Informed consent

Research name: Using Thoracic Paravertebral Block for Perioperative Lung Preservation During VATS Pneumonectomy: A Dual Center Randomized Controlled Trial

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Department: Department of Anesthesiology

Research institution: Beijing Tongren Hospital, Capital Medical University; Beijing Chest Hospital, Capital Medical University

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Dear Patient,

We will invite you to participate in a clinical study, because you may meet the conditions for this study. This Informed Consent will introduce the purpose, process, benefits, risks of this study to you. Before you decide whether to participate in this study, please read the following as carefully as possible.

When the researcher explains the content of this Informed Consent Form to you, you can ask questions at any time and ask him/her to explain what you don't understand. You can discuss with your family, friends and your doctor before making a decision.

1. **Why is this study conducted?**

Lung cancer is the main cause of cancer death, and surgical resection is still the preferred treatment. As a minimally invasive operation, video-assisted thoracoscopic surgery (VATS) has significantly reduced surgical trauma and systemic inflammation, and has become the best treatment method for lung cancer surgery.

Postoperative pulmonary complications (PPCs) are one of the most common complications after thoracoscopic lung cancer surgery, which are related to the prolongation of hospital stay, hospital costs, and increased perioperative mortality. How to reduce the incidence of PPCs is very important, which is an urgent problem to be solved in clinical practice.

The incidence of pain 24 hours after VATS was 38%, and the incidence of chronic pain 6 months after VATS was 25%. Poor postoperative analgesia will affect postoperative recovery, which may increase the risk of pulmonary complications due to insufficient respiratory function and weak sputum excretion. Studies have reported that thoracic epidural anesthesia can reduce respiratory complications in high-risk patients. The analgesic effect of thoracic paravertebral block (TPVB) is similar to that of thoracic epidural analgesia. The failure rate of thoracic paravertebral block is less, and there are fewer complications such as intraspinal hematoma, hypotension, nausea, and urinary retention. A recent retrospective propensity matching analysis showed that TPVB combined with general anesthesia (GA) was associated with a lower incidence of postoperative pulmonary complications (29.8% vs. 34.2%).

Therefore, We assessed whether general anesthesia combined with thoracic paravertebral block can reduce the incidence of postoperative pulmonary complications and achieve the role of lung protection in VATS pneumonectomy compared with simple general anesthesia, so as to provide clinical basis for optimizing perioperative lung protection strategies.

2. Who will be invited to participate in this study?

Continuous sampling method was adopted to recruit patients who were scheduled to undergo thoracic surgery in Beijing Tongren Hospital, Capital Medical University and Beijing Chest Hospital, Capital Medical University.

Inclusion criteria:

1. Patients scheduled for elective VATS pneumonectomy had an expected operation duration (from skin incision to suture) greater than 1h;

2. Age>18;

3. ASA: I - III.

Exclusion criteria:

1. Patients with acute or chronic respiratory failure, chronic obstructive pulmonary disease GOLD grade ⩾ Grade III, poorly controlled asthma or acute respiratory distress syndrome (ARDS, according to the new definition of ARDS at the 2011 Berlin Conference);

2. Patients with severe cardiovascular complications (defined as NYHA Grade IV, acute coronary syndrome, or persistent ventricular tachycardia);

3. Patients who had a history of ipsilateral thoracotomy or had a history of mechanical ventilation within 4 weeks;

4. Patients with contraindications to TPVB (coagulation dysfunction, anticoagulation or antiplatelet therapy, skin ulcer infection, local anesthetic allergy, Spinal deformity, etc.);

5. Patients with trachea malformation or tracheotomy;

6. Pregnant or lactating patients.

302 subjects were enrolled in this study.

3. How was the study conducted?

This study is a prospective randomized controlled study. The subjects were randomly divided into two groups: general anesthesia group (general anesthesia group): no nerve block was performed before operation. General anesthesia combined with thoracic paravertebral block group (combined group): Thoracic paravertebral nerve block was performed under ultrasound guidance at T4 and T7 segments respectively before operation. The probability of subjects being divided into each group is 50%. Because different anesthesia methods are implemented in this study, the operator cannot achieve blind method. The postoperative evaluation was carried out by a separate research team, who did not know the team assignment, and the experimental patient and the experimental evaluator were blind. The anesthesia methods of all patients are the same and consistent, which are commonly used in clinical anesthesia. The patient's relevant medical history and preoperative examination results were collected one day before the surgery, and preoperative pulmonary function and pulmonary ultrasound were performed. After entering the operating room, the patients in the combined group were placed in a lateral position. The low-frequency convex array probe guided by ultrasound (Shenzhen Huasheng Navi) was used for out of plane technical puncture. 0.5% ropivacaine was administered to the thoracic paravertebral space at T4 and T7 segments respectively, with

a total amount of 30 ml. After injection, the pleura of the punctured segment and adjacent segments could be obviously moved down. After successful puncture, the patient was transferred to the supine position. After 5, 10, and 15 minutes, the block plane T3~T8 was measured to cover the surgical area. No nerve block in general anesthesia group. Routine monitoring data, blood gas analysis and inflammatory factor examination were recorded during the operation, and postoperative follow-up was conducted at 24h and 48h after the operation. The follow-up contents included postoperative pulmonary complications, pulmonary ultrasound, pulmonary function examination, postoperative NRS analgesia score, QoR-15 postoperative rehabilitation quality evaluation scale, and the length of hospitalization after the operation and other hospitalization related indicators were recorded at the time of discharge. We will follow up long-term prognostic indicators by telephone at 1, 3 and 6 months after surgery, including mortality, complication rate, tumor recurrence rate, etc. The study started on the day before operation and ended 6 months after operation.

4. What are the possible benefits of your participation in this study?

This study is a prospective study that will provide you with lung protection ventilation and ultrasound guided paravertebral nerve block surgery during surgery. The above two procedures may reduce the incidence of postoperative pulmonary complications and enable you to recover faster after surgery.

We also hope that the information obtained from your participation in this study will help doctors understand the correlation between general anesthesia combined with thoracic paravertebral block and the incidence of postoperative pulmonary complications in thoracic surgery, and provide clinical basis for optimizing perioperative lung protection strategies.

5. Possible risks and inconvenience of your participation in this study?

This study will perform thoracic paravertebral nerve block for you, which is a relatively mature method for postoperative analgesia after thoracic surgery. The complications of thoracic paravertebral nerve block are relatively rare, such as allergic reaction, general spinal anesthesia, local tissue damage, puncture point pain, local infection, Bradycardia, hypotension, etc. In this study, the nerve block operation will be completed in the operating room, and the monitoring and rescue equipment and drugs are relatively complete. Any of the above situations can be found and handled in a timely manner.

If you feel uncomfortable in the questionnaire, you can refuse to answer. If you have any discomfort, or new changes in your condition, or any unexpected situation during the study, regardless of whether it is related to the study, your doctor should be informed in a timely manner, and he/she will make a judgment and give appropriate medical treatment.

6. How does your participation in this study affect your daily life?

In addition to your regular follow-up in the hospital one month after the operation, we will give you a telephone follow-up within half a year after the operation, which will take up some of your time and may also cause you trouble or inconvenience.

Please consult your study doctor before taking any new prescription drugs. In consideration of your safety and to ensure the effectiveness of the research results, you cannot participate in any other clinical research on drugs and medical devices during the

research period.

7. If you do not participate in this study, are there any other treatment options?

You can choose not to participate in this study, which will not have any adverse effect on your access to conventional treatment. Whether you participate or not, the anesthesia methods of all patients are basically the same, which are commonly used in clinical practice. If you do not participate in this study, the anesthesiologist will choose an appropriate postoperative analgesia program according to your preoperative situation and surgical visit. Whether or not you use thoracic paravertebral block technology, we will pay close attention to the postoperative analgesia and the occurrence of postoperative pulmonary complications, and deal with them in a timely manner, so there is no need for alternative treatment.

8. Who is responsible for your expenses for participating in this study?

This study is not funded, and you will not get economic compensation. The data information required for this trial are the results of routine examinations and tests before and during the operation, without additional costs.

9. Are you compensated for participating in this study?

You will not be paid for participating in this study.

10. What if you have a study related injury?

The doctor will do his best to prevent and treat possible injuries caused by this study. If your health is harmed by participating in this study, please inform the researcher, and we will take necessary medical measures free of charge. According to the relevant laws and regulations of China, if you have any injury related to this study, the research group will bear the relevant treatment costs and provide corresponding economic compensation.

11. Under what circumstances might this study be terminated prematurely?

1. Subjects can voluntarily withdraw from the study at any time;

2. Withdrawal and termination of observation due to serious adverse events;

3. The subject did not perform such operation or changed the operation method during the operation;

4. Other reasons that the investigator thinks it is impossible to continue the trial treatment.

12. Do you have to participate in and complete this study?

Whether to participate in the study depends entirely on your wishes. You can refuse to participate in this study, or withdraw from this study at any time during the study, which will not affect the relationship between you and the doctor, nor will it affect the loss of your medical or other benefits. For your best interests, the doctor or researcher may suspend your participation in this study at any time during the study. If you withdraw from the study for any reason, you may be asked about your use of the investigational drug. If the doctor thinks it is necessary, you may also be required to have a laboratory examination and physical examination. During the study, if there is any new information that may affect your decision to continue to participate in the study, we will inform you in a timely manner.

13. Will your personal information be kept confidential?

Your medical records (research medical records/CRF, laboratory test reports , etc.) will be completely saved in the hospital where you visit. The doctor will record the results of tests and other examinations on your medical record. The research data will be kept in a locked filing cabinet for the reference of relevant researchers only. When necessary, the government supervision department and the ethics committee can access your personal data according to the regulations. We will make every effort to protect the privacy of your personal medical data to the extent permitted by law. According to medical research ethics, except for personal privacy information, the test data will be available for public inquiry and sharing. The inquiry and sharing will be limited to web-based electronic databases. Your participation in this study and your personal data in this study are confidential. When this research result is published, your identifiable identity information will not be disclosed.

14. Who can you contact if you have questions or difficulties?

If you have any questions or injuries related to this study, please contact the project leader.

If you have any questions related to your own rights, you can contact the Ethics Committee of Beijing Tongren Hospital, Capital Medical University.

Bookmark page of informed consent

Statement of subject

I know the purpose, process, risks and benefits of this study.

I have enough time and opportunity to ask questions, and my questions have been answered satisfactorily.

I know who I can contact when I have the questions, concerns, suggestions about this study, or want further information.

I have carefully read this informed consent form and agree to participate in this study.

I know that I can withdraw from this study at any time during the study without any reason.

I will get a copy of this informed consent form, which contains the signatures of me and the researcher.

Signature of the subject (In block letters)	Date
Signature of legal guardian (In block letters) (If necessary, please indicate the relationship with the subject)	Date
Signature of impartial witness (In block letters) (If necessary)	Date

Statement of investigator

"I have informed the subject of the purpose, process, risks and benefits of this study, given the subject enough time to read this Informed Consent Form or discuss with others, and answered questions about the study in detail; I have informed the subject of his contact information when encountering problems related to the study; I have informed the subject that he can withdraw from the study at any time; I have informed the subject that he will receive a copy of this Informed Consent Form, which contains I signed with him/her. "

_____ _____

Signature of researcher who obtained informed consent (In block letters)

Date

_____

telephone number