Regional Anesthesia For Open Abdomen Aortic Aneurysm Repair

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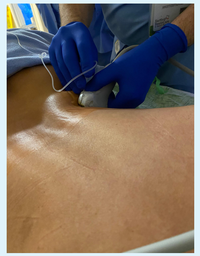
Figures



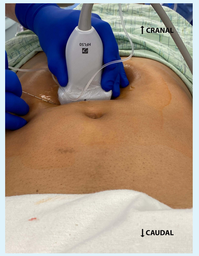
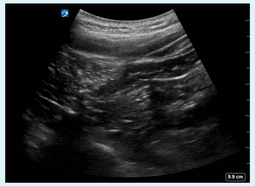
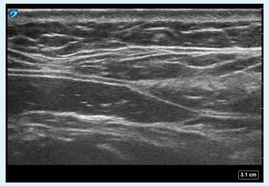
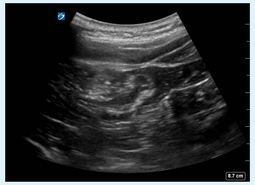
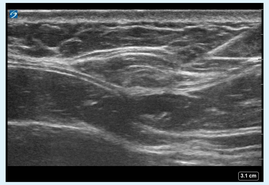


Figure 1/Figure 2: Staged photograph showing transducer and needle orientation during QL block/ rectus sheath block.
Figure 3: Staged photograph showing the surgical field with extensive surgical incision during the open abdominal aortic aneurysm repair.









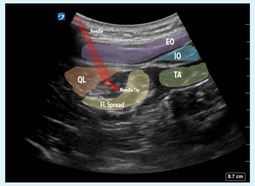


Figure 4a/b/c: Ultrasound imaging before and during rectus sheath block. Figure 5c shows anatomy and fluid spread with false color overlay. (Abbreviations: EO - External Oblique, IO - Internal Oblique, TA - Transverse Abdominus, QL - Quadratus Lubmorum)

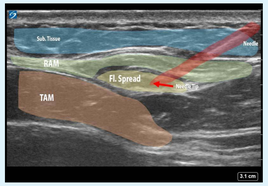


Figure 5a/b/c: Ultrasound imaging before and during QL block. Figure 4c shows anatomy and fluid spread with false color overlay. (Abbreviations: RAM - Rectus Abdomiucs Muscle, TAM - Transversus Abdominus Muscle

Introduction

Prior to the introduction of endovascular aneurysm repair (EVAR), open abdominal aortic aneurysm (AAA) repair was the standard of care when surgical intervention was required. Now, EVAR has become the preferred approach, as it is associated with a significant reduction in perioperative mortality. However, open AAA repairs are still performed in situations where EVAR is not feasible, such as unfavorable anatomy, aortic thrombosis and aortic rupture. An open AAA repair involves a large abdominal incision to directly access the aorta, which makes postoperative pain control a significant concern. Thoracic epidural analgesia is an excellent option and has been shown to reduce the incidence of respiratory failure and ICU length of stay compared to systemic opioids. Potential challenges with thoracic epidurals include associated hypotension, coagulation management and difficulty with placement. Alternatives to epidural include spinal morphine and peripheral nerve blockade.

Here, we report the successful use of bilateral quadratus lumborum (QL) blocks and rectus sheath blocks for postoperative analgesia in a patient undergoing open AAA repair.

Case Description

A 46-year-old male, 69 kg (BMI 26) diagnosed with a 5.3 x 5.2 cm infrarenal AAA without rupture presented for an open AAA repair. Past medical history was unremarkable except for vascular disease. Preoperative TTE showed normal left ventricular ejection fraction 60-65%, normal RV function, and no significant structural or valvular abnormalities. Exercise stress test was negative for any evidence of ischemia. After discussion with the patient and surgeon, plan was made for general endotracheal anesthesia with bilateral quadratus lumborum and bilateral rectus sheath blocks.

Prior to the initiation of general anesthesia, the patient was placed in the prone position to facilitate QL block placement. The patient's lateral abdominal wall was prepared with chlorhexidine. A SonoSite X-Porte HFL50xp 15-6 Mhz linear ultrasound probe (Sonosite, Bothell WA) was placed in the transverse plane superior to the iliac crest. The shamrock sign was visualized. Using the transmuscular approach, a 22 gauge, 4 in Stimuplex needle (B-Braun, Melsungen, Germany) was advanced. A mixture of 20 mL 0.25% bupivacaine and 10 mL liposomal bupivacaine 1.3% was used. 20 mL was deposited with negative aspiration between the QL and psoas major muscles.

Case Description (continued)

The needle was then withdrawn until positioned between the QL and external oblique muscles, where the remaining 10 mL was deposited. The same technique was repeated on the right. There were no apparent complications and no ultrasound evidence of vascular puncture, intraperitoneal puncture or intraneural injection.

The patient was then positioned supine, and general anesthesia was induced using propofol and rocuronium. An arterial line and a right IJ central line were inserted post-induction. Bilateral rectus sheath blocks were then placed using ultrasound guidance and sterile technique. The ultrasound transducer was positioned transverse on the abdomen, superior and lateral to the umbilicus. The needle was advanced first to the posterior aspect of the rectus sheath, and 15 mL of the bupivicaine anesthetic was deposited. The needle was then slightly withdrawn until it was visualized at the anterior aspect of the rectus sheath, and an additional 5 mL of the bupivicaine anesthetic was deposited. The process was repeated on the opposite side.

Anesthesia was maintained with sevoflurane, rocuronium, dexmedetomidine ranging from 0.3-0.8 mcg/kg/hr, and remifentanil ranging from 0.05-0.08 mcg/kg/min. A nitroglycerin infusion was utilized as needed, ranging from 10-20mcg/min. The intraoperative course was unremarkable. The patient was extubated and transferred to the post-anesthesia care unit (PACU). Intraoperatively and in the PACU, he required no additional narcotics

Postoperatively, pain was well controlled with scheduled IV then oral acetaminophen Time to first IV narcotic on postoperative day one was 26 hours after initiation of block. The table below summarizes the patient's postoperative pain scores and opioid consumption.

Postop Day	Pain Score	Opioid Consumption	MEQ	Cumulative MEQ
0	3	None	0	0
1	5	2 mg morphine IV x 4	8	8
2	3	2 mg morphine IV x 3	6	14
3	1	None	0	14

Discussion

In this case, we successfully used bilateral QL and rectus sheath blocks to provide postoperative analgesia for a patient undergoing open AAA repair. QL blocks produce a broad distribution of local anesthetic and in most cases provide both somatic and visceral analgesia along the T7-L1 dermatomes. The QL block has a very good adverse effect profile due to its posterior location along the abdominal wall, which provides distance from the peritoneum, viscera and nearby vascular structures.

In order to prolong the duration of postoperative analgesia, liposomal bupivacaine was added to the local anesthetic mixture. Furthermore, bilateral rectus sheath blocks were performed in order to provide adequate analgesia along the incision line. Also worth noting, dexmedetomidine was included in our multimodal anesthetic regimen, which may have decreased the patient's opioid requirements and facilitated recovery following the surgery.

US-guided QL blocks can be considered an effective regional anesthesia technique for large abdominal surgeries like open AAA repair, especially when neuraxial techniques are not feasible. Further research investigating the best approach tailored to specific surgery and safety against other modalities is recommended.

Acknowledgements & References

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