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Early Application Study of Intravenous Pain Pump Combined with Parecoxib Injection in Relieving Pain in Patients after Thoracoscopy

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Abstract

Objective: To explore the clinical effectiveness of combined use of intravenous pain pump with Parecoxib injection in alleviating pain in patients during the early postoperative period after thoracoscopic surgery. **Methods:** Eighty patients who underwent thoracoscopic surgery in a tertiary hospital were selected as the study subjects and randomly divided into two groups, with 40 patients in each group. The control group received routine postoperative treatment with intravenous pain pump, while the experimental group received Parecoxib in addition to the standard postoperative pain pump treatment. Visual Analog Scale (VAS) pain scores were used to evaluate postoperative pain relief in both groups, along with adverse reactions, postoperative complications, and patient satisfaction with pain relief. **Results:** Patients who received Parecoxib injection in addition to the routine use of intravenous pain pump had VAS pain scores lower than 3 points at 6 h, 12 h, 24 h, and 36 h postoperatively compared to those in the control group. The incidence of postoperative lung collapse, pleural effusion, and pulmonary infections was also significantly lower in the experimental group. The differences between the two groups were statistically significant ($P < 0.05$). **Conclusion:** Early combined use of Parecoxib injection in the early postoperative period after thoracoscopic surgery has shown good clinical efficacy. It can reduce the level of pain in patients, promote effective coughing and expectoration, facilitate early mobilization of patients, improve patient compliance, reduce complications, shorten hospital stay, and expedite patient recovery. Therefore, it is worth promoting the widespread clinical application of Parecoxib injection in this setting.

Keywords

Parecoxib, Combined Use, thoracoscopic Surgery, Intravenous Pain Pump,

Postoperative Pain

1. Introduction

Pain after chest surgery has always been a problem. In addition to pain caused by wound trauma, patients experience severe pain when coughing or expectorating pulls on the wound [1]. Therefore, pain is one of the reasons that lead patients to refuse or have ineffective coughing and expectoration. Ineffective coughing can lead to sputum retention, which in turn can cause postoperative complications such as lung infections and lung collapse [2], affecting patient recovery and prolonging hospital stays [3]. Parecoxib is the world's first injectable selective cyclooxygenase-2 inhibitor, which can be administered intravenously and by intramuscular injection as a non-steroidal anti-inflammatory drug [4]. Parecoxib can be used during the perioperative period to treat moderate to severe pain with good analgesic effects. It does not increase adverse gastrointestinal reactions or affect platelet function. When combined with other analgesic drugs, it can be used for the treatment of moderate to severe postoperative pain, reducing postoperative pain scores, increasing patients' willingness for early mobilization, and thereby reducing postoperative complications [5] [6]. This study explores the early postoperative use of Parecoxib in combination with intravenous pain pumps to alleviate patient pain, achieving good clinical results. The specific report is as follows.

2. Materials and Methods

2.1. General Materials

A total of 80 patients who underwent thoracoscopic pulmonary lobectomy with mediastinal lymph node dissection and postoperative chest tube placement by a single medical team from January to December in the past year were selected as the study subjects. They were randomly divided into a research group of 40 cases and a control group of 40 cases. Exclusion criteria included: 1) Patients planned for open thoracic surgery; 2) Patients planned for total lung surgery; 3) Patients planned for robot-assisted surgery; 4) Patients with severe gastrointestinal ulcers, blood system diseases, severe abnormalities in heart, liver, kidney function, or severe hypertension; 5) Patients with a history of allergy to nonsteroidal anti-inflammatory drugs; 6) Patients with a history of aspirin-induced asthma and those who had taken anesthetics, analgesics, or non-steroidal medications before surgery.

In the control group, there were 28 males and 12 females, aged 39 to 72 years old, with an average age of (52.45 ± 5.23) years. Educational levels included: primary school or below (5 cases), junior high school or high school (27 cases), and college or above (8 cases). Disease types were: 23 cases of left lung lobes and 17 cases of right lung lobes.

In the experimental group, there were 27 males and 13 females, aged 38 to 72

years old, with an average age of (51.65 ± 6.13) years. Educational levels included: primary school or below (6 cases), junior high school or high school (25 cases), and college or above (9 cases). Disease types were: 13 cases of left upper lobe, 7 cases of left lower lobe, 11 cases of right upper lobe, and 9 cases of right lower lobe. There were no statistically significant differences in age, sex, smoking history, educational level, and surgical methods between the two groups ($P > 0.05$).

2.2. Methods

The nurses from the department (not involved in postoperative follow-up) conducted health education for the control group and experimental group according to the perioperative health education protocols of the department. Starting from admission, they provided lung function exercises to both groups of patients, taught patients effective methods for coughing and expectorating, emphasized the importance of effective coughing and early mobilization after surgery, and educated both groups of patients and their families on postoperative complications. After the surgery, patients and their family members were educated on pain management knowledge, including the use of Patient-Controlled Analgesia (PCA) pumps and precautions. Patients and their families were instructed on using pain scales and assessment forms, and were encouraged to promptly record and document the number of presses and end time of the PCA pump.

The control group received routine postoperative treatment with an intravenous pain pump. The specific method is as follows: the analgesic pump formulation and usage were 100 μg of sufentanil added to 100 ml of 0.9% sodium chloride injection solution. The background dose was set at 2 ml/h, with a single dose of 0.5 ml each time. The pain pump device was removed after 48 hours.

The experimental group received postoperative routine treatment with an intravenous pain pump (used concurrently with the control group for the same duration) in combination with Parecoxib injection. The specific method was as follows: a single intravenous injection of Parecoxib injection was administered at 6 hours postoperatively, followed by intravenous administration of Parecoxib injection every 12 hours starting from the first day postoperatively until the patient's discharge.

2.3. Observation Indicators

Observations were made and recorded on postoperative pain, time to first mobilization, number of presses on the pain pump, length of hospital stay, and occurrence of postoperative complications in patients. The number of presses on the intravenous pain pump was recorded for both the control group and the experimental group at 6 hours, 12 hours, 24 hours, and 36 hours postoperatively. Pain intensity assessments were conducted on the patients at 6 hours, 12 hours, 24 hours, and 36 hours postoperatively. The visual analog scale method was used, where patients were shown a ruler with a scale of 0 - 10. A score of 0 indicated no pain, 1 - 3 indicated mild pain, 3 - 5 indicated moderate pain, 5

- 7 indicated severe pain, 7 - 9 indicated intense pain, and 10 indicated unbearable pain. A score of 3 indicated good pain relief, 3 - 4 indicated basic satisfaction with pain relief, and a score above 5 indicated poor pain relief.

2.4. Statistical Method

Statistical analysis was performed using SPSS12.0 statistical software. Count data are expressed in numbers of cases. Within-group comparisons are performed using t-tests for numerical data and χ^2 tests for count data, with a significance level of $P < 0.05$ indicating statistical significance.

3. Results

The research results showed that the incidence of lung collapse, pleural effusion, and pulmonary infection in the experimental group was significantly lower than that in the control group. A statistical significance difference was found between the two groups ($P < 0.05$). Details are shown in Tables 1-2.

4. Discussion

Currently, there are two commonly used effective analgesic methods in clinical practice: one is anesthesia analgesic drugs, and the other is non-anesthesia analgesic drugs. Anesthesia analgesic drugs are usually represented by sufentanil, which mainly acts on the μ opioid receptors and belongs to the class of central nervous system drugs in clinical practice, commonly used as analgesics. The use of patient-controlled analgesia (PCA) after surgery has become more widespread. However, sufentanil is not an ideal analgesic drug in clinical practice. Studies have shown that the excessive use of opioid drugs during the perioperative period can lead to various adverse reactions, such as common postoperative symptoms like nausea, vomiting, urinary retention, constipation, and more severe complications like respiratory depression. This is an important reason why

Table 1. Comparison of postoperative complication rates between the two groups of patients (No.).

Group	No.	Atelectasis	Pleural effusion	Pulmonary infection	Incidence rate (%)
Control group	40	4	3	4	11 (29.00)
Experimental group	40	1	1	1	3 (7.500)
χ^2					6.582
P					0.010

Table 2. Comparison of pain satisfaction between the two groups of patients (%).

Group	No.	Very satisfied	Partly satisfied	Dissatisfied	Degree of satisfaction
Control group	40	22 (51.2)	12 (31.5)	6 (15.3)	34 (86.3)
Experimental group	40	34 (85.1)	5 (12.3)	1 (2.5)	39 (98.2)
χ^2		4.71	2.46	5.02	5.12
P value		<0.05	<0.05	<0.05	<0.05

sufentanil cannot be used as a standalone postoperative analgesic regularly [7].

However, Parecoxib Sodium Injection does not have these adverse reactions. Parecoxib Injection is currently one of the better non-steroidal anti-inflammatory analgesics. It is a water-soluble drug presented as a white or off-white lyophilized block. It has a fast onset of action and long-lasting analgesic effects, with onset of action in 7 to 13 minutes after entering the body, and can last for 6 to 12 hours. It reaches peak effect within 2 hours, and the effective duration after a single dose is >6 hours [8]. Parecoxib Sodium Injection used in combination with opioid drugs can reduce the adverse reactions of the latter and decrease the required dosage. The results of this study show that the number of PCA presses within 24 hours after surgery in the treatment group was significantly less than that in the control group ($P < 0.05$).

Lung cancer is currently a common malignant tumor, with a relatively high incidence rate and easy to be missed in diagnosis, posing a serious threat to human health. With the worsening environmental pollution, the incidence of lung cancer remains high and is becoming increasingly prevalent among younger individuals. Surgery is the most effective method for curing lung cancer, but the incidence of complications and mortality rates during the perioperative period are high. As stated by Ma Yanlan [9], effective sputum clearance is one of the main measures to prevent postoperative pulmonary complications. However, postoperative pain is a major obstacle to patient coughing, so timely and effective analgesia should be provided postoperatively to alleviate incisional pain caused by coughing, ensuring the effectiveness of patient coughing and sputum clearance.

In this study, it can be observed that within 6 hours postoperatively, the number of cases in which patients in the experimental group who received Parecoxib Injection once had a VAS pain score lower than 3 points was significantly higher than that in the control group where intravenous pain pumps were used routinely. At 12 hours, 48 hours, and 36 hours postoperatively, the VAS pain scores were below 3 points in the experimental group, which was also significantly better than that in the control group (**Table 3**). This indicates that Parecoxib Injection can significantly enhance the analgesic effect. In the patient satisfaction survey, the analgesic effect was more satisfactory in the experimental group compared to the control group ($P < 0.05$).

Table 3. Comparison of pain during postoperative coughing between the two groups (%).

Group	No.	NRS score	6 h	12 h	48 h	36 h
Control group	40	3 points	25 (62.5)	20 (50.0)	20 (50.0)	18 (45.0)
		3 - 4 points	5 (12.5)	7 (17.5)	15 (37.5)	20 (50.0)
		5 points	1 (2.5)	2 (5.0)	6 (15.0)	10 (25.0)
Experimental group	40	3 points	35 (87.5)	30 (75.0)	28 (70.0)	25 (62.5)
		3 - 4 points	4 (10.0)	5 (12.5)	10 (25.0)	15 (37.5)
		5 points	1 (2.5)	1 (2.5)	3 (7.5)	4 (10)

Complications are related to various factors, and pulmonary infection, atelectasis, hypoxemia, and respiratory system complications are common complications of thoracotomy. Zhang Xiuguo [10] mentioned that Parecoxib Injection can reduce postoperative inflammatory factor levels, improve patient pulmonary oxygenation function, and reduce postoperative pulmonary complications. In this study, the incidence of postoperative complications in the experimental group was significantly lower than that in the control group (**Table 2**), which is consistent with Zhang Xiuguo's viewpoint.

5. Conclusion

In conclusion, the use of Parecoxib Injection in addition to routine intravenous pain pumps postoperatively can reduce the severity of pain when patients cough, decrease the incidence of postoperative complications, and significantly reduce pulmonary infections, atelectasis, and pleural effusion. This approach is beneficial for early mobilization of patients, helps shorten the length of hospital stay, and the combined use of intravenous pain pumps with Parecoxib Injection in the early postoperative period is safe and reliable. It represents a new analgesic model [11] that is worth clinical promotion and application.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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