Case Report

The Ultrasound-Guided Bilateral Erector Spinae Plane Block is an Effective and Safe Postoperative Analgesia Method at Liver Transplantation Recipient: 3 Cases Report

Qiao-ling Zhou*, Su-Yun Feng, Hui-Ping Wu, Hong-Zhen Liu, Mei -Juan Liao and Han-Bing Wang

Department of Anaesthesiology, The Affiliated Foshan Hospital of Sun Yat-sen University, China

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Corresponding author:
Qiao-ling Zhou,
Department of Anasthesiology, Affiliated Foshan Hospital of Sun Yat-sen University, Foshan 528000, China,
Email: zhouqiaoling78@126.com

ABSTRACT

Introduction: In the context of the concept of rapid rehabilitation, the postoperative pain treatment of patients undergoing liver transplantation is facing challenges. Traditional methods of simple intravenous analgesia and epidural analgesia both have shortcomings and are difficult to adapt to clinical needs. With the clinical application of ultrasonography, peripheral nerve block has been widely carried out, such as orthopedic knee replacement surgery, chest surgery, cesarean section and so on，in which Erector Spinal Block (ESPB) is more suitable for chest surgery and upper abdominal surgery for analgesia. Erector spinal block is a novel analgesic method for liver transplantation.

Case report: We observed the efficacy and safety of ESPB combined with intravenous analgesia in 3 patients with liver transplantation, showing that it can be used safely and effectively in such patients.

Discussion: The most important advantage of the ESPB is less technical expertise is required for as the sonographic leading points are easily visualized. It is safer than others forms of regional anesthesia such as epidural anesthesia and paravertebral nerve block. Our cases showing that it can be used safely and effectively for patients with liver transplantation. Large and multicenter studies are needed to confirm this method.

INTRODUCTION

Liver Transplantation (LT) is the standard surgical method for terminal liver failure. It was reported that One year survival rates were higher than 80%,and 5-year survival rates were higher than 70%, respectively, in experienced centers [1]. LT is the most difficult surgical operation with large Mercedes incision and long operation time. Postoperative pain in liver transplant recipients is severe, and the excessive use of opioids may lead to respiratory depression, nausea and vomiting, or prolonged the time in the hospital and other complications. Inadequate analgesia may be detrimental to patient recovery. Enhanced recovery following LT has gained attention even though there is limited evidence on the efficacy of existing analgesic techniques. It was previously thought that liver transplantation recipients had hepatic insufficiency, partial hepatic encephalopathy or sensory nerve passivation, and the postoperative days might be spent under sedation in the intensive care unit. Historically, patients undergoing LT were kept sedated and ventilated for at least 12 h because of respiratory issues. During that time, the pain is the most intense, they were given generous continuous infusions of opioids that provided sufficient analgesia. When

patients woke up, they had already passed the most painful postoperative phase. At present, Enhanced Recovery After Surgery（ERAS） is performed during liver transplant surgery, with 90 percent of patients becoming conscious within a few hours after surgery. These measures allow patients to return directly to the ward rather than stay in the ICU, where pain is most intense [2]. Opioids is a routinely used analgesic technique, but this measure is associated with well-documented side effects, such as sedation, respiratory depression, pruritus, hallucinations and Postoperative Nausea And Vomiting (PONV). Epidural analgesia, has historically been the standard of postoperative pain control, but limited by perioperative coagulation dysfunction, which is typical in the patients for liver transplantation and subsequent catastrophic neurologic injuries resulting from epidural haematoma. Accordingly, alternative analgesic methods that avoid this risk have been used in the search for safe but effective pain management.

In 2016, Forero introduced a novel method: the Erector Spinae Plane Block (ESPB) which was first used to provide analgesia in the thoracic region [3]. Since then, ESPB has shown promise as an alternative to neuraxial blockade for a variety of surgeries with good effect. ESPB has been demonstrated to improve pain-related outcomes after upper abdominal surgeries, such as laparoscopic cholecystectomy [4] and living donor liver transplantation [5]. To our knowledge, the analgesic efficacy of ultrasound-guided ESPB has not been extensively investigated in the setting of liver transplant recipients. Here, we report three cases of perioperative pain management for liver transplant recipients. All patients were monitored on electrocardiography, continuous arterial blood pressure, and pulse oximetry. Central venous pressure, end-tidal CO_2, body temperature, and urine output were, likewise, monitored.

CASE REPORT

All cases were collected from Affiliated Foshan Hospital of Sun Yat-sen University.

Case 1

A 39-year-old man (169 cm, 65 kg) , he was found HBsAg positive 7 years ago, and repeated total abdominal distension, edema of lower limbs and decreased urine volume occurred 3 years ago without obvious cause. Up to now, he has received intravenous ligation and tissue glue injection for 10 times in other hospitals and our hospital. There is no obvious cause for abdominal distension and gradual aggravation recently. There is no cold, fever, diarrhea, nausea and vomiting, belching, acid reflux, skin ecchymosis, and skin itching. The diagnosis was 1.decompensated stage of liver cirrhosis after hepatitis B, 2.liver cirrhosis accompanied by varicose esophagogastric fundus, 3.hypersplenism,4. peritoneal effusion, 5.hepatorenal syndrome.

He was admitted to the transplant department for liver transplantation, the donate liver came from Patients with brain death . A written informed consent was obtained from the patient and family for this report. He was sedated with 2 mg midazolam. The induction of anesthesia was performed with sufentanyl 1.5 μg/kg, target infusion of propofol, as plasma concentratio 3.5 μg/kg , remifentanil as plasma concentratio 2.0 ng/kg, and 0.2 mg/kg cis-atracurium. Anesthesia was maintained with inhalation of sevoflurane in the air oxygen mixture and with propofol and remifentanil infusion. The patients were positioned after intubation. The ESPB were performed positioning in the right lateral decubitus position .

With the patient positioned in right lateral decubitus, the skin was sterilized with a 2% chlorhexidine in 70% alcohol solution, and the ultrasound transducer was placed in a transverse orientation to identify the spinous process, lamina, and transverse process. The high-frequency linear transducer was placed on the spinous process at the T8-T9 level, rotated to a cephalo-caudad orientation in the parasagittal plane, sliding it 3 cm laterally to visualize the transverse process and erector spinae muscle. Using an in-plane technique, the needle tip was sited between the transverse process and the erector spinae muscle. The correct location was confirmed using injection of 3 mL of normal saline to view the hydrodissection between the transverse process and the erector spinae muscle. After verification of proper needle position, 25 mL of 0.4% ropivocaine was injected between the muscle and the transverse process, and extensive cephalocaudad spread in the correct plane was noted on the ultrasound (Figure 1).The same procedure was done for the contralateral side. Surgery was performed using Mercedes incision (Figure 2).

No complications occurred during the surgery in none of the patients. The operation time was 460 min.

An intravenous dose of 1.5 μg/kg sufentanyl was administered and a Patient Control Analgesia (PCA) device which contains

sufentanyl was used for the maintenance of postoperative analgesia. The pain of the patients was assessed by the Visual Analog Scale (VAS). The block lasted for about 24 hours, and afterwards analgesia was maintained by tramadol 100 mg intramuscularly on demand. His VAS ≤ 3 during the first 24h after ESPB. His sufentanyl consumption was 36 μg in the first 24 h，and the routine sufentanyl consumption in these recpients may be 60-70μg. No nausea, vomiting, pruritus, sedation or desaturation developed during the follow up of the patients in the inpatient service. On the 5th postoperative day，he did not need any analgesia more. On the 22th postoperative day, the patients were discharged uneventfully.

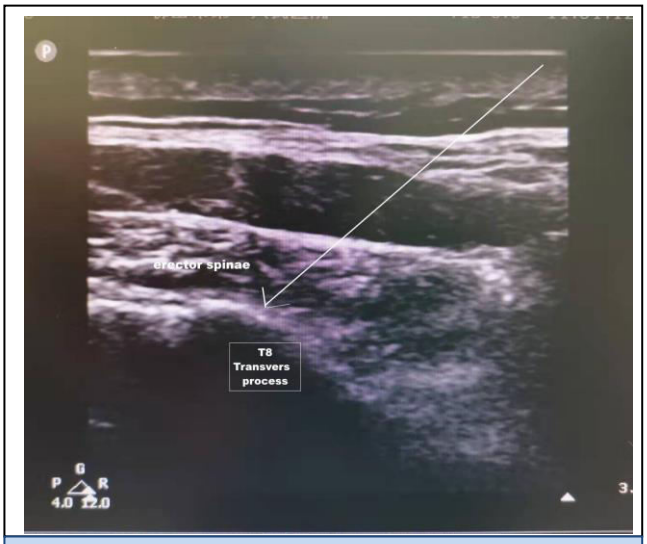

Figure 1: ESPB.

Figure 2: Mercedes incision.

Case 2

is a 59-year-old female (158 cm, 48kg) ,he had a history of hepatitis B for more than 10 years, and received TACE treatment in our hospital 3 months ago due to "primary liver cancer". CT review 2 months ago indicated that the tumor mass was larger than before, and laparoscopic hepatocellular carcinoma resection and cholecystectomy and percutaneous microwave ablation of liver tumor was performed. Ascites slightly increased, left upper lung and bilateral lower pneumonia consolidation, bilateral pleural effusion. Fearless cold, fever, no diarrhea, no nausea and vomiting, no belching, no acid reflux, no skin ecchymosis, no skin itching. The diagnosis was 1. Hepatocellular carcinoma;2. Decompensated stage of posthepatitis cirrhosis;3. After comprehensive treatment of liver cancer. He was admitted to liver transplantation for treatment of chronic terminal liver disease (ESLD). A written informed consent was obtained from the patient and family for this report. The ESP procedure and anesthesia in this case were similar to that in case 1. No complications occurred during the surgery in none of the patients. The operation time was 482 min. The block lasted for about 26 hours, and afterwards analgesia was maintained by tramadol 100 mg intramuscularly on demand. Her VAS ≤ 2 during the first 24h after ESPB. Her sufentanyl consumption was 30 μg in the first 24h. No nausea, vomiting, pruritus, sedation or desaturation developed during the follow up of the patients in the inpatient service. On the 5th postoperative day, she did not need any analgesia more. On the 25th postoperative day, the patients were discharged uneventfully.

Case 3

is a 60-year-old male (165 cm, 56kg)，he had a history of hepatitis B for more than ten years. A few years ago, without obvious causes, the patient repeatedly developed total abdominal distension, edema of lower limbs and decreased urine volume. Up to now, she has been treated with entecavir and other antiviral drugs, and has a history of repeated gastric bleeding. There is no obvious cause for abdominal distension and gradual aggravation recently. There is no cold, fever, diarrhea, nausea and vomiting, belching, acid reflux, skin ecchymosis, and skin itching. The diagnosis was decompensated stage of post-hepatitis B cirrhosis, cirrhosis with esophageal and gastric varices, hypersplenism, peritoneal effusion and

pleural effusion.

He was admitted to liver transplantation for treatment of liver cancer. A written informed consent was obtained from the patient and family for this report. The ESP procedure and anesthesia in this case were similar to that in case 1 and case 2. No complications occurred during the surgery in none of the patients. The operation time was 412 min. The block lasted for about 24 hours, and afterwards analgesia was maintained by tramadol 100 mg intramuscularly on demand. His VAS ≤ 3 during the first 24 h after ESPB. His sufentanyl consumption was 40 μg in the first 24 h. No nausea, vomiting, pruritus, sedation or desaturation developed during the follow up of the patients in the inpatient service. On the 4th postoperative day, he did not need any analgesia more. On the 16th postoperative day, the patients were discharged uneventfully.

DISCUSSION

The most important advantage of the ESPB is less technical expertise is required for the sonographic leading points are easily visualized. It is more safe than others forms of regional anesthesia such as epidural anesthesia and paravertebral nerve block, because ESPB is superficial block as the site of injection is far from the pleura, neuraxial structures, and major vascular structures [6]. Furthermore, the local anesthetic diffused in the direction of the head and the tail along the fascial plane underlying the ESM permits extensive, this is multiple dermatomes with a single injection [3]. The local anesthetic also penetrates anteriorly through the intertransverse connective tissue, gaining indirect access to the paravertebral space where it can potentially block the dorsal and ventral rami of the spinal nerves [3]. It may also block the sympathetic nerve fibers [7]. This block has been shown to be extensive somatic and visceral abdominal analgesia when performed at the T7-9 level [7].

CONCLUSION

ESPB is an good pain control option after liver transplantation. A randomized controlled clinical trial appears warranted to assess the efficacy of ESPB blockade and compare it with other analgesic options in both liver transplant surgery and other abdominal surgeries.

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Ethics Committee of Affiliated Foshan Hospital of Sun Yat-sen University (Foshan, China). Signed informed consents were obtained from the patients or the guardians.

PATIENT CONSENT FOR PUBLICATION

Not applicable.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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