Erector Spinae Plane Block and Opioid Sparing Anesthesia for Robotic Nephrectomy: A Case Report

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Figures

Fig 1: Staged photograph showing transducer and needle orientation during ESP block.

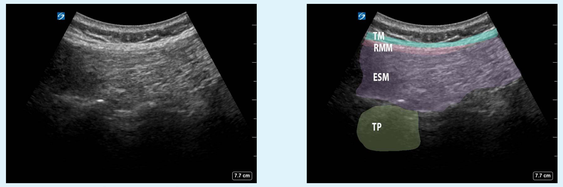

Fig 2a. Ultrasound image illustrates anatomy prior to nerve block. Fig 2b. Ultrasound image illustrates anatomy prior to nerve block with color overlay.

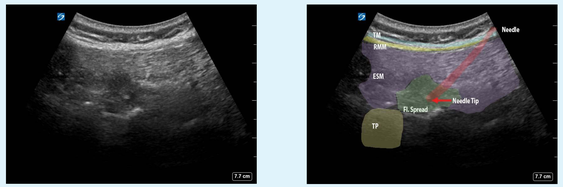

Fig 3a. Ultrasound image illustrates anatomy after the nerve block with the needle, needle tip, and local anesthetic fluid spread visible. Fig 3b. Ultrasound image with color overlay illustrates anatomy after the nerve block with the needle, needle tip, and local anesthetic spread visible.
Abbreviations: TM = Thoracic Muscle, RMM = Rhomboid Muscle, ESM = Erector Spinae Muscle, TP = Transverse Process

Introduction

Robotic nephrectomy can be performed via a transperitoneal or retroperitoneal approach. The retroperitoneal approach has the advantages of easier renal access and less risk of damage to intraperitoneal and abdominal vascular structures despite being more technically complex. For this reason, retroperitoneal nephrectomy with a minimally invasive robotic technique has become favorable. Pain management is essential, as poor pain management during the early postoperative period can cause significant issues with the patient's pulmonary (pneumonia, splinting, atelectasis, bronchial secretions), cardiovascular (increased oxygen consumption and tachycardia), and endocrine (stress response, hyperglycemia) systems. Regional pain reduction may be achieved through erector spinae plane blocks (ESPB) or quadratus lumborum blocks, with ESPB having the advantage of greater ease of placement and less risk of damage to intra-abdominal structures.

In this case report, we briefly describe using a combination of ESPB and multimodal analgesia for a patient undergoing a retroperitoneal robotic nephrectomy who desired opioid minimization due to prior addiction. We achieved robust pain control and high patient satisfaction. Written consent for publication of non-identifying medical information and Health Insurance Portability and Accountability Act authorization was obtained from all patients.

Case Description

A 55-year old, 106 kg male with a unilateral renal mass was scheduled for a nephrectomy using a minimally invasive robotic retroperitoneal approach. Of note, the patient had a significant history of opioid use disorder, for which he had previously successfully sought treatment. At the time of preoperative evaluation, he was maintained on 80mg/day of methadone. He expressed significant concern over perioperative opioid use and was very motivated to avoid the need to take opioids postoperatively, especially at home following discharge, in order to avoid the risk of relapse of his disease.

After thorough discussion about the risks and benefits of various anesthetic and analgesic regimens, the patient consented to general anesthesia utilizing a multimodal opioid-sparing analgesia regimen including the use of ESPB, ketorolac, dexmedetomidine, and ketamine.

Case Description (continued)

After skin disinfection, sterile draping was placed over the patient's back and the ultrasound probe was sheathed. The level of the block was the transverse process of T10. The block was performed using a SonoSite X-Porte HFL50xp (15-6MHz) linear ultrasound probe, which was placed in a parasagittal plane 1 cm from the posterior midline. The deep plane to the erector spinae muscle (ESM) was identified, and a 22 G, 50 mm insulated needle (Sonoplex Stim®, Pajunk, Germany) was inserted craniocaudally in plane between the transverse process and the fascia of the ESM. After negative aspiration, 30 cc 0.25% bupivacaine mixed with 5mg dexamethasone was injected. Correct local anesthetic positioning was confirmed by visualizing the solution lifting the ESM off the transverse process. Spread of local anesthetic between the T10 and T11 transverse processes was thereafter visually tracked with the transducer.

General anesthesia was subsequently induced with propofol 1.5 mg/kg, rocuronium 0.5 mg/kg, midazolam 2 mg, and fentanyl 25 mcg. Anesthesia was maintained over the course of the 2 hour case with dexmedetomidine 0.8 mcg/kg/hr, magnesium sulfate 2g and ketorolac 15 mg infused over 2 hours, and ketamine in a 0.5 mg/kg bolus followed by 5 mcg/kg/min infusion. The patient remained hemodynamically stable throughout the entirety of the case.

At the conclusion of the case, the patient was transferred uneventfully to the PACU where he reported no pain. He was admitted to floor level care and over the subsequent 24 hours received hydromorphone 0.3 mg IV and hydrocodone/acetaminophen 10/650 mg PO. On POD #1 he received his maintenance dose of 80 mg methadone.

Postop Day	Pain Score	Opioid Consumption	MEQ	Cumulative MEQ
0	0	None	0	0
1	0	Hydromorphone 0.3 mg IV Hydrocodone 10 mg PO	46	46
2	0	None	0	46

The patient was discharged home on postoperative day 2 and noted satisfaction with his perioperative/postoperative care.

Discussion

In this case report, we report the successful use of regional anesthesia with ultrasound guided ESPB to provide an opioid-sparing anesthetic for a patient undergoing robotic nephrectomy via a retroperitoneal approach. The use of a ESPB block for retroperitoneal surgery is one of many acceptable analgesic techniques, along with quadratus lumborum blocks (QLB). However, QLB is technically more challenging due to its deeper target and resultant greater risk of damage to intra-abdominal structures, including the risk of retroperitoneal hematoma, compared to the ease and lower risk of targeting more superficial bony anatomy during ESPB. EPSB has been shown to provide comparable analgesic effect to QLB for open nephrectomy via retroperitoneal approach, suggesting EPSB is a safer and easier yet equally efficacious alternative for QLB. Other important elements of the anesthetic regimen included preemptive administration of ketamine, which has been shown to have both anti-hyperalgesic and anti-allodynic properties due to its ability to block the NMDA receptor, as well as administration of dexmedetomidine, which has been shown to have anti-allodynic properties. Although this approach has been successful in managing a retroperitoneal nephrectomy, it is unclear if it would be as effective for transperitoneal nephrectomy. The potential that this approach may hold for significantly improving postoperative pain control in this patient population warrants further investigation.

References

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