Informed Consent Form

（Version:V2.0　　Date：June 23, 2024）

Dear participants：

We would like to invite you to participate in a comparative study titled “A Comparative Study on the Analgesic Effects of Bupivacaine Liposomes and Ropivacaine for Peng Block in Patients Undergoing Hip Arthroplasty”. Professor Wei Mei from Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, is the principal investigator of this research. The research protocol has been approved by the Ethics Committee of Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, thus allowing for the conduction of this clinical study.

Before deciding whether to participate in this study, please read the following information carefully. It can help you understand the purpose of this study, the procedures and timeline of the research, as well as the potential benefits, risks, and discomfort that may arise from participating. If you wish, you can discuss it with your family or friends, or seek explanations from your healthcare provider to aid in your decision-making process. If you are currently participating in other clinical research, please inform your study doctor or research personnel. Thank you for your support in this study.

1 Background and Objective

Pain management is an essential component of perioperative care, and multimodal analgesia is the current mainstream analgesic strategy. Local anesthetics and regional nerve blocks are important components of multimodal analgesia, but traditional local anesthetics have limited duration of action and can lead to postoperative breakthrough pain. Liposomal bupivacaine is an ultra-long-acting local anesthetic with significant analgesic efficacy and safety, which has been utilized in the Enhanced Recovery After Surgery (ERAS) concept.

The aim of this study is to compare the difference in analgesic efficacy between liposomal bupivacaine and ropivacaine for periarticular nerve blockade in patients undergoing hip arthroplasty. A prospective randomized controlled trial design will be employed, in which patients aged 18-60 years with ASA 1-2 status undergoing hip arthroplasty will be randomly assigned to two groups: the experimental group receiving ultrasound-guided PENG blockade with liposomal bupivacaine, and the control group receiving ultrasound-guided PENG blockade with ropivacaine. The primary outcome measure will be pain scores during positional changes, overall pain scores,the amount of sufentanil delivered by the patient-controlled analgesia pump for 3 days postoperatively. Secondary outcome measures include duration of surgery, length of hospital stay, and complications such as local anesthetic toxicity.

This study aims to provide evidence for selecting appropriate analgesic strategies in clinical practice, optimize analgesic regimens, improve postoperative quality of life in patients, and support the promotion and application of multimodal analgesic concepts in China.

2 **the content and procedures of the trial**

If you agree to participate in this study, the following procedures need to be completed with the cooperation of the research team:

1) Screening and enrollment:

a) You will be asked about your medical history, undergo a physical examination, and may need to undergo some laboratory tests to determine if you meet the inclusion criteria for this study.
b) If you meet the inclusion criteria, the research team will provide you with a detailed explanation of the purpose, content, risks, and benefits of this study, and answer any questions you may have.
c) You will need to sign an informed consent form to indicate your voluntary participation in this study.

2) Group assignment:
Random allocation: To ensure comparability in baseline characteristics (such as age, gender, weight, medical history, etc.), the research team will use computer random allocation to assign you to one of the groups. This means you have an equal chance of being assigned to the experimental group or the control group. The purpose of group assignment is to evaluate the analgesic efficacy of liposomal bupivacaine in periarticular nerve blockade for hip arthroplasty by comparing the postoperative pain outcomes of the two groups.
If you agree to participate in this study, you will be randomly assigned to one of the following two groups:
a) Experimental group: Ultrasound-guided PENG blockade with liposomal bupivacaine +bupivacaine
You will receive liposomal bupivacaine, which is a new ultra-long-acting local anesthetic with significant analgesic effects. The research team will use ultrasound-guided techniques to accurately inject liposomal bupivacaine around your hip joint nerves for optimal pain relief.
b) Control group: Ultrasound-guided PENG blockade with ropivacaine
You will receive ropivacaine, which is a commonly used local anesthetic in clinical practice. The research team will also use ultrasound-guided techniques to accurately inject ropivacaine around your hip joint nerves.

Please note: Once you are assigned to a group, you will not be able to change groups. The research team will make every effort to ensure that both groups receive the same treatment, except for the difference in local anesthetic agents used. If you have any questions about group assignment, please feel free to contact the research team.

3) PENG blockade:
Before you receive spinal anesthesia, the research team will use ultrasound-guided techniques to inject liposomal bupivacaine or ropivacaine around your hip joint.

4) Spinal anesthesia:
While you are under PENG blockade, the research team will perform spinal anesthesia to alleviate any pain during the positioning process before the spinal anesthesia.

5) Surgery
An experienced orthopedic surgeon will perform a total hip replacement surgery for you.

6) Postoperative analgesia
a) After the surgery, you will receive standard postoperative analgesic medication as needed, including non-steroidal anti-inflammatory drugs, acetaminophen, and opioid medications.
b) You will also be equipped with a patient-controlled analgesia pump, which allows you to

self-administer the analgesic medication.
c) Research personnel will record your pain scores, analgesic pump usage, and other relevant information.

7) Follow-up
After your discharge, research personnel may follow up with you at 1 week, 2 weeks, 4 weeks, and 12 weeks to assess your pain status, recovery progress, and other relevant information.

8) Withdrawal from the study
a) You may withdraw from this study at any time without giving any reasons.
b) If you choose to withdraw from the study, necessary medical services will be provided to you by the research personnel.
Please note:
a) Participation in this study may involve some risks such as pain, infection, and allergic reactions.
b) Participation in this study may also provide some benefits such as alleviating postoperative pain and reducing the use of opioid medications.
c) Before making a decision to participate in this study, please carefully read this informed consent form and ensure that you understand the content, risks, and benefits of this study.

3、Potential Benefits
If you choose to participate in this study, you may potentially receive the following benefits:
1) Postoperative pain relief: Liposomal bupivacaine, a long-acting local anesthetic, has shown significant analgesic effects. Compared to traditional local anesthetics, liposomal bupivacaine provides longer-lasting pain relief, helping to alleviate postoperative pain and improve your comfort.
2) Reduced use of opioid medications: Opioid medications are potent analgesics, but long-term use may lead to addiction, constipation, and other side effects. This study aims to compare the analgesic effects of liposomal bupivacaine with ropivacaine. If liposomal bupivacaine is effective in reducing pain, it may decrease your need for opioid medications and hence reduce the risk of side effects.
3) Shortened hospital stay: Effective postoperative pain management can facilitate a faster recovery, resulting in a shorter hospital stay.
4) Increased satisfaction: Improved pain control and reduced use of opioid medications can enhance postoperative satisfaction and facilitate a quicker return to normal activities.

Please note: The aforementioned benefits are potential and not guaranteed. Participation in this study may involve some risks such as pain, infection, allergic reactions, and others. Before deciding whether to participate in this study, please carefully read the informed consent form and ensure that you understand the content, risks, and benefits of this study.

4、Potential risks, discomforts, or inconveniences
If you choose to participate in this study, you may potentially encounter the following risks, discomforts, or inconveniences:
1) Risks associated with local blockade injections:
a) Pain: During the local blockade injection process, you may experience needle pricks or a burning sensation.

b) Infection: There is a risk of infection at the site of the local blockade injection, with symptoms such as redness, swelling, warmth, or pus formation.
c) Bleeding: Local blockade injections may result in bleeding or hematoma at the injection site.
d) Nerve damage: In rare cases, local blockade injections may cause nerve damage, manifested as numbness, tingling, or weakness.
e) Allergic reactions: Patients allergic to local anesthetics may experience allergic reactions, including rash, itching, hives, or difficulty breathing.

2) Risks associated with spinal anesthesia:
a) Headache: The most common complication of spinal anesthesia is postoperative headache, with an incidence rate of approximately 10%-20%. Headaches typically occur within 1-2 days after the procedure and resolve on their own after several days.
b) Nausea and vomiting: Spinal anesthesia may cause gastrointestinal reactions such as nausea and vomiting.
c) Lower back pain: Spinal anesthesia may result in lower back pain.
d) Lower limb nerve damage: In rare cases, spinal anesthesia may lead to nerve damage in the lower limbs, characterized by numbness, tingling, or weakness.
e) Serious complications: In very rare cases, spinal anesthesia may give rise to more severe complications, such as epidural hematoma or subarachnoid hemorrhage.

3) Other risks:
a) Surgery-related risks: Hip replacement surgery itself carries certain risks, such as infection, bleeding, or failure of bone cement.
b) Research-related risks: This study is a scientific research and not a medical service. Therefore, the guaranteed benefits cannot be assured. Your participation in this study may delay your treatment time and may require additional examinations or treatments.

Please note that the aforementioned risks are potential and not definitive. The researchers will take all measures to minimize your risks as much as possible. If you experience any discomfort or adverse events during the research process, please immediately inform the researchers.

5、Privacy
Your participation in the study and any personal information collected during the study will be kept confidential. The research findings and academic papers produced after the study will not disclose your personal identity. Superiors in the research management department, hospital ethics committee, researchers, and representatives of the sponsor may have access to your records to verify the research procedures and/or data. We will strictly protect your personal privacy within the limits of the current laws.

6、Rights
Your participation is entirely voluntary. You have the right to refuse to participate in this study or to withdraw at any time during the data collection process, without providing any reasons. Your decision will not affect your relationship with our research team, and you will not be subjected to any discrimination or retaliation.

7、Expenses

Regarding expenses, commonly used medications, consumables, and medical technical services that are not directly related to the research will be charged according to the regulations of the hospital's Pricing Bureau, and participants will be responsible for covering these costs. The research medications used in this study will be funded by the project. No additional compensation will be provided to participants in this study. We genuinely appreciate your understanding and cooperation!

Finally, thank you for reading the above information. You may access relevant information materials at any time. The contact person for the research team is Dr. Ke Xijian, reachable at Phone No. 13429826148. If you have any questions about your rights in this study, please contact the Medical Ethics Committee of Tongji Hospital, Huazhong University of Science and Technology, at 027-83662379.

Informed Consent Form. Consent Signature Page.

Title： Bupivacaine Liposome Plus Bupivacaine or Ropivacaine for PENG Block on Post Operative Pain Management in Patients Undergoing Hip Arthroplasty: a Prospective, Randomized, Single Blind, Active Controlled Study

Institution: Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology

Informed Consent

I have read the above information regarding the study and have had the opportunity to discuss and ask questions about the study with the doctor. All of my questions have been satisfactorily answered.

I understand the risks and benefits associated with participating in this study. I am aware that participation in the study is voluntary, and I confirm that I have had sufficient time to consider it and understand the following:

- I can consult the doctor for more information at any time.
- I can withdraw from the study at any time without discrimination or retaliation, and my medical treatment and rights will not be affected.

I consent to the ethics committee or management department accessing my research data.

I will receive a signed and dated copy of the informed consent form.

Finally, I have decided to consent to participate in this study and promise to comply with the medical advice to the best of my ability.

Participant's signature：_____ _____(date)

Contact：_____

I confirm that I have provided the patient with a detailed explanation of the trial, including their rights and the potential benefits and risks, and have given them a signed copy of the informed consent form.

Investigate signature：_____ _____(date)

Contact：_____