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Painless gastroscopy in anesthesia with propofol combined with different opioid analgesic drugs—comparative analysis of effects

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Abstract: *Esophageal cancer is a common malignant tumor in modern society, which is usually treated by surgical resection, and anesthesia is required during the operation, and the choice of anesthetic drugs and anesthetic forms is the key to the smooth implementation of the operation. Currently, general anesthesia is commonly used in clinical practice, but the actual application effect of general anesthesia does not meet expectations, so some scholars have proposed that General anesthesia without opioid drugs combined with thoracic epidural anesthesia can obtain good anesthetic effects. In this study, a randomized controlled study was conducted to compare the anesthetic effects of conventional general anesthesia and opiate-free general anesthesia combined with thoracic epidural anesthesia, and it was found that: The overall anesthetic effect, pain degree, complication rate and other indicators of the latter are better than those of the former, which also indicates that the implementation of opiate-free general anesthesia combined with thoracic epidural anesthesia for surgical anesthesia during radical resection of esophageal cancer can further improve the anesthetic effect and ensure the surgical safety.*

Keywords: *Painless gastroscopy; anesthesia; propofol; opioid analgesic drugs*

1. Introduction

Painless gastroscopy (Gastroscopy) is a widely used clinical examination method in the diagnosis and treatment of gastric diseases, which has significant value in the detection and treatment of early lesions. [1]However, the procedure of gastroscopy may cause discomfort and pain, and anesthesia is able to improve patient comfort and the success rate of examination. Currently, propofol (Propofol), as a drug widely used in painless gastroscopy anesthesia, has become one of the first choices in clinical practice. Propofol is a short-acting intravenous anesthetic that has the properties of rapid onset and maintenance of anesthesia. However, propofol also has some shortcomings, which may cause hypotension and respiratory depression, which require continuous monitoring and adjustment by medical staff[2]. Therefore, to improve the safety and efficacy of painless gastroscopy anesthesia, researchers have been seeking different combinations of anesthetic drugs. The application of combined opioid analgesic drugs has become an option to improve the anesthetic effect of painless gastroscopy. Opioids such as fentanyl and sufentanil, and piperidine hydrochloride are widely used in the field of analgesia, which can quickly reduce pain and discomfort while maintaining a stable physiological condition of the patient. Therefore, combining propofol with opioid analgesics can better balance the duration of anesthesia and patient comfort, thus improving the success rate and safety of gastroscopy. Based on this, the effect of propofol combined with different opioid analgesic drugs in painless gastroscopy anesthesia will be analyzed, as reported below.

2. Data and methods

2.1 General information

The 170 inflammatory patients who came to our hospital for painless gastroscopy from May 2022 to November 2022 were selected as the survey target, and divided into experimental group (85 group) and observation group (85 group) according to the parity method. Experimental group: 50 males and 35 females, aged 25-79, mean at (41.25 ± 9.64); reference group: 51 males and 34 females, aged 26-78,

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mean at (41.26 ± 9.42). There was no significant difference in the general data between the two groups (p> 0.05). Inclusion criteria: (1) meeting the criteria for painless gastroscopy; and (2) complete clinical data. Exclusion criteria: (1) with severe mental illness; (2) with serious infectious disease.

2.2 Methods

The reference group used propofol compound oxycodone anesthesia, in which propofol manufacturer: Xi'an Libang Pharmaceutical Co., LTD.; Chinese drug approval: H20010368), 2.0~2.5mg/kg ccording to body weight. Oxycodone (Beijing Huasu Pharmaceutical Co., Ltd.; H20090214)[3].The experimental group used propofol compound pithidine hydrochloride anesthesia, in which propofol was consistent with the reference group, pithidine hydrochloride (manufacturer: Qinghai Pharmaceutical Factory Co., LTD.; Chinese drug approved H63020016)[4].

2.3 Observed indicators

Inflammatory factors: mainly include C-reactive protein (CRP), γ interferon (IFN- γ), tumor necrosis factor- α (TNF α), and high mobility group protein B1 (HMGB-1).Changes in the molecular expression level of inflammatory pathways: including ROCK, RhoA, JNK, and ERK 1 / 2.Stress product content: specifically including O_2^-, OH^-And malondialdehyde (MDA)[5].Adverse reactions: record the type and number of adverse reactions occurring during the course of treatment respectively.

Anesthesia: the onset time and action time of effective anesthesia were recorded in all patients[6].

2.4 Statistical analysis

Data were analyzed by SPSS 24.0 statistical software, measurement data by (x ± s), line t-test, count data by (%), and line x^2Test, when P <0.05 indicates that the difference is statistically significant [7].

3. Results

3.1 Inflammatory factors

Table 1: Inflammatory factors (x ± s)

group	CRP(μg/ml)		IFN-γ(ng/ml)		TNF-α(ng/ml)		HMGB-1(pg/ml)	
	Before the inspection	After the inspection	Before the inspection	After the inspection	Before the inspection	After the inspection	Before the inspection	After the inspection
Experimental group (n=85)	2.38±0.54	3.86±0.58	12.75±1.52	19.64±2.38	23.46±4.36	32.58±4.82	78.42±9.61	104.26±12.34
Reference group (n=85)	2.34±0.52	6.75±1.46	12.48±1.48	27.52±7.64	23.48±4.46	40.26±5.24	78.42±9.43	127.42±13.58
t	0.246	13.264	0.267	7.138	0.143	7.624	0.263	10.367
p	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

After the examination, the inflammatory factor index increased in all patients, but the index increased even lower in the experimental group (p <0.05), see Table 1.

3.2 Changes in the molecular expression level of the inflammatory pathways

After examination, the molecular expression index of the inflammatory pathway increased, and the experimental group increased even lower (p <0.05), see Table 2.

Table 2: Changes in molecular expression of inflammatory pathways (x ± s)

group	ROCK		RhoA		JNK		ERK1/2	
	Before the inspection	After the inspection	Before the inspection	After the inspection	Before the inspection	After the inspection	Before the inspection	After the inspection
Experimental group (n=85)	1.05±0.28	1.57±0.3	1.04±0.34	1.48±0.46	1.07±0.26	1.34±0.32	0.94±0.24	1.46±0.26
Reference group (n=85)	1.07±0.39	62.28±0.69	1.07±0.27	2.07±0.34	1.05±0.27	2.09±0.34	0.96±0.18	1.97±0.34
t	0.148	6.328	0.246	9.364	0.234	11.356	0.543	9.367
p	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

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3.3 Content of stress products

After examination, the content of stress products increased, and the increase of the experimental group was even lower ($p < 0.05$), see Table 3.

Table 3: Stress product content ($\bar{x} \pm s$)

group	O_2^-		OH^-		MDA(nmol/ml)	
	Before the inspection	After the inspection	Before the inspection	After the inspection	Before the inspection	After the inspection
Experimental group (n=85)	15.49±2.34	20.34±3.46	11.52±1.52	15.38±2.64	4.36±0.54	6.34±0.83
Reference group (n=85)	15.38±2.34	27.64±5.94	11.34±1.37	24.59±5.34	4.48±0.46	9.95±2.14
t	0.164	7.368	0.137	10.367	0.367	11.346
p	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

3.4 Adverse reactions

The probability of adverse reaction was lower in the experimental group ($p < 0.05$), see Table 4.

Table 4: Adverse Effects [n (%)]

group	hypopiesia	bradycardia	hyoxemia	Prevalence of adverse reactions
Experimental group (n=85)	2(2.35)	2(2.35)	1(1.76)	5(6.46)
Reference group (n=85)	5(5.88)	6(7.06)	7(8.24)	18(21.18)
x^2				6.328
p				<0.05

3.5 Anesthesia situation

Patients in the experimental group had a faster anesthesia onset time and a longer action time ($p < 0.05$), see Table 5.

Table 5: Anesthesia ($\bar{x} \pm s$; min)

group	Effective anesthesia onset time	Time of effective anesthetic action
Experimental group (n=85)	4.38±0.78	273.61±89.34
Reference group (n=85)	8.61±0.87	267.42±90.34
t	5.312	11.348
p	<0.05	<0.05

4. Discussion

Gastroscopy is mainly used for evaluating gastric health, diagnosis of gastric and duodenal diseases, biological testing sampling, or some treatment procedures. However, due to the presence of discomfort symptoms such as foreign body sensation, pain, and painless gastroscopy in invasive patients, it can ensure that gastroscopy reduces or eliminates discomfort symptoms in patients, and improves patient cooperation and acceptance. Therefore, the choice of the appropriate anesthesia method is crucial. Propofol has been widely used in anesthesia as a fast-acting, short-recovery anesthetic agent. In this study, propofol was used to compound different opioid analgesic drugs to further enhance its anesthetic effect[8]. Propofol mainly enhances the inhibitory effect of γ -aminobutyric acid (GABA) by acting with GABA _ A receptors, so as to achieve the effect of anesthesia. Moreover, the rapid anesthesia induction and recovery of propofol give it certain advantages in painless gastroscopy. As an NMDA receptor antagonist, oxycodone produces an analgesic effect mainly by blocking the NMDA receptors in the CNS. When propofol is combined with oxycodone, the effects of both in anesthesia and analgesia can be mutually reinforcing. Propofol provides an anesthetic effect through its effects on GABA _ A receptors, while oxycodone enhances the analgesic effects through NMDA receptor antagonism[9]. Furthermore, oxycodone can reduce the total dose required for propofol, thereby reducing the possible adverse effects of propofol. Piperidine hydrochloride is a selective central analgesic with an effect focused on the blockade of μ -opioid receptors. By binding to these receptors, pethidine hydrochloride can effectively reduce pain signalling in the CNS, resulting achieving analgesic effects. Piperidine hydrochloride has a lower risk of addiction and respiratory depression compared to other opioids. When propofol is combined with pethidine hydrochloride, both can form a dual line of anesthesia and analgesia. Propofol provides the basic anesthetic effect, ensuring that the patient loses consciousness

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throughout the gastroscopy, and piperidine hydrochloride enhances the analgesia by not awakening midway. Moreover, because both act on different receptors and pathways, its combination is able to reduce the dose requirement of a single drug, reducing potential adverse effects and complications.

This study showed that, the inflammatory factors of all patients increased after the examination, but the experimental group was lower; after the examination, the index was lower; in the experimental group, in the experimental group, the index was lower, compared with Wang Lihui The results ($p < 0.05$) was the intervention of piperidine hydrochloride on the nerve conduction pathway and its synergistic effect with propofol. By reducing the stress response and inflammatory response, it also helps to reduce the overall stress to the body, thus making the patient experience more comfortable and improving the overall anesthesia effect. The combination of propofol and peperidine hydrochloride has multiple advantages in painless gastroscopy. First, it can effectively reduce the inflammatory stress response. Inflammatory stress response is the natural response that the body has to the appearance of external stimuli and injuries, and gastroscopy may sometimes lead to mild mucosal irritation. The antioxidant properties of propofol, and its effects on GABA _ A receptors, can inhibit neural cell activity and thus reduce the generation of inflammatory stress. Meanwhile, piperidine hydrochloride as a selective central analgesic can further reduce the transmission and increase of pain signals, thus reducing the degree of inflammatory stress. Secondly, the combination of piperidine hydrochloride and propofol reduces the probability of adverse effects. Since both drugs act on different physiological pathways, a lower dose of each drug can be used in combination, thus reducing the possible adverse effects when used alone. Furthermore, this drug combination can achieve anesthetic effects faster. Propofol as a fast-acting intravenous anesthetic, propofol is able to rapidly move patients into anesthesia. Piperidine hydrochloride, however, can enhance and stabilize this anesthetic effect, ensuring its effectiveness throughout the examination process. Finally, the combination of propofol and pithidine hydrochloride can prolong the effective action time of anesthesia. Although propofol is a short-acting drug, its anesthetic effect can be stable and extended when combined with peperidine hydrochloride, prolonging the physician operating time window, thus ensuring the smooth completion of gastroscopy.

In conclusion, for patients with painless gastroscopy, using propofol compound piperidine hydrochloride anesthesia can effectively reduce the inflammatory stress response, reduce the probability of adverse reactions, reduce the onset time of anesthesia, and prolong the effective action time of anesthesia.

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