

Ultrasound Guided Paravertebral Nerve Block in Thoracotomy

Qifei Li

Department of Anesthesiology, The First People's Hospital of Jingzhou (The First Affiliated Hospital of Yangtze University), Jingzhou, Hubei, 434020, China
lqf2021@163.com

Abstract: The pain after thoracic surgery is often moderate to severe. Perioperative analgesia has always been one of the research hotspots of thoracic anesthesia. The patients were prepared before operation according to the routine, and the fasting time was performed according to the fasting guidelines before anesthesia for adult surgery. After entering the operating room, first establish an infusion channel in the vein of the upper limb, and routinely use a monitor to monitor the basic vital signs. Puncture the right internal jugular vein and place the tube under ultrasound; Under local anesthesia, the radial artery was punctured and catheterized, and the catheter was connected with the transducer to monitor the invasive blood pressure. All patients in group P used the puncture method through the lateral approach. Use the same method on the opposite side. The plane was measured by acupuncture. If there was hypoesthesia, the effect of block was determined, and the spinal nerve block segments after plane fixation were recorded. The complications related to puncture (such as pneumothorax, hemothorax, local anesthetic poisoning, etc.), operation time, extubation time, propofol, remifentanyl and the use of cisatracurium during maintenance were recorded. Among all patients, the patients with $ID \geq 2$ in TPVB group and Gen group were 14.1% and 18.8% respectively, and the difference was not statistically significant ($P > 0.05$). Thoracic paravertebral block combined with general anesthesia is beneficial to reduce perioperative complications, incidence rate and mortality, and improve postoperative outcome.

Keywords: Ultrasound Guidance, Paravertebral Nerve Block, Thoracic Operation, One-Lung Ventilation

1. Introduction

In recent years, due to the application of nerve block and ultrasonic technology in peripheral nerve block, parathoracic spinal obstruction technology has caused new waves. With the advent of parathoracic spine block technology again, more detailed and comprehensive research on parathoracic spine block is being carried out at home and abroad. Because of its perfect analgesic effect and high safety, parathoracic spinal mass is more and more used in compound anesthesia and postoperative analgesia.

The parathoracic spinal cavity mass is different from the epidural mass. The yellow ligament is relatively strong during epidural puncture. There is an obvious sense of breakthrough after passing through the yellow ligament. Even if air and normal saline are injected, it has almost no resistance [1-2]. However, in the parathoracic spine block, when the needle tip passes through the upper ligament of the transverse protrusion of the rib, there is often no obvious sense of breakthrough. When the needle tip enters the muscle tissue, the pressure in the parathoracic spine cavity is higher than that in the supradural cavity, and air and saline still have a certain resistance [3-4]. The analgesic effect of general anesthesia and local anesthesia is carried out through two different paths [5]. Local anesthesia can block the peripheral motor nerve and sensory nerve to achieve the effect of analgesia and muscle relaxation [6]. The combination of local anesthesia and general anesthesia can greatly reduce the use of anesthetics, analgesics and muscle relaxants and greatly shorten the recovery time [7]. The side effects caused by the use of high-dose anesthetics will be greatly reduced. The concept of multimodal analgesia proposed in recent years is to combine a variety of analgesic methods, block the formation, transmission and integration of pain, strengthen the analgesic effect and reduce a variety of analgesic methods [8-9]. Systemic analgesics used for postoperative analgesia or / and paraspinal nerve blocks combined with non steroidal antipyretic analgesics have a good explanation for multimodal analgesia

[10].

The parathoracic spinal mass combined with general anesthesia is conducive to reduce the complications, morbidity and mortality during the perioperative period and improve the postoperative recovery. It is better than simple things in reducing postoperative tumor metastasis and recurrence and reducing postoperative chronic pain. These studies also have certain limitations, especially for patients with chest cracking or cardiopulmonary insufficiency, which can actually reduce perioperative complications such as cardiovascular and pulmonary complications.

2. Related Theories

2.1. Ultrasound Guided Paravertebral Nerve Block

Spinal nerve blocks are often used in thoracic surgery. In recent years, some studies have shown that abdominal surgery can achieve an analgesic effect that is beneficial to the prognosis and early recovery of patients. At the same time, with the advancement of visualization technology, ultrasound guidance has made spinal PVB more effective and safer. Unilateral spinal nerve block (PVB) is effective for early postoperative pain relief after breast cancer surgery and lobectomy. Patients undergoing PVB treatment will effectively reduce early postoperative complications, and provide patients with relatively high, relatively safe, more effective and feasible programs and plans.

The formal description of sentence modeling is as follows:

$$h_i^w = RNN_{encode}^w(h_{i-1}^w, e_i^w, W_{encode}^w) \quad (1)$$

Among them, $RNN_{encode}^w(*)$ represents the word encoding network based on LSTM, and K is the number of nodes in the hidden layer of LSTM.

In this paper, mean-pooling is used to obtain the contextual semantic representation context of the interactive scene S. The calculation formula is as follows:

$$context = avg(h^s) = \frac{\sum_{t=1}^{|S|} h_t^s}{|S|} \quad (2)$$

$$d_{t-1} = W_h^s d_{t-1}^s + W_e^s d_{end}^w(t-1) \quad (3)$$

2.2. Thoracic Surgery

In the process of eras, the implementation and development of low-invasive surgery has promoted the progress of the surgical team and reduced the trauma caused by the surgery itself. Compared with thoracotomy, taking the operation of chest and abdomen as an example, the thoracotomy of thoracotomy can reduce the cracking of skin, chest and abdomen, and the damage caused by the surgical incision itself and the walls of chest and abdomen. Reduce the incidence of postoperative pain and postoperative respiratory dysfunction. Acute pain after thoracotomy is considered to be one of the most serious postoperative pain. Thoracoscopic laparoscopic surgery is less harmful and traumatic than thoracotomy, but both may cause tissue injury, inflammation and acute postoperative pain, but the degree of pain needs to be considered as follows. From moderate to severe, the control of acute pain after thoracic surgery is insufficient, and persistent pain may have a serious impact on the quality of life of patients. In order to prevent the transfer of acute pain to chronic pain, effective management of acute pain is essential.

3. Application Experiment of Ultrasound Guided Paravertebral Nerve Block in Thoracotomy

3.1. Surgical Methods

The patient was prepared for surgery in accordance with the usual practice, and performed a hunger strike in accordance with adult hunger strike guidelines before anesthesia. After entering the operating room, first establish an injection channel in the upper limb vein, and use a monitor to monitor the basic vital signs on a regular basis. Under ultrasound, the right internal jugular vein is punctured, the catheter

is seized, the radial artery is punctured, placed under local anesthesia, the catheter is connected to the adapter, and the invasive blood pressure is monitored. All patients in group P received side puncture. Disinfect the skin near the puncture point by 20 cm, and arrange the ultrasonic probe parallel to the ribs, and arrange it at a distance of about 2.5 cm from the midline of T6~7, and arrange it near the skin. The backlash is clearly visible. Use the same method on the other side. After the plane is fixed, the spinal cord nerve block is recorded and guided regularly.

3.2. Postoperative Follow-Up

The main purpose of follow-up is to record the incidence and severity of chronic pain. The follow-up content includes: 1. Do you currently have chest surgery-related pain? (Yes/No) If the answer is yes, use the VAS scale to assess the average pain level and whether daily activities are restricted. The ID pain questionnaire was used to assess whether the patients had neuropathic characteristics of pain.

4. Experimental Results

The comparison of chronic pain in the two groups of patients 3 months after operation is shown in Table 1. The VAS scores of chronic pain patients in the PVB group and GEN group were 2.824 ± 1.122 and 2.939 ± 1.214 , respectively, and the difference was not statistically significant ($p > 0.05$). The postoperative pain of VATS mainly comes from the soft tissue, ribs, nerves, pleura, and lung tissue that are damaged by the operation. Tissue damage, and then the body produces a severe inflammatory response.

Table 1: Comparison of chronic pain in the two groups of patients 3 months after operation

	TPVB	GEN	p
CPSP incidence	47%	63%	0.001
VAS score	2.824 ± 1.122	2.939 ± 1.214	0.511
ID \geq 2	24.4%	33.7%	0.033

The comparison of chronic pain between the two groups of patients at 6 months after surgery is shown in Figure 1. Among all patients, the numbers of patients with ID \geq 2 in TPVB group and GEN group were 14.1% and 18.8%, respectively, and the difference was not statistically significant ($p > 0.05$). In terms of regional nerve block, intercostal nerve block has been mostly used in clinical practice in recent years. The particularity of its anatomical position will increase the incidence of incomplete block range and pneumothorax.

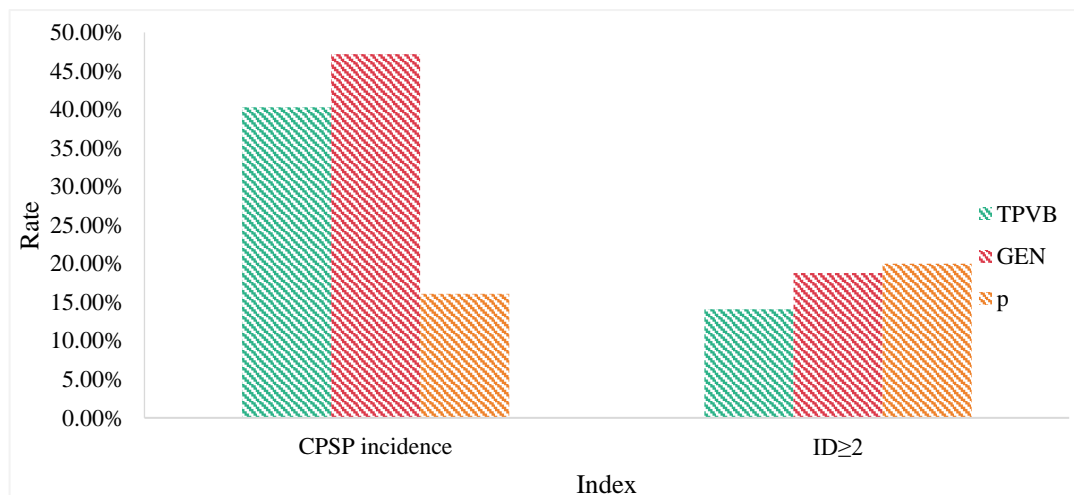


Figure 1: Comparison of chronic pain between the two groups of patients at 6 months after surgery

The comparison of the number of patients with different TNM stages is shown in Figure 2. In the P group, T2~T5 were compared with T1, and there was no significant difference in vital signs.

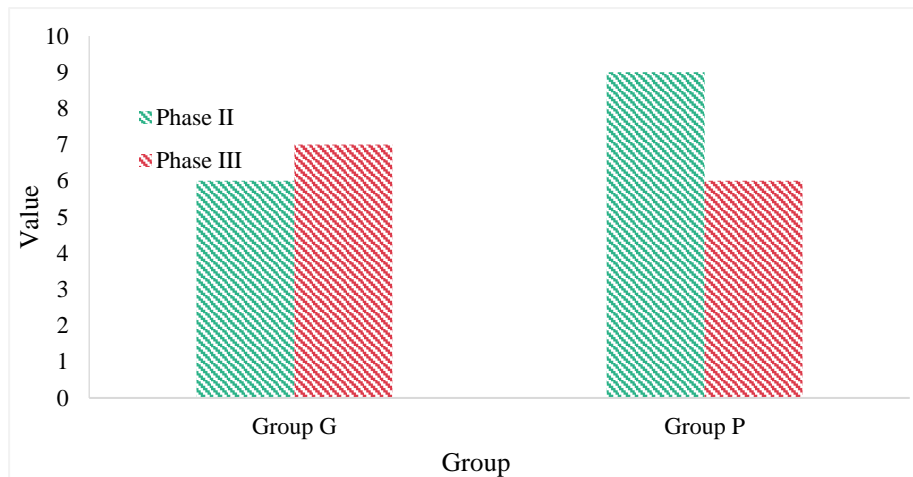


Figure 2: Comparison of the number of patients with different TNM stages

5. Conclusion

Lateral spinal nerve block (PVB) refers to the injection of local anesthetic into the wedge-shaped spinal cavity near the spinal nerve coming out of the intervertebral foramen to bring the somatosensory and sympathetic nerve block on the same side to achieve the physical anesthesia and tranquilization on the same side. Local block method for pain. Effect. In this study, the spinal nerve block under ultrasound guidance was used, and real-time guidance was reliable and safe. There were no complications associated with puncture in group P. In the process of ERAS, the implementation and development of low-invasive surgery promoted the progress of the surgical team and reduced the trauma caused by the surgical operation itself. With the continuous progress of modern aging society, the average age of human beings continues to increase, and there are more and more patients who need to undergo surgery and elderly patients, which means that more and more there are overt or subclinical dementia or cognitive dysfunction. Of patients need to receive anesthesia, and as a qualified contemporary anesthesiologist, you must have the ability to fully understand and properly manage these patients.

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