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# Analysis of the Effect of Parathoracic Nerve Block and Compound Propofol Anesthesia on the Perioperative Period of Elderly Thoracotomy

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ABSTRACT

**Objective:** To explore the application of thoracic nerve block and propofol anesthesia in the treatment and perioperative period. **Methods:** A total of 40 patients with thoracotomy for esophageal cancer between May 2020 and September 2021 in the hospital were selected to participate in this study. All the patients were divided into reference and experimental groups according to the anesthesia protocol. For the experimental group, the parathoracic vertebral nerve block scheme was used under ultrasound guidance, with general anesthesia in the same manner, and after the surgical treatment of both groups, the patient-controlled intravenous analgesia (PCIA) regimen was applied to both patients. The time of surgery for the two patient groups, intraoperative propofol, postoperative pain conditions and postoperative blood glucose and NE, E, DA levels were measured and conducted for comparative analysis. **Results:** There is no significant differences between the two groups, besides, in the experimental group, propofol in surgery was less than that in the reference group; At the T6~T9 timepoint, patients in the experimental group had lower VAS scores in quiet and active conditions than those in the reference group; At the T9 timepoint, blood glucose and NE levels were higher than the T1, T4, T5 time point levels in each group; At the T4, T4 timepoint, E levels in both groups were lower than the T1, T9 time point level in each group; at T9 time point, the DA level was higher in the reference group than the T1, T4 time point level in each group; at T9 Time point, blood glucose and NE, E, DA were lower than those in the reference group. **Conclusions:** In the treatment of thoracotomy in elderly patients, thoracic paravertebral nerve block compound propofol anesthesia program can be used to patients, with striking anesthesia effect and remarkable recovery effect in perioperative period, which is conducive to relieving postoperative pain and worth promotion and application.

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## 1. Introduction

In recent years, accelerated rehabilitation surgery has developed rapidly, and regional block has gradually become a key medical research field. In the treatment of surgical patients, simple general anesthesia scheme is generally applied to patients, and thoracic epidural block scheme can also be jointly applied to patients to achieve good analgesic effect. However, according to clinical research, if epidural anesthesia is applied to patients, it will have a great impact on patient hemodynamics, and there are many operational risk factors, and some patients have a high incidence of postoperative complications. In recent years, parathoracic nerve block has been gradually applied in surgical treatment, which will only have a block effect on the surgical side of the patient, and will not exert a great adverse impact on the patient's body. In recent years, visual anesthesia technology has been prominently improved, and parathoracic nerve block technology has been gradually promoted and applied [1]. In this regard, in this study, a total of 40 patients with thoracic surgery for esophageal cancer between May 2020 and September 2021 were selected to take part in this study, to deeply explore the application of parathoracic vertebral nerve block compound propofol anesthesia in the treatment of elderly thoracotomy and the impact on the perioperative period of patients.

## 2. Materials and Methods

### 2.1 General Information

A total of 40 patients with thoracotomy for esophageal cancer between May 2020 and September 2021 in our hospital were chosen to participate in this study, with American Anesthesia Association (American society of anesthesiologists, ASA) grade I or grade II, between 62 and 82 years, and average (69.1 ± 9.3). All patients were conscious and had normal cardiopulmonary function and did not receive preoperative radiotherapy, chemotherapy or blood transfusion regimens. During the perioperative period, none of the patients were treated with hormonal drugs. According to the different anesthetic protocols, all patients were divided into a reference group and an experimental group, in which 20 patients in the reference group were applied a simple continuous patient-controlled intravenous analgesia protocol, while 20 patients in the experimental group were applied a continuous thoracic paravertebral nerve block combined with a continuous patient-controlled intravenous analgesia protocol.

### 2.2 Methods

Atropine 0.5 mg was applied to patients in both groups prior to surgical treatment, and was administered by intramuscular injection; after entering the operating room, patients were closely monitored, including heart rate (HR), bispect ral index (BIS) and pulse oxygen saturation ($SpO_2$) etc. Venipuncture was performed into the patient's right jugular and a double-tailed central vein catheter injected to prepare for intraoperative rehydration and venous blood extraction.

For the experimental group, an ultrasound-guided parathoracic vertebral nerve block protocol was used. The patient was assisted to take the lateral position, select the midline 1.5 cm~2.0 cm space of the rib space in the open chest, use it as the puncture point, routine skin disinfection, and 1% lidocaine was applied to the puncture point. Color Doppler ultrasound diagnostic instrument is chosen. For the ultrasound probe, it can be placed in the transverse plane and the perimeter of the puncture site is checked. During the exploration, the perpendicularity between the probe and the spine is maintained vertical, and a hyperechoic band, i.e., the mural pleura, is visible laterally, while the anechoic region is the lung. In addition, on exploration above the mural pleura, dark echogenic strips were seen, i.e., the patient's ribs, and the thoracic paravertebral nerve was in the area between the above three. After the paravertebral space images were obtained by ultrasound exploration, the images were analyzed, and a 21G-long 100 mm contrast puncture needle was inserted from the side of the ultrasound probe, and the anesthesia needle was placed into the paravertebral space under the guidance of the ultrasound machine, and 15 mL of 0.5% ropivacaine was injected after no blood was drawn back, and then the catheter was placed and fixed with a patch to assist the patient to lie flat [2]. After 10min, the effect of the nerve block was checked, and after passing the examination, the patient could be induced by general anesthesia.

The general anesthesia was the same in both groups, with mask oxygen inhalation and midazolam 0.05 mg/kg~0.10 mg/kg, propofol 1.0 mg/kg~1.5 mg/kg, rocuronium bromide 0.6 mg/kg and fentanyl 4 mg/kg~6 mg/kg, by intravenous injection. The left two-cavity bronchial catheter is inserted and the ventilator is adjusted to intermittent positive pressure ventilation (IPPV) mode, the tidal volume can be controlled between 8 mL/kg~10 mL/kg, frequency 12 / min~14 / min aspiration ratio 1:2 and 35 mmHg~40 mmHg. In order to maintain the general anesthesia effect, propofol and remifentanil should be applied to patients by continuous intravenous infusion. Apart from

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that, rocuronium bromide is applied to patients and intermittent intravenous injection to maintain a good muscle relaxation effect. During the procedure, the patient blood pressure level and BIS value were closely monitored, and the anesthetic dosage was adjusted to control the patient blood pressure fluctuations within 20% of the preoperative monitoring value, while the patient BIS value was controlled between 50~60. In both groups of patients, 30 min before the surgical treatment, patients should also be applied dizocine 5 mg, tramadol 100 mg, toltestrone 6 mg [3].

After the completion of surgical treatment in both groups, intravenous patient-controlled analgesia (PCIA) protocol was applied to the patients. 2 μg/kg of sufentanil citrate, 10 mg/kg of tramadol and 8 mg of toltesetron were selected and added to 0.9% sodium chloride solution to prepare 100 mL of the mixture, and the continuous dose was set at 2 mL/h, 2 mL each time, and the locking time was set at 15 min. On top of that, for patients in the experimental group, an electronic pump formulation of 300 mL of 0.15% ropivacaine hydrochloride at a continuous dose of 6 mL/h was applied.

### 2.3 Observing Indicators

Time of surgery for the two patient groups, intraoperative propofol, postoperative pain conditions and postoperative blood glucose and NE, E, DA levels were measured and conducted for comparative analysis. The perioperative period varied from pre-anesthesia (T1), time (pre-induction (T2), immediate tracheal intubation (T3), surgical 2h (T4), postoperative (T5), 1h (T6), 4h (T7), 8h (T 8), 24h (T9), 48h (T10). For the assessment of patients' pain, the pain visual analogue scale (VAS) was used, with a score out of 10, the higher the score, the more intense the postoperative pain felt by the patient. At the detection of patient epinephrine (E), norepinephrine (NE), dopamine (DA) concentrations, after internal jugular vein sampling for 1h, plasma was collected by centrifugation at 2000 r/min for 5 min, placed into a-70 ºC cryogenic refrigerator for storage and assayed by radioimmunoassay.

## 3. Results

### 3.1 Comparison of Surgical Time and Intraoperative Medication between the Two Patient Groups

The time of surgery and the intraoperative medication statistics are shown in Table 1. The operation time difference between the two groups was not significant, and the amount of propofol in the experimental group was less than that of the reference group.

**Table 1.** Time of operation and intraoperative medication of the patients in the two groups

| Group (n) | Time of surgery (h) | intraoperative propofol (mg) |
|---|---|---|
| Experimental Group (n=20) | 4.0±0.6 | 960.0±216.8 |
| Reference Group (n=20) | 4.0±0.7 | 1242.5±200.1 |

### 3.2 Comparison of Postoperative VAS Scores between the Two Patient Groups

Postoperative VAS scores in both groups are shown in Table 2, at time points T6 to T9, the VAS scores of patients in the experimental group were lower than those of patients in the reference group when they were quiet as well as when they were active.

**Table 2.** Postoperative VAS scores and Ramsay sedation scores for the two patient groups (points)

| Group (n) | Time point | VAS score in quiet | VAS score at activity |
|---|---|---|---|
| Experimental Group (n=20) | T6 | 0.5±0.1 | 1.6±1.0 |
| | T7 | 0.6±0.2 | 1.2±1.0 |
| | T8 | 0.7±0.1 | 2.0±0.7 |
| | T9 | 0.7±0.1 | 2.0±0.8 |
| | T10 | 1.5±0.6 | 2.9±0.7 |
| Reference Group (n=20) | T6 | 1.2±0.8 | 3.1±0.6 |
| | T7 | 1.6±0.6 | 3.1±0.8 |
| | T8 | 1.9±0.7 | 3.3±0.6 |
| | T9 | 1.8±0.6 | 3.6±0.6 |
| | T10 | 1.6±0.4 | 3.6±0.7 |

### 3.3 Comparison of Postoperative Blood Glucose and NE, E, DA Levels between the Two Patient Groups

The postoperative blood glucose and NE, E, DA levels are shown in Table 3, where the blood glucose and NE levels were higher than the T1, T4, T5 time point, the T1, T9 time point, the T9 time point, and the T9 time point, the blood glucose and NE, E, DA in the experimental group were lower than the reference group.



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**Table 3.** Postoperative blood glucose and NE, E, DA levels in the two groups

| Group (n) | Time point | Blood glucose (nmol/L) | NE(ng/L) | E(ng/L) | DA(ng/L) |
|---|---|---|---|---|---|
| Experimental Group (n=20) | T1 | 5.4±0.4 | 196.6±55.6 | 176.6±55.6 | 36.7±15.6 |
| | T4 | 5.7±0.8 | 155.0±26.4 | 85.0±26.4 | 72.0±23.4 |
| | T5 | 5.3±1.1 | 142.5±25.0 | 62.4±35.0 | 19.4±29.9 |
| | T9 | 7.4±1.2 | 321.0±43.0 | 170.1±69.0 | 57.5±34.0 |
| Reference Group (n=20) | T1 | 5.6±0.6 | 189.7±48.6 | 175.6±54.1 | 39.8±18.6 |
| | T4 | 5.7±1.1 | 149.0±26.2 | 69.0±24.4 | 862.2±18.1 |
| | T5 | 6.3±1.1 | 139.4±22.0 | 52.4±24.0 | 62.5±18.9 |
| | T9 | 8.9±1.1 | 467.0±40.0 | 207.1±71.0 | 92.2±33.1 |

## 4. Discussion

Thoracotomy will cause great trauma to patients, and it is easy to induce stress reactions. The incidence of postoperative adverse reactions is relatively high. Elderly patients have varying degrees of physiological decline and more perioperative complications. After thoracotomy, many patients experience cognitive dysfunction and significant pain, and the effect of anesthesia has a greater impact on the patient's postoperative recovery. In recent years, the technique of regional block complex general anesthesia has developed rapidly and is more commonly used in thoracic surgical treatment [4]. By comparing the thoracic paravertebral nerve block with the epidural tissue protocol, a good block of the torso on the operated side can be achieved without depressing the patient's heart.

In this study, for both groups of patients, for the experimental group, the ultrasound-guided thoracic paravertebral nerve block protocol was used, and the general anesthesia was the same for both groups, and the intravenous patient-controlled analgesia (PCIA) protocol was applied to the patients after the completion of surgical treatment in both groups. Time of surgery for the two patient groups, intraoperative propofol, postoperative pain conditions and postoperative blood glucose and NE, E, DA levels were measured and conducted for comparative analysis. When applying the thoracic collateral nerve block composite general anesthesia scheme to the patients in the experimental group, ultrasound technology was jointly used to ensure the location, direction and depth control effect of the puncture, and the operation success rate was relatively high [5].

According to the study, the experimental group patients' perioperative indicators are better than the reference group patients. It can be seen that in the treatment of thoracotomy in elderly patients, a thoracic paravertebral nerve block compounded with propofol anesthesia protocol can be applied to patients, which has significant anesthetic effect and the patient's perioperative recovery effect is significant and is conducive to the relief of postoperative pain, and is worth promoting and applying.

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