Bilateral Continuous Quadratus Lumborum Block for Acute Postoperative Abdominal Pain as a Rescue After Opioid-Induced Respiratory Depression

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We present a case of acute postoperative abdominal pain after proctosigmoidectomy and colorectal anastomosis that was treated by bilateral continuous quadratus lumborum block. The block was performed in the lateral position under ultrasound guidance with a 15-mL bolus of 0.5% bupivacaine injected anterior to the quadratus lumborum muscle followed by bilateral catheter placement. Each catheter received a continuous infusion of 0.1% bupivacaine at 8 mL/h and an on-demand bolus 5 mL every 30 minutes. Sensory level was confirmed by insensitivity to cold from T7 through T12. The block was devoid of hemodynamic side effects or motor weakness. This case demonstrates that bilateral continuous quadratus lumborum catheters can provide extended postoperative pain control. (A&A Case Reports. 2015;5:107–11.)

Pain is common after major abdominal surgeries. Uncontrolled postoperative pain increases the incidence of postoperative complications. Multimodal analgesia can improve pain control in the postoperative period and reduces complications that may arise from using a single mode of analgesia. For example, reliance on opioid analgesia increases the incidence of adverse effects of opioids including pruritus, nausea, and vomiting, as well as respiratory depression.

The true incidence of respiratory depression varies in different studies. Non-obstetric studies report an incidence of respiratory depression with neuraxial opioids in 0.01% to 7% of patients. The incidence of respiratory depression after systemic opioid administered by IV patient-controlled analgesia (PCA) was reported to be 1.2%, 1.26%, and 1.97% in 3 different studies.

Effective regional anesthesia techniques for abdominal surgery include epidural analgesia, paravertebral block, and transversus abdominis plane (TAP) block. Multiple approaches have been used for TAP blocks including the commonly used ultrasound-guided midaxillary approach. TAP block provides analgesia mainly in T10-L2 dermatomes. TAP blocks are sometimes patchy with variable wound coverage. The use of an ultrasound-guided approach at the level of the quadratus lumborum muscle is new and may provide wider spread of local anesthetic (T5-L1) than TAP blocks, and hence better analgesia. The patient gave verbal permission for the authors to publish the report.

CASE DESCRIPTION

A 50-year-old man, weighing 95 kg, with a medical history of anxiety, prostate cancer, prostatectomy, and rectal cancer was admitted to the hospital for anterior proctosigmoidectomy and low colorectal anastomosis through a midline longitudinal incision. Epidural analgesia was suggested; however, the surgical team preferred to use IV PCA for postoperative pain to avoid possible hemodynamic side effects of the epidural. After uneventful surgery, the patient received IV hydromorphone in the postanesthesia care unit for pain management. Hydromorphone PCA was initiated and set at 0 mg basal, 0.3 mg bolus with a 6-minute lockout interval, total 3 mg/h. After achieving an acceptable level of pain control, the patient was transferred to the floor. Per institutional protocol, the patient received 2L/min nasal oxygen. Nurse monitoring included respiratory rate and sedation score every 1 hour for the first 2 hours after initiation of hydromorphone PCA, then every 4 hours. In addition, he was monitored with continuous pulse oximetry.

On the first postoperative day, the patient complained of increased abdominal pain and required supplemental hydromorphone (total additional 1.2 mg in 3 divided doses). Although still receiving nasal oxygen, the patient developed respiratory failure requiring intervention by the Acute Medical Emergency team. He was unresponsive, apneic, with oxygen saturation in the 50s. He had strong palpable pulses and adequate arterial blood pressure. His airway was secured by nasal airway insertion and bag-mask ventilation, which promptly increased his oxygen saturation to the 90s. A 12-lead electrocardiogram did not show any acute ST/T wave changes. Naloxone IV was given in 2 doses of 0.4 mg each. The patient awoke and followed commands. He was able to maintain adequate respiratory effort and 99% oxygen saturation with a 100% nonbreathing mask.

With reversal of opioid analgesia, the patient complained of excruciating abdominal pain, which was managed by IV acetaminophen and IV ketorolac. The IV hydromorphone PCA was discontinued. The pain management team was consulted. The surgical team still preferred to avoid a thoracic epidural if possible. Therefore, we considered bilateral continuous quadratus lumborum blocks.
After obtaining informed consent, the patient was transferred to the induction room. He was connected to a pulse oximeter and electrocardiograph. Noninvasive arterial blood pressure was measured every 3 minutes. The patient was placed in a lateral position (Fig. 1). Using routine aseptic technique, a high-frequency (6–12 MHz) linear ultrasound transducer probe in a sterile cover (Venue 40, GE Healthcare, Waukesha, WI) was placed horizontally between the coastal margin and the iliac crest. The 3 muscle layers of the abdominal wall were identified: external oblique, internal oblique, and transversus abdominis muscles (Fig. 2). The fascia surrounding the transversus abdominis muscle was tracked posteriorly to its origin, where the transversus abdominis muscle merges with the thoracolumbar fascia surrounding the quadratus lumborum muscle (Fig. 3). A 17G 3-inch-long nonstimulating echogenic needle (Plexus FlexBlock, ARROW, Reading, PA) was inserted in-plane with the ultrasound probe and targeted toward the fascia transversalis. Normal saline 3 mL was used to identify the splitting of the fascia. We injected 10 mL bupivacaine 0.5% in the same plane after negative aspiration. This was seen spreading around the quadratus lumborum muscle (Figs. 4 and 5). A 19G (1.1-mm diameter × 60 cm) echogenic styletted peripheral nerve catheter (Plexus FlexBlock, ARROW) was advanced 5 cm beyond the tip of the needle with minimal resistance, and another 5 mL bupivacaine 0.5% was injected to confirm the appropriate location of the catheter tip within the quadratus lumborum fascial plane.

The procedure was repeated on the other side after placing the patient in the opposite lateral position. We injected a total of 15 mL bupivacaine 0.5% on each side. Within 15 minutes, the patient reported pain as mild to none, with a pain score ranging between 2 and 3 (on a numeric rating scale 0–10). After the initial bolus, the patient was unable to feel cold in the upper, middle, and lower abdomen bilaterally. Both catheters were connected to the patient-controlled infusion pumps with 0.1% ropivacaine at a basal rate of 8 mL/h each and an on-demand bolus of 5 mL every 30 minutes.

Daily patient examination revealed sensory level T7-L1 bilaterally, while the infusion was running. The catheters remained in place for 7 days. For the first 4 days, the patient reported no pain. There were no significant changes in his hemodynamics nor was there any weakness or difficulty with ambulation. On postoperative day 5, the patient started...
an oral diet and began to take oral oxycodone tablets and slowly transitioned to an oral regimen. The catheters were removed on postoperative day 7, and he was discharged to home. The length of stay was dictated by the surgical plans, unrelated to pain management.

**DISCUSSION**

Untreated pain can lead to increased patient stress and dissatisfaction, in addition to other cardiopulmonary complications and slower recovery.¹² There are many approaches to pain control after abdominal and colorectal surgeries. Epidural analgesia is associated with a shorter duration of postoperative ileus, attenuation of stress response, fewer pulmonary complications, and improved postoperative pain control and recovery.¹²

Thoracic paravertebral block has been used as an alternative to an epidural providing analgesia for different indications. Blind and ultrasound-guided techniques have been described with various success and complication rates. It is still considered a neuraxial block with comparable side effects to an epidural.¹³

TAP block is a simple alternative after abdominal surgery, with the advantage of lacking the sympathetic effects of neuraxial anesthesia. In one study, TAP blocks were shown to provide better analgesia and reduce opioid requirements when compared with a control group receiving morphine PCA, nonsteroidal antiinflammatory drugs, and acetaminophen.¹⁴

The extent of analgesia provided by the TAP block depends on the site of injection and pattern of spread within the plane. Currently, there are a number of ultrasound-guided approaches in use, including an anterior oblique subcostal approach, a midaxillary approach, and a more recently proposed posterior approach.⁹–¹¹ Studies have not yet definitely identified the appropriate local anesthetic

![Figure 4. Local anesthetic spreading around the QL muscle. FT = fascia transversalis; IO = internal oblique muscle; LA = local anesthetic; QL = quadratus lumborum.](image)

![Figure 5. Cross-sectional view showing the tip of the needle in relation to the back muscles.](image)
Table 1. Truncal Blocks for Abdominal Surgery

<table>
<thead>
<tr>
<th>Subcostal TAP</th>
<th>Classical TAP</th>
<th>QL</th>
<th>Paravertebral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical indications</td>
<td>Abdominal surgery above umbilicus e.g., Cholecystectomy</td>
<td>Abdominal surgery below umbilicus e.g., large bowel resections, open/laparoscopic appendectomy, cesarean delivery, renal transplant surgery, abdominoplasty</td>
<td>Abdominal surgery either above or below the umbilicus e.g., Cesarean delivery and lower abdominal operations, abdominoplasty</td>
</tr>
<tr>
<td>Dermatomes covered</td>
<td>T6-T9</td>
<td>T10-L2</td>
<td>T6-L1</td>
</tr>
<tr>
<td>Lower extremity weakness</td>
<td>No</td>
<td>Had been reported</td>
<td>Possible</td>
</tr>
<tr>
<td>Level performed or site of needle entry</td>
<td>Just below the coastal margin midclavicular line</td>
<td>Anterior axillary line below the coastal margin and above the iliac crest</td>
<td>Lateral abdomen near the posterior axillary line, below the coastal margin and above the iliac crest</td>
</tr>
<tr>
<td>Plane of injection</td>
<td>Plane between the RA muscle and the TA muscle</td>
<td>TA plane between the internal oblique and the TA near the midaxillary line</td>
<td>Potential space medial to the abdominal wall muscles and lateral to QL muscle. Optimal site is still investigational</td>
</tr>
<tr>
<td>Complications</td>
<td>Potential injury to pleura liver and spleen</td>
<td>Muscle hematoma, Bowel injury</td>
<td>Muscle hematoma, kidney injury</td>
</tr>
<tr>
<td></td>
<td>No hypotension nor urinary retention</td>
<td>No hypotension nor urinary retention</td>
<td>No hypotension nor urinary retention</td>
</tr>
</tbody>
</table>

QL = quadratus lumborum; RA = rectus abdominis; TA = transversus abdominis muscle; TAP = transversus abdominis plane.


References
