

Effect of Dexmedetomidine Hydrochloride on Early Cognitive Function in Postoperative Elderly Patients

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Abstract: Purpose: to explore the effect of dexmedetomidine hydrochloride on early cognitive function in postoperative elderly patients. Methods: during December 2015 to November 2016, 80 elderly patients who received surgical treatment in our hospital were selected as research object. Result: patients were randomly divided into two groups (control group and research group). On the basis of routine anesthetic induction, patients in research group took dexmedetomidine, in comparison, patients in control group took an equal dose of sodium chloride solution. The goal was to evaluate the anesthetic effect of those two methods. One hour before surgery, there was no significant difference in the MMSE score between the two groups ($P > 0.05$). In research group, the MMSE scores at postoperative 1d and 3d were (23.8 ± 2.4) and (27.1 ± 2.0) respectively. In control group, the MMSE scores at postoperative 1d and 3d were (20.5 ± 3.2) and (24.6 ± 3.4) respectively. The difference was statistically significant ($P < 0.05$). There was no significant difference in anesthesia time, awake time and extubation time between those two groups ($P > 0.05$). Conclusion: using dexmedetomidine in elderly patients after surgery can protect early cognitive function and improve the prognosis.

Keywords: Dexmedetomidine; Early cognitive function; Anesthetization

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1. Introduction

Because the matter of physique and surgery to elderly patients, it's easy to damage their early cognitive function, which mainly manifests in several aspects such as impaired cognition and impaired social function. Dexmedetomidine is an adrenoceptor agonist, which could adjust metabolism. It has been gradually applied to the surgical anesthesia field. However, there were only a few researches about early cognitive function in elderly patients after surgery.^[1] Therefore, in order to explore the effect of dexmedetomidine hydrochloride on early cognitive function, this thesis contains 80 elderly patients after surgery in our hospital, which is reported as follows.

2. Information and Methods

2.1 Patients' Information

80 elderly patients who received surgical treatment in our hospital from December 2015 to November 2016 were selected as research objects, including 46 males and 34 females. The patients' age ranged from 60 to 77 and the average was (68.6 ± 2.4) . Inclusion criteria: 1) all patients are over 60 years old; 2) patients had undergone surgical treatment; 3) patients had already consented to this study and signed the informed consent form. Exclusion criteria: 1) patients with neurological disorders; 2) patients who used analgesic drugs before the surgery. These patients were randomly divided into two groups (control group and research group). The general data of the two groups

were comparable ($P > 0.05$).

2.2 Research Method

Both groups used routine anesthetic induction: 1.5 mg/kg propofol, 2 $\mu\text{g}/\text{kg}$ fentanyl and 0.6mg/kg rocuronium bromide for intravenous injection. Patients in control group took 0.9% sodium chloride solution with the dose of 4 $\mu\text{g}/\text{m}$ for injection. Patients in research group took the equal doses of dexmedetomidine for injection.

The same anesthesia maintenance was adopted in the two groups. Took 8 - 10 $\mu\text{g} \cdot \text{kg}^{-1} \cdot \text{h}^{-1}$ remifentanyl and 1-1.5mg $\cdot \text{kg}^{-1} \cdot \text{h}^{-1}$ simultaneously for intravenous injection, and then compared the anesthetic effects of these two groups.

2.3 Judgment Criteria

Mini-Mental State Examination (MMSE) was adopted to evaluate several indexes such as memory, language and attention respectively one hour before surgery, 1d after surgery and 3d after surgery. Total score: 30 points; 27 or more: normal; 24 - 27: mild cognitive impairment. 19 - 23: moderate cognitive impairment, 18 or below: severe cognitive impairment. Patients with restlessness and memory disorders will be directly diagnosed as cognitive impairment.^[2]

2.4 Index Observation

Compare anesthesia time, awake time and extubation time between two groups.

2.5 Statistical Treatment

SPSS 17.0 software was adopted in this research to process data, wherein, ($\bar{x} \pm s$) means measurement data and t refers to the test. $P < 0.05$ indicates statistical difference.

3. Results

3.1 MMSE Scores Comparison in Two Groups

In this research, one hour before surgery, there was no significant difference in the MMSE score between the two groups ($P > 0.05$). In research group, the MMSE scores at postoperative 1d and 3d were (23.8 ± 2.4) and (27.1 ± 2.0) respectively. In control group, the MMSE scores at postoperative 1d and 3d were (20.5 ± 3.2) and (24.6 ± 3.4) respectively. The difference was statistically significant ($P < 0.05$). See Table 1 data.

Table 1. Comparison Table of MMSE Scores in Two Groups ($\bar{x} \pm s$)

	Pre-surgery 1h	Post-surgery 1d	Post-surgery 3d
Research group	28.5 \pm 2.2	23.8 \pm 2.4	27.1 \pm 2.0
Control group	28.4 \pm 2.6	20.5 \pm 3.2	24.6 \pm 3.4
t	2.210	7.694	9.821
P	0.982	0.014	0.009

3.2 Anesthetic Effect Comparison in Two Groups

In this research, there was no significant difference in anesthesia time, awake time and extubation time between those two groups ($P > 0.05$). See Table 2 data.

Table 2. Comparison Table of Anesthetic Effects in Two Groups ($\bar{x} \pm s$)

	Anesthesia time (min)	Awake time (min)	Extubation time (min)
Research group	118.6 \pm 5.2	32.6 \pm 4.4	44.6 \pm 2.8
Control group	120.1 \pm 4.3	33.2 \pm 3.9	44.0 \pm 3.0
t	1.289	2.102	2.004
P	0.513	0.614	0.387

4. Discussion

Because the difference of the physique of elderly patients, patients with poor physical quality were more likely to suffer cognitive impairment after surgical anesthesia. It's not conducive to protect patients' physical and mental health.^[3] Routine anesthetic induction was the combination of propofol, fentanyl and rocuronium bromide. However, this induction could easily damage nervous system.^[4] Dexmedetomidine is an adrenoceptor agonist, which could reach the effect of analgesia and sedation by inhibiting receptor.^[5] Now it has been applied to clinical anesthesia of adjuvant therapy. However, there were only a few researches about early cognitive function in elderly patients after surgery. Therefore, it has important value to exploring its clinical effect.

In this research, one hour before surgery, there was no significant difference in the MMSE score between the two groups ($P > 0.05$). In research group, the difference of MMSE scores at postoperative 1d and 3d was statistically significant ($P < 0.05$). It showed using dexmedetomidine in elderly patients after surgery can improve MMSE scores and protect cognitive function at the greatest extent for keeping it away from cognitive impairment. In anesthetic induction, anesthetics could usually damage brain nerves and tissues. Dexmedetomidine is an adrenoceptor agonist. It has a short half-life. In clinical, it could reach the effect of analgesia and sedation by inhibiting the release of norepinephrine. Meantime, it has the effect of diuresis and cold resistance. It may be due to the drug's protective effect on the patient's brain, but clinical studies still need to be further verified. Clinical studies show that dexmedetomidine has a certain protective effect on thalamic and damaged cortex.^[6] There are also other studies show that dexmedetomidine can reduce the damage to the patient's nervous system,^[7] which conforms to the research perspectives of this thesis.

In this research, there was no significant difference in anesthesia time, awake time and extubation time between those two groups ($P > 0.05$). It is demonstrated that using dexmedetomidine to assist anesthesia in elderly patient's operation does not affect the anesthesia time and awake time, which may be due to the fact that dexmedetomidine has the anesthesia auxiliary efficacy, but it has no influence on the dosage and time of anesthesia. Researchers point out that dexmedetomidine is a receptor agonist that can be used for clinical anesthesia in patients and can achieve ancillary efficacy, but it has no influence on the time and dose of anesthesia,^[8] which conforms to this research perspective.

5. Conclusion

In conclusion, the use of dexmedetomidine for elderly patients with operation can effectively reduce the influence of early postoperative cognitive function, and can improve the patient's prognosis, with higher clinical application and promotion value. However, due to the small sample size of this study and the obvious differences in the physique of elderly patients, this study may have some errors; but in general, it still has implications for the anesthesia treatment of elderly patients with operations.

References

- [1] Yi Wang, Huaichang Wen, Xiaoju Jin, et al. Meta-Analysis of Effects of Dexmedetomidine on Early Postoperative Cognitive Function in Elderly Patient with Non-Cardiac Operation under General Anesthesia[J]. *Journal of Clinical Anesthesiology*, 2017, 33(01): 45 - 51. (in Chinese)
- [2] Xinglong Qin, Chunliu Huang. Effect of Dexmedetomidine on Cerebral Metabolism and Early Postoperative Cognitive Function in Elderly Patient with Laparoscopic Operation[J]. *Jilin Medical Journal*, 2016, 37(3): 552 - 554. (in Chinese)
- [3] Qinshuang Liu, Donghui Sun, Xiaohang Qi. Effect of Different Doses of Dexmedetomidine Hydrochloride Injection on Early Postoperative Cognitive Function in Elderly Patient with Total Hip Replacement Operation[J]. *Hebei Medical Journal*, 2015, 37(24): 3745 - 3747. (in Chinese)
- [4] Jinhua Zhang, Jiying Zhong, Chengxiang Yang. Effect of Dexmedetomidine on Early Postoperative Cognitive Impairment in Elderly OLV Patient with Esophageal Carcinoma Operation[J]. *Guangdong Medical Journal*, 2015, 36(11): 1750 - 1753. (in Chinese)
- [5] Yiwen Zhang, Zumin Xing, Yinghua Xu, et al. Effect of Different Doses of Dexmedetomidine on Early Postoperative Cognitive Impairment in Elderly Patient with Laparoscopic Operation for Colorectal Cancer[J]. *Journal of Southern Medical University*, 2014, 34(05): 743 - 746. (in Chinese)
- [6] Ping Zhang, Chen Ma, Dandan Zhou. Effect of Loading Dose of Dexmedetomidine Hydrochloride Injection on Heart Rate Variability and Postoperative Cognitive Function in Elderly Patient with Gynecological Laparoscopic Operation[J]. *Shanxi Medical Journal*, 2017, 46(11): 1548 - 1551. (in Chinese)
- [7] Shubao Zhang, Mei Mei, Wenyan Lv, et al. Effect of Dexmedetomidine on Stress Reaction and Early Postoperative Cognitive Function in Elderly Patient with Spinal Operation[J]. *Chinese Journal of General Practice*, 2017, 15(02): 249 - 251. (in Chinese)
- [8] Jian Mo, Guixi Mo, Yijun Liu, et al. Effect of Dexmedetomidine Hydrochloride Injection on Postoperative Cognitive Impairment in Elderly Patient with Abdominal Operation[J]. *Journal of Practical Medicine*, 2012, 28(24): 4150 - 4152. (in Chinese)