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Case Control Study

# Study of wrist-ankle acupuncture therapy for optimizing anaesthesia scheme of painless gastroscopy and improving painless gastroscopy related complications

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## Abstract

### BACKGROUND

Painless gastroscopy is a widely used diagnostic and therapeutic technology in clinical practice. Propofol combined with opioids is a common drug for painless endoscopic sedation and anaesthesia. In clinical work, adverse drug reactions of anaesthesia schemes are often one of the important areas of concern for doctors and patients. With the increase in propofol dosage, the risk of serious adverse drug reactions, such as respiratory depression and hypotension, increases significantly; the use of opioids often causes gastrointestinal reactions in patients after examination, such as nausea, vomiting, delayed recovery of gastrointestinal function and other complications, which seriously affect their quality of life.

### AIM

To observe the effect of wrist-ankle acupuncture therapy on the anaesthesia regimen and anaesthesia-related complications during and after painless gastroscopy examination.

## METHODS

Two hundred patients were selected and randomly divided into a treatment group ( $n = 100$ ) and a control group ( $n = 100$ ). Both groups were routinely anaesthetized with the nalbuphine and propofol regimen, gastroscopy began after the patient lost consciousness, and given supportive treatment and vital sign monitoring. If the patient interrupted the surgery due to intraoperative torsion, intravenous propofol was used to relieve his or her discomfort. The treatment group received wrist-ankle acupuncture on this basis.

## RESULTS

The general data before treatment, American Society of Anesthesiologist (ASA) grade and operation time between the two groups was no significant difference. The Wakeup time, and the Self-ambulation time in the treatment group was significantly faster than that in the control group ( $P < 0.05$ ). The total dose of propofol in the treatment group was  $109 \pm 8.17$  mg, significantly lower than that in the control group ( $P < 0.05$ ). The incidence of respiratory depression and hypotension was not significantly different, but the incidence of hiccups was significantly lower than that in the control group ( $P < 0.05$ ). After the examination, the incidence of nausea, vomiting, abdominal distension, and abdominal pain was 11%, 8%, 6%, and 5%, respectively, which was significantly lower than that in the control group ( $P < 0.05$ ). In addition, both the operators and the patients were more satisfied with this examination, with no significant difference between the groups ( $P > 0.05$ ).

## CONCLUSION

Wrist-ankle acupuncture treatment can optimize the painless gastroscopy and anaesthesia scheme, reduces propofol total dose; shortens patient Wakeup time and Self-ambulation time, improves patient compliance and tolerance, is beneficial to clinical application.

**Key Words:** Wrist-ankle acupuncture therapy; Acupuncture anaesthesia; Painless gastroscopy; Gastroscopy; Anaesthesia-related complications

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**Core Tip:** The use of wrist ankle acupuncture can optimize the anesthetic regimen during painless gastroscopy, significantly reduce the total dose of propofol during the examination without affecting the examination operation and the satisfaction of the examiner and the patient, thus shortening the patient's awakening time and autonomous activity time, reducing the occurrence of hiccup during the examination and nausea, vomiting, abdominal distension, abdominal pain and other complications after the operation, It is beneficial to the development of painless gastroscopy in clinical practice, and improve the compliance and tolerance of patients.

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## INTRODUCTION

Painless gastroscopy is a widely used diagnostic and therapeutic technology in clinical practice that can find common lesions of the oesophagus and stomach, such as gastritis, gastric cancer, reflux oesophagitis, oesophageal cancer, and gastroduodenal ulcer, in a timely and accurate manner[1,2]. The application of anaesthesia technology to the operation process can effectively reduce the fear and discomfort of patients, improve their compliance and tolerance during the examination process, and thus improve the detection rate of potential diseases and the timeliness of endoscopic treatment[3]. Propofol combined with opioids is one of the most commonly used anaesthetic prescriptions for painless gastrointestinal endoscopy in clinical practice and is a common drug for painless endoscopic sedation and anaesthesia[4]. The sedative and anaesthetic effect of propofol is characterized by quick onset, good drug effect and short recovery time. However, due to its lack of analgesic effect, it is often necessary to combine opioids to enhance the effect of anaesthesia and analgesia and reduce the dosage of propofol. In clinical work, adverse drug reactions of propofol anaesthesia schemes are often one of



the important areas of concern for doctors and patients. On the one hand, with the increase in propofol dosage, the risk of serious adverse drug reactions, such as respiratory depression and hypotension, increases significantly; on the other hand, the use of opioids often causes gastrointestinal reactions in patients after examination, such as nausea, vomiting, delayed recovery of gastrointestinal function and other complications, which seriously affect their quality of life. Therefore, it is urgent to find a treatment plan that can reduce the dosage of propofol and the gastrointestinal reactions of patients after the examination.

Wrist-ankle acupuncture therapy is a shallow needling method[5,6] created by Doctor Zhang Xinshu according to the guidance and inspiration of the traditional Chinese medicine theory of meridians and collaterals by combining the "five needling", "twelve needling" and other acupuncture methods recorded in ancient books and records with long-term clinical practice. It has the characteristics of simple point selection, safety, simplicity, no need for electroacupuncture and other equipment, rapid and reliable effects, and no side effects[7]. Recently, the application of acupuncture anaesthesia in the field of digestive endoscopy has gradually achieved good results[8]. Therefore, this study observed the intervention treatment of patients with wrist-ankle acupuncture therapy and observed the influence of the anaesthesia scheme, drug dosage and occurrence of anaesthesia-related adverse reactions during and after painless gastroscopy. The aim was to provide a more optimized painless gastroscopy anaesthesia prescription scheme for clinical practice, help reduce the dose of anaesthetic drugs, shorten the time for patients to wake up and leave the hospital, reduce anaesthetic complications, facilitate the development of painless gastroscopy in clinical practice, and improve the compliance and tolerance of patients to treatment.

## MATERIALS AND METHODS

### *Clinical data*

This study was approved by the Medical Ethics Committee of Xiamen Hospital of Traditional Chinese Medicine and signed by all patients with informed consent.

**Inclusion criteria were as follows:** (1) Patients aged 18-65 years with BMI  $\leq 28$  kg/m<sup>2</sup>; (2) ASA classified as I-II; and (3) No contraindication for gastroscopy.

**Exclusion criteria:** (1) Patients who have major diseases such as cardiovascular and cerebrovascular diseases and cannot cooperate with the examination; (2) Pregnant women; (3) Patients with propofol and opioid allergy or intolerance; and (4) Patients who take psychotropic drugs or drugs that affect the blood coagulation function before the operation.

**General information:** From January 2022 to July 2022, 200 patients without major diseases who were selected from the endoscopic treatment room of Xiamen Traditional Chinese Medicine Hospital for painless gastroscopy were randomly divided into the treatment group ( $n = 100$ ) and the control group ( $n = 100$ ) according to the sequence. There was no significant difference in general data between the two groups ( $P > 0.05$ ), which was comparable, as shown in Table 1.

### *Treatment*

All patients fasted for 8 h, completed health education before the examination, and confirmed contraindications of anaesthesia and gastroscopy. During the examination, the patients were placed in the left lateral position and given nasal catheter oxygen inhalation (6 L/min). The indwelling needle opened the venous channel and was connected to the multifunction detector to monitor ECG, SPO<sub>2</sub>, BP and other vital signs.

The control group was routinely anaesthetized with nalbuphine and propofol according to the Expert Consensus on Sedation and Anaesthesia in the Diagnosis and Treatment of Digestive Endoscopy in China[9]. Before administration, the patient performed several deep breathing exercises, including intravenous injection of nalbuphine (0.025 mg/kg), followed by intravenous injection of propofol (1.5 mg/kg), until the eyelash reflex disappeared, and after no response to shouting, gastroscopy was performed. If the patient showed movement, frowning or haemodynamic changes (heart rate increase of  $> 20$  beats per minute, systolic blood pressure increase of  $> 20\%$  the base value) during the operation, propofol (0.5 mg/kg) was added until the patient was sedated again.

The treatment group received wrist-ankle acupuncture treatment on the basis of the control group. A needle (32 gauge, 1 inch, 0.25 mm diameter  $\times$  25 mm) was used. For the acupuncture, point selection and acupuncture method of Huatuo brand in Suzhou, China, refer to Professor Zhang Xinshu's Wrist-Ankle acupuncture treatment point selection standard[6].

The following observation indicators were recorded from the patients in both groups: (1) Painless gastroscopy, including the Operation time (from the beginning to the end of the examination), the Wakeup time (from the end of the examination to the time at which the patient could correctly state his or her name and birthdate), the Self-ambulation time (from the end of the examination to the time at which the patient could walk steadily from his or her own bed), and the total dose of propofol during

**Table 1 Comparison of the general data of the two groups of patients**

Group	Gender		ASA grade		Median age (age)
	Male	Female	I	II	
Observation group ( <i>n</i> = 100)	54	46	80	20	36 (19-56)
Control group ( <i>n</i> = 100)	52	58	82	18	41 (21-62)
$\chi^2/t$ value	0.296		0.530		0.396
<i>P</i> value	> 0.05		> 0.05		> 0.05

ASA: American Society of Anesthesiologist.

the examination; (2) Incidence rate of complications (hypoxemia, hypotension, hiccup, *etc.*) during anaesthesia; (3) Occurrence of gastrointestinal reactions (nausea, vomiting, abdominal distension, abdominal pain, *etc.*) after the examination; and (4) Operator and patient satisfaction visual analog scale (VAS) scores for this examination.

### Statistical method

SPSS 23.0 software was used for data analysis. The measurement data are expressed as (mean  $\pm$  SD), and a *t* test was adopted. The counting data are expressed as [*n* (%)] using  $\chi^2$  analysis. The F test for analysis of variance was used for comparisons among multiple groups, and the difference was considered statistically significant if *P* < 0.05.

## RESULTS

### Comparison of gastroscopy in gastroscopy in gastroscopy in gastroscopy in the two groups

The duration of gastroscopy in the two groups was 4-6 min, with no significant difference (*P* > 0.05). However, the recovery time of patients in the treatment group was  $3.26 \pm 0.27$  min, and the time of independent walking was  $6.12 \pm 0.87$  min, which was significantly faster than that in the control group. The total dose of propofol in the treatment group was  $109 \pm 8.17$  mg, which was lower than that in the control group, as shown in Table 2.

### Comparison of complications between the two groups during anaesthesia

The incidences of common complications, such as hypoxemia, hypotension and hiccup, during painless gastroscopy in the two groups were 16%, 23% and 1%, respectively, which were significantly lower than those in the control group (*P* < 0.05). Shown in Table 3.

### Comparison of gastrointestinal reactions between the two groups after examination

After the examination, the incidence of nausea, vomiting, abdominal distension and abdominal pain in the treatment group was significantly lower than that in the control group (*P* < 0.05), as shown in Table 4.

### Comparison of the satisfaction scores of the operators and patients with painless gastroscopy

Both operators and patients were satisfied with this painless gastroscopy, and there was no significant difference in VAS scores between the two groups (*P* > 0.05), but the VAS scores of operators in the treatment group were still higher, at  $9.89 \pm 0.31$ , as shown in Table 5.

## DISCUSSION

With the development of society and the improvement of economic levels, Chinese residents are paying increasing attention to their health. Gastroscopy has become one of the important items of routine physical examination and is widely used in the clinical diagnosis and treatment of gastric cancer, precancerous diseases, tissue mucosal lesions and other diseases[10,11]. However, in the process of gastroscopy, patients often suffer from tension, anxiety, nausea, vomiting and other discomforts, resulting in patients discontinuing or terminating gastroscopy due to fear or intolerance. With the intervention of anaesthesia technology, painless gastroscopy can effectively reduce the pain of patients and is gradually becoming a widely accepted examination method in clinical practice[12]. However, each anaesthetic and opioid has adverse reactions, such as respiratory depression[13]. When propofol is used for painless examination, the incidence of respiratory and haemodynamic complications reaches

**Table 2 Comparison of gastroscopy in the two groups**

Group	Operation time (min)	Wakeup time (min)	Self-ambulation time (min)	Total dose of propofol (mg)
Observation group ( <i>n</i> = 100)	4.73 ± 2.41	3.26 ± 0.27	6.12 ± 0.26	109 ± 8.17
Control group ( <i>n</i> = 100)	4.35 ± 2.33	6.71 ± 0.34	7.08 ± 0.61	149 ± 10.17
<i>t</i> value	0.487	4.250	3.129	6.213
<i>P</i> value	> 0.05	< 0.01	< 0.05	< 0.01

**Table 3 Comparison of complications between the two groups during anaesthesia [*n* (%)]**

Group	Hypoxemia	Hypotension	Hiccup	<i>F</i> value	<i>P</i> value
Observation group ( <i>n</i> = 100)	16 (16.00)	23 (23.00)	1 (1.00)	14.89	< 0.05
Control group ( <i>n</i> = 100)	21 (21.00)	30 (30.00)	13 (13.00)		

**Table 4 Comparison of gastrointestinal reactions between the two groups after examination [*n* (%)]**

Group	Nausea	Vomiting	Abdominal distension	Abdominal pain	<i>F</i> value	<i>P</i> value
Observation group ( <i>n</i> = 100)	11 (11.00)	8 (8.00)	6 (1.00)	5 (5.00)	12.89	< 0.05
Control group ( <i>n</i> = 100)	20 (20.00)	16 (16.00)	15 (0.00)	12 (12.00)		

**Table 5 Comparison of visual analog scale scores for the satisfaction of operators and patients with painless gastroscopy**

Group	VAS score of operator satisfaction	VAS score of patient satisfaction
Observation group ( <i>n</i> = 100)	9.89 ± 0.31	8.45 ± 1.54
Control group ( <i>n</i> = 100)	9.19 ± 1.02	8.28 ± 1.05
<i>t</i> value	0.596	2.471
<i>P</i> value	> 0.05	> 0.05

VAS: Visual analog scale.

20%-24.5%. The combined use of nalbuphine can reduce the dose of propofol to achieve a safer anaesthetic effect, so it has become a commonly used anaesthetic scheme in clinical practice[14,15].

At present, the combining of other methods to further reduce the dose and side effects of propofol has become the current research exploration field. Nondrug methods, such as a large number of studies on acupuncture analgesia, have shown that the combination of acupuncture and anaesthesia can effectively reduce the dose of anaesthetic drugs. Among these approaches, wrist-ankle acupuncture treatment is a simple, safe and reliable therapy[16]. Some literature shows that wrist-ankle acupuncture treatment can increase cerebral blood flow and accelerate the passage of the blood-brain barrier to propofol, shorten the onset time, and thus reduce the induced dose of propofol[17,18]. In this study, the gastroscopy operation time in the two groups of patients lasted approximately 5 min, and the examination process in the two groups of patients was successfully completed. However, the total dose of propofol in the treatment group was small, and the time to awakening and walking independently after the examination was significantly faster than that in the control group. This may be related to the reduction of propofol dose or increased  $\beta$ -endogpin secretion by wrist and ankle acupuncture treatment[19], which is worthy of further study. On the other hand, during the operation of painless gastroscopy, especially when the dosage of propofol is high, the risk of inducing respiratory tract depression and blood pressure fluctuation is high, which is the most common cardiopulmonary complication of painless gastroscopy[20]. In our study, the incidence of hypotension and hypoxemia in the wrist-ankle acupuncture treatment group was significantly lower than that in the control group, which should be related to the reduction in the propofol dose in the wrist-ankle acupuncture treatment group, thus reducing the incidence of respiratory depression and hypotension in patients. Moreover, the most common complication after painless gastroscopy is a gastrointestinal reaction. Patients often feel nausea, vomiting, abdominal distension, abdominal pain, *etc.*, within hours or even days after the examination [21,22]. Our study suggests that the incidence of hiccups, nausea, vomiting, abdominal distension and



abdominal pain in the wrist-ankle acupuncture treatment group was significantly lower than that in the control group ( $P < 0.05$ ). Further query of the literature revealed that acupuncture treatment with wrist-ankle acupuncture treatment can reduce sympathetic nerve activity and vagus nerve tension, thereby relieving gastrointestinal spasm to alleviate nausea and vomiting and reduce abdominal distension and abdominal pain[23,24]. The degree of pain of patients after gastroscopy was mild. Analysis of the satisfaction of operators and patients with painless gastroscopy showed that both groups had high satisfaction but that the VAS score for the satisfaction of operators in the treatment group was still higher, at  $9.89 \pm 0.31$ . This indicated that both patients and operators were more satisfied with the anaesthesia method of this examination; moreover, patients in the treatment group woke up and moved independently faster, so this method was more popular with doctors.

## CONCLUSION

In summary, wrist-ankle acupuncture treatment can optimize the anaesthesia prescription during painless gastroscopy and significantly reduce the total dose of propofol during the examination without affecting the examination operation and the satisfaction of the examiner and the patient, thus shortening the patient's recovery time, and significantly reducing the probability of nausea, vomiting, abdominal distension and other complications after the completion of the procedure. This treatment is beneficial to the development of painless gastroscopy in clinical practice, and improves the compliance and tolerance of patients, that is worthy of clinical promotion.

## ARTICLE HIGHLIGHTS

### Research background

With the intervention of anaesthesia technology, painless gastroscopy can effectively reduce the pain of patients and is gradually becoming a widely accepted examination method in clinical practice. However, each anaesthetic and opioid has adverse reactions, such as respiratory depression. Recently, the application of acupuncture anaesthesia in the field of digestive endoscopy has gradually achieved good results.

### Research motivation

This study observed the intervention treatment of patients with wrist-ankle acupuncture therapy and observed the influence of the anaesthesia scheme, drug dosage and occurrence of anaesthesia-related adverse reactions during and after painless gastroscopy. To find a treatment plan that can reduce the dosage of propofol and the gastrointestinal reactions of patients after the examination.

### Research objectives

The aim was to provide a more optimized painless gastroscopy anaesthesia prescription scheme for clinical practice, help reduce the dose of anaesthetic drugs, shorten the time for patients to wake up and leave the hospital, reduce anaesthetic complications, facilitate the development of painless gastroscopy in clinical practice, and improve the compliance and tolerance of patients to treatment.

### Research methods

In this study, two hundred patients with painless gastroscopy from January 2022 to July 2022 were selected and randomly divided into a treatment group ( $n = 100$ ) and a control group ( $n = 100$ ). Both groups were routinely anaesthetized with the nalbuphine and propofol regimen, and gastroscopy began after the patient lost consciousness. If the patient interrupted the surgery due to intraoperative torsion, intravenous propofol was used to relieve his or her discomfort. The control group was given supportive treatment and vital sign monitoring, and the treatment group received wrist-ankle acupuncture on this basis.

### Research results

The general data before treatment, American Society of Anesthesiologist (ASA) grade and operation time between the two groups was no significant difference. The Wakeup time, and the self-ambulation time was significantly faster than that in the control group. The total dose of propofol in the treatment group was  $109 \pm 8.17$  mg, significantly lower than that in the control group ( $P < 0.05$ ). The incidence of respiratory depression and hypotension was not significantly different, but the incidence of hiccups was significantly lower than that in the control group. After the examination, the incidence of nausea, vomiting, abdominal distension, and abdominal pain was significantly lower than that in the control group. In addition, both the operators and the patients were more satisfied with this examination, with no significant difference between the groups.

## Research conclusions

Wrist-ankle acupuncture treatment can optimize the anaesthesia prescription during painless gastroscopy and significantly reduce the total dose of propofol during the examination without affecting the examination operation and the satisfaction of the examiner and the patient, thus shortening the patient's recovery time and significantly reducing the probability of nausea, vomiting, abdominal distension and other complications after the completion of the procedure.

## Research perspectives

This treatment is beneficial to the development of painless gastroscopy in clinical practice, and improves the compliance and tolerance of patients. Therefore, drug anaesthesia combined with wrist-ankle acupuncture treatment is a safe, feasible, simple and effective method that is worthy of clinical application and promotion.

## FOOTNOTES

**Author contributions:** Zheng LY, Wu LY, Lu H, and Mi SC performed the research; Mi SC and Lu H designed the research study; Xu ZJ and Lu H contributed to the collection and assembly of data; Lu H, Zheng LY, and Wu LY analysed the data; Zheng LY, Wu LY, and Mi SC wrote the paper.

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