

Clinical Observation of Dexmedetomidine Combined with the Mixture of Propofol and Etomidate on Painless Gastroscopy in Children

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Abstract: Objective: To observe the anesthetic effect of dexmedetomidine combined with the mixture of propofol and etomidate on painless gastroscopy in children. **Methods:** A total of 80 pediatric patients who underwent painless gastroscopy in the Guangxi Minzu Hospital from January 2019 to September 2020 were randomly divided into two groups, A and B, with 40 patients in each group. Group A was given A mixture of etomidate 20 mg and propofol 0.2g, Dexmedetomidine was pumped into group B 10min before surgery, 0.4 g/kg. HR, SBP, DBP, SpO₂ and BIS were continuously monitored after entering the room. The doses of propofol and etomidate were recorded, as well as the time of waking and leaving the hospital. Adverse reactions such as hypotension, hypoxemia, nausea, vomiting and dizziness were recorded too. **Results:** Compared with group A, the dosage of propofol and etomidate in group B was significantly reduced ($P < 0.001$), the time of waking and out of the chamber were significantly shortened ($P < 0.001$), the body movement in the incidence of intraoperative was significantly reduced ($P < 0.001$), and the nausea, vomiting and dizziness in the incidence of postoperative were significantly reduced ($P < 0.05$). **Conclusion:** Dexmedetomidine combined with propofol and etomidate mixture can be safely used in painless gastroscopy in children, which can significantly reduce the dosage of propofol and etomidate, reduce the occurrence of adverse reactions, and shorten the time of resuscitation and

discharge.

Key words: Painless gastroenteroscopy; Dexmedetomidine; Propofol; Etomidate; Children

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1 Introduction

The mixed solution of propofol and etomidate is one of the common combinations of anesthetic drugs used in clinical painless gastroenteroscopy in recent years^[1]. Dexmedetomidine can induce sedation and hypnosis in patients, reduce stress response, stabilize hemodynamics, relieve pain, inhibit saliva secretion, and resist cold and war, and is not easy to produce respiratory depression^[2]. Previous studies have found that dexmedetomidine combined with other sedatives and analgesics can significantly reduce the use of other sedatives and analgesics during painless gastroenteroscopy and shorten the time of patients' resuscitation^[3]. There has been no study on the use of dexmedetomidine combined with the mixed solution of etomidate and propofol in children's painless gastroscopy. This study aims to observe the anesthetic effect of dexmedetomidine combined with the mixed solution of etomidate and propofol in children's painless gastroscopy and provide clinical evidence.

2 Materials and Methods

2.1 General Information

This study was approved by the Ethics Committee of Guangxi Minzu Hospital, and the patients' informed consent was obtained. A total of 80 pediatric patients who underwent painless gastroscopy in the Guangxi Minzu Hospital from January 2019 to September 2020 were selected. They were randomly divided into A and B groups with 40 patients in each group. Inclusion criteria : (1). Age ≥ 6 years and ≤ 14 years. (2). ASA I ~ II level. Exclusion criteria: (1). Upper respiratory tract infection. (2) Complicated with

serious diseases of heart, liver, brain, lung, kidney and other organs. (3) No psychiatric disease, no history of long-term use of psychiatric drugs. (4) ECG showed no bradycardia or atrioventricular block. Experimental drug Dexmedetomidine Hydrochloride injection (Yangzijiang Pharmaceutical Group Co., LTD., approval Number: H20183219, specification: 0.2mg/2ml); Propofol emulsion injection (xi 'an libang pharmaceutical co., LTD., approval number: H20010368, specification: 0.1g/10ml); Etomidyl emulsion injection (Jiangsu Nhwa Pharmaceutical Co.,Ltd., approval no. : H20020511, specification: 20mg/10ml)

Table 1. Comparison of general conditions of patients in groups A and B

Group	Male/Female	Age(Year)	Weight (kg)	ASA I / II
A (N=40)	20/20	10.13 \pm 2.29	34.85 \pm 10.20	28/12
B (N=40)	23/17	10.28 \pm 2.32	36.03 \pm 11.41	32/8

2.2 Methods

All patients fasted for 8 h and drank for 4 h before surgery. Intravenous needle was inserted before anesthesia, and oxygen was given to the nasal catheter at a flow rate of 2L/min. Noninvasive arterial blood pressure, electrocardiogram, oxygen saturation, respiratory rate and bispectral index(BIS) were monitored. Patients in group A were given preoperative intravenous injection of propofol and etomidate mixture (the mixture consisted of 20mg etomidate mixed with 0.1g propofol into 0.5% propofol injection, A total of 20ml), and propofol injection measured at 1mg /kg was performed for 1min. Patients in group B were pre-operatively injected with dexmedetomidine hydrochloride by injection pump at a constant speed, with a pumping dose of 0.4 g/kg and a pumping time of 10 min. After the pumping, the same dose of etomidate mixture was used for injection. BIS was controlled intraoperatively between 40 and 60, and the time of gastroscopy was less than 5 min^[4]. Propofol is injected at any time according to the situation, and 0.5 mg/kg of propofol is injected each time. If heart rate per minute during operation < 50 . Atropine was given 0.3mg intravenously. If the systolic blood pressure was lower than 25% of the basic value, ephedrine was given 2mg for each intravenous injection, and when SpO₂ $\leq 90\%$, the nasal catheter was increased to 5L/min.

2.3 Observe

The final intraoperative dose of propofol and etomidate, the resuscitation time (from the time when gastroscopy left the mouth to the time when patients opened their eyes autonomously) and the time when patients left the hospital after anesthesia were recorded (the time when patients opened their eyes autonomously to the time when they met the standard of leaving the hospital after anesthesia ≥ 9 points, and the standard of leaving the hospital after anesthesia was PADSS score). The incidence of adverse reactions such as hypotension, hypoxemia, dizziness, nausea and vomiting was recorded.

2.4 Analysis

SPSS25.0 software was used for statistical analysis. The difference was statistically significant ($P < 0.05$).

3 Results

The wake time and leave time of group B were significantly shorter than group A ($P < 0.001$); The amount of propofol and etomidate was significantly lower than that of group A ($P < 0.001$), as shown in Table 2. The incidence of movement, nausea, vomiting and dizziness in group B was less than that in group A ($P < 0.05$); There was no significant difference in the incidence of hypotension and hypoxia between the two groups, as shown in Table 3.

Table 2. Comparison of patients' waking time, leave time, propofol dosage and etomidate dosage

Group	waking time (min)	leave time (min)	propofol (mg)	etomidate (mg)
A (n=40)	46.45±8.04	17.35±3.09	55.40±12.22	11.08±2.44
B (n=40)	34.68±7.83	8.20±2.56	39.83±12.48	7.97±2.50
<i>t</i>	6.635	14.404	5.640	5.640
<i>P</i>	<0.001	<0.001	<0.001	<0.001

Table 3. Comparison of intraoperative and postoperative adverse reactions

Group	movement	hypoxia	hypotension	Nausea and vomiting	dizziness
A (n=40)	29	7	18	7	13
B (n=40)	8	3	10	0	3
χ^2	22.175	1.829	3.516	7.671	7.813
<i>P</i>	<0.001	0.176	0.100	0.006	0.01

4 Discussion

In the diagnosis and treatment of gastroscopy, due to the rich distribution of laryngopharyngeal nerves, patients are often accompanied by throat discomfort, cough, nausea and vomiting, but not sensitive to pain. Therefore, sufficient sedation can meet the requirements of gastroscopy, but also avoid the drastic changes in hemodynamics of patients and improve the safety of painless gastroscopy. Dexmedetomidine is a highly selective 2 adrenergic receptor agonist that acts on the central and peripheral nervous systems, it acts on the α_2 receptor in the locus coeruleus and stimulates endogenous sleep-promoting pathways, thereby inducing sedative and hypnotic effects in patients. At the same time, the drug can also reduce stress response, stabilize hemodynamics, analgesia, and inhibit saliva secretion. In a meta-analysis, dexmedetomidine also prevented perioperative nausea and vomiting [6]. Previous studies have also confirmed that the use of dexmedetomidine in painless endoscopy in children can reduce the probability of adverse events [7]. In addition, dexmedetomidine has a good synergistic effect when used in combination with other sedatives and analgesics, and can significantly reduce the use of other sedatives and analgesics.

Propofol etomidate mixture injection is one of the common anesthesia methods used in the diagnosis and treatment of painless gastroscopy. The study of Yang Xiaochun [1] showed that propofol etomidate mixture could reduce the time for patients to wake up and leave the hospital, and reduce intraoperative and postoperative adverse reactions. In this study, propofol etomidate mixture was used for painless gastroscopy in children, and 0.4 g/kg dexmedetomidine was pumped 10min before

surgery. The dosage of propofol and etomidate was significantly reduced ($P < 0.001$), the time of waking and leaving hospital was significantly shortened ($P < 0.001$), the incidence of intraoperative body movement was significantly reduced ($P < 0.001$), and the incidence of postoperative nausea, vomiting and dizziness was significantly reduced ($P < 0.05$). The combined application of dexmedetomidine and propofol etomidate mixture, the use of lower doses of propofol and etomidate can achieve the same depth of anesthesia, meet the requirements of clinical painless gastroscopy, reduce the incidence of intraoperative body movement and postoperative nausea and vomiting, shorten the time of patients waking and leaving the hospital, and improve the comfort and satisfaction of patients.

To sum up, 0.4 g/kg of dexmedetomidine combined with propofol etomidate mixture can be used in painless gastroscopy in children, which can reduce the dosage of propofol etomidate, reduce the incidence of intraoperative and postoperative adverse reactions, and shorten the time of patients' resuscitation and withdrawal from hospital. It is a safe and effective new method.

References

- [1] Yang XC, Xie YQ, Zhao WY, et al. Comparison of different proportions of etomidate and propofol mixture in painless gastroscopy [J]. Journal of Clinical Anesthesiology. 2018(03): 246-249.
- [2] Wu XM, Xue ZG, Ma H, et al. Expert consensus on clinical application of dexmedetomidine (2018)[J]. Journal of Clinical Anesthesiology. 2018(08): 820-823.
- [3] Shi CM, Xu M, Meng LM, et al. Low-dose dexmedetomidine in painless gastroscopy and colonoscopy: a prospective randomized controlled study [J]. Chinese Journal of Minimally

- Invasive Surgery. 2017(02): 117-119.
- [4] Huo LH, Zhang JM, Wang F. Application of BIS monitoring technology in children colonoscopy [J]. Chinese Journal of Endoscopy. 2008(01): 36-37.
- [5] Common expert consensus on anesthesia management of digestive endoscopic surgery [J]. Journal of Clinical Anesthesiology. 2019(02): 177-185.
- [6] Gan T J, Diemunsch P, Habib A S, et al. Consensus Guidelines for the Management of Postoperative Nausea and Vomiting[J]. Anesthesia & Analgesia. 2014, 118(1).
- [7] Mason K P, Park R S, Sullivan C A, et al. The synergistic effect of dexmedetomidine on propofol for paediatric deep sedation: A randomised trial[J]. Eur J Anaesthesiol. 2020.