TTP Blocks Combined With Rectus Sheath Blocks As Part Of Enhanced Recovery After Cardiac Surgery For The Bentall Procedure: A Case Report

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Figures

Fig 1. Staged photograph showing transducer and needle orientation during transversus thoracic muscle plane block.

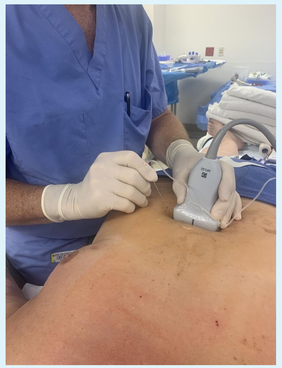

Fig 2. Staged photograph showing transducer and needle orientation during rectus sheath block.

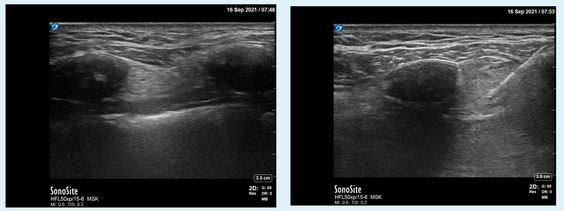

Fig 3. Transverse ultrasound image between the fourth and fifth ribs parasagittal to the sternum. At the lateral edge of the sternum each muscle layer, the pectoralis major, internal intercostal, and transversus thoracic muscle are shown. Fig 3a illustrates anatomy prior to nerve block, Fig 3b illustrates local anesthetic deposition after block

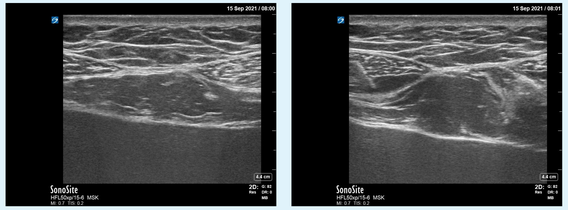

Fig 4. Transverse ultrasound image illustrating the rectus abdominis muscle, posterior layer of the rectus sheath, and peritoneum. Fig 4a illustrates anatomy prior to nerve block, Fig 4b illustrates local anesthetic deposition after block

Introduction

Composite graft replacement of the ascending aorta and aortic valve with concomitant reimplantation of the coronary arteries was first introduced by Bentall and Debono in 1968, and has been proven to be the gold standard in the treatment of patients with aortic root diseases such as (1) ascending aortic aneurysm disease associated with aortic valvular disease, (2) acute and chronic aortic dissection, (3) cystic medial necrosis, and (4) Marfan's syndrome. Perioperative pain management after cardiac surgery has traditionally been accomplished with liberal use of potent narcotics. Fascial plane blocks can help to decrease opioid consumption, improve patient pain scores, decrease duration of hospitalization, and thus may be be useful in minimizing pain after the Bentall procedure. We present a case in which transversus thoracic plane (TTPB) and rectus sheath blocks (RSB) were used to minimize opioid requirements after the Bentall procedure.

Case Report

A 62-year old 129-kg man with significant past medical history including hypertension paroxysmal atrial fibrillation and aortic valve replacement, presented for a reoperative Bentall procedure. Of note, the patient related severe intolerance to long-acting opioids with nausea to morphine. His physical examination was notable for a robust body habitus and a murmur consistent with aortic insufficiency. After a thorough discussion, the patient consented to both bilateral transversus thoracic plane blocks (TTPB) and rectus sheath blocks (RSB) as part of his enhanced recovery after cardiac surgery (ERAS-C) multimodal pain management plan.

The patient received gabapentin 600 mg and acetaminophen 975 mg preoperatively one hour before surgery. General anesthesia was induced with etomidate 20 mg, midazolam 2 mg, fentanyl 250 mg and cisatracurium 20 mg.

Bilateral TTPB were performed at the T4 level. After chlorhexidine 4% prep, the ultrasound probe was positioned in a parasagittal orientation to obtain a parasternal view (Figure 1).

Case Report (continued)

The ribs were identified as hyperechoic structures with acoustic shadowing below. The block needle was inserted in a cranial-to-caudal direction using the in-plane technique. When the needle tip was positioned just below the intercostal muscle, the correct tip position was confirmed by the visualization of linear fluid spreading in the myofascial plane between the transversus thoracic and internal intercostal muscles. (Figure 3). Twenty milliliters of 0.25% bupivacaine with 5 mg dexamethasone was injected in 5 ml aliquots. This procedure was repeated on the opposite side for a total of 40 ml of local anesthetic.

Bilateral RSB were performed at the subxiphoid level. After chlorhexidine 4% prep, the ultrasound probe was positioned in a transverse orientation with slight caudal tilt to visualize the rectus abdominus muscle. (Figure 2). The block needle was inserted in a lateral-to-medial direction using the in-plane technique. When the needle tip was positioned just below the rectus abdominus muscle, the correct tip position was confirmed by the visualization of linear fluid spreading in the myofascial plane just below the posterior layer of the rectus sheath. (Figure 4). Ten milliliters of 0.25% bupivicane with 10 mL of 1.3% liposomal bupivicaine were injected in 5 ml aliquots. This procedure was repeated on the opposite side for a total of 40 ml of local anesthetic.

All blocks were performed with Ultrasound-guidance using a linear array ultrasonography 8-13 Hz probe (HFL38x, M-Turbo; SonoSite, Bothwell, WA) and 50-mm 22-gauge Stimulplex needle (B-Braun, Melsungen, Germany).

Anesthesia was maintained with sevoflurane and cisatracurium 2 mcg/kg/min. An additional 1250 mcg of fentanyl was administered in divided doses as needed in the pre-bypass and bypass periods. No fentanyl was required in the post-bypass period. The patient was transferred to the ICU and extubated 2 hours after surgery. Postoperative narcotic requirements consisted of one dose of hydromorphone 1 mg IV, 8 hours after surgery, and one dose of oxycodone 5 mg PO 34 hours after surgery. Acetaminophen 650 mg PO q6 hrs for 72 hours and gabapentin 300 mg PO twice daily were given per protocol. The patient made an unremarkable recovery and was discharged home on post op day five.

Discussion

In this case report, a single-shot injection provided analgesia at multiple intercostal levels due to the cranial-caudal spread of local anesthetic. Liposomal bupivicaine was utilized to provide extended analgesia at the site of chest tube insertion. RSB is safe because the needle remains distant from the neuraxis, pleura, major vessels, and nerves at all times. While the potential risk of pneumothorax and internal mammary artery injury does exist during TTPB, we did not observe this adverse event clinically. It is important to note that this anesthetic regimen included preemptive analgesic administration of gabapentin and acetaminophen which also may have decreased the patient's intraoperative and postoperative opioid requirements.

Conclusion

Combined regional anesthesia techniques may be underutilized in this patient population, and increased usage may provide significant benefits for both patient morbidity and satisfaction. In this particular patient, the combination of intraoperative conduction blockade with TTPB and RSB, administration of anti-inflammatory agents, and modulation of nociceptive processing may explain the robust analgesic effect observed in this case report. The potential that this multimodal anesthetic approach may hold for significantly improving postoperative pain control in this patient population warrants further investigation.

References

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