes to rapid postoperative awaking and the rate reduction of postoperative delirium occurrence.

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