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QUADRATUS LUMBORUM BLOCK

Surgical Specialty:	Regional Anesthesia
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Background:

- General Considerations
    - Truncal nerve blocks have fewer contraindications than neuraxial blocks and can provide analgesia for similar procedures.
    - The quadratus lumborum (QL) block is a truncal fascial plane block targeting the thoracolumbar nerves similar to the Transversus Abdominis Plane (TAP) block and can be implemented using similar techniques.
    - The QL block is more consistent and has less variation in local anesthetic spread, resulting in more extensive analgesia than the TAP block due to its proximity to the origin of the segmental nerves and the spread through tissue layers (cephalad and paravertebral spread have been reported).
    - There is limited evidence for efficacy and postsurgical outcomes with QL blocks when compared to the TAP block.
    - A greater ultrasonic depth and less defined tissue planes may be encountered in obese patients.
    - The QL block can be done with and without a nerve stimulator, but an ultrasound probe is necessary.
    - Local anesthetic deposition can be at the anterior (QL3), lateral (QL1), or posterior (QL2) aspects of the quadratus lumborum muscle.
- Patient Considerations
    - The QL block should be considered in patients with abdominal procedures or those requiring post-operative pain relief in T7-L2 dermatomes.
    - QL block with a catheter has a lower toxicity risk than an epidural catheter. Additionally, motor blockade is less likely than an epidural catheter.
    - The QL block is useful for abdominal procedures (urology, gynecology, and general surgery) when neuraxial anesthesia is not indicated or is contraindicated.
- Associated Comorbidities/Syndromes
        - No specific associated comorbidities/syndromes

Anesthetic Planning:

- Pre-Anesthetic Evaluation
    - Physical examination should be focused on recognizing abnormal anatomy around the iliac crest and lumbosacral region.

  - Although no additional lab work is required, history should be focused on ruling out bleeding diathesis.
  - Monitors:
    - Standard American Society of Anesthesiologists (ASA) monitors can help with the detection and prompt treatment of Local Anesthetic Systemic Toxicity (LAST).
  - Equipment and medications required for resuscitation and treatment should a life-threatening emergency occur (LAST, hemorrhage, allergic reaction).
  - Discussions to have with surgeon/family
    - Intramuscular psoas injection can occur which can potentially lead to some quadriceps weakness.
- Specific or Unique Room Set-up Requirements
  - Airway
    - Equipment for respiratory support and/or intubation should respiratory depression (LAST) occur.
  - Drugs/Infusions
    - Lidocaine 1% for skin numbing if block is performed in an awake/sedated patient.
    - Single shot: ropivacaine 0.2% (2-4mg/kg max dose; can be divided into 1-2 mg/kg per side if doing bilateral QL blocks)
      - Single-dose ropivacaine will have an intermediate onset of action and a three to ten-hour duration of action.
    - Continuous infusion of LA can be started after a single shot with ropivacaine 0.2% at 0.3 mg/kg/hr.
    - Ropivacaine should not be used in patients with allergy to amide local anesthetics.
    - Intralipid® 20% (As per LAST protocol)
  - Monitors
    - Standard ASA monitors for all patients, regardless of the level of consciousness at the time of the block.
  - Equipment
    - Stimuplex® 22g x 2-inch needle, with or without nerve stimulator, but needle size is patient-dependent.
    - Sterile skin-prep solution, marking pen, drape, gauze, ultrasound gel, hypodermic needle for infiltration.
    - A high-frequency linear ultrasound probe can be used, with a low-frequency curvilinear probe recommended for those with significant subcutaneous tissue.
  - Other Indicated Resources
    - Easy access to resuscitative equipment and medications, as required for other nerve blocks.

Intraoperative Considerations:

- General
  - A spontaneously breathing, awake patient may require lidocaine for Stimuplex® needle insertion.
  - A ventilated, anesthetized patient should still be vigilantly monitored for signs of LAST (ECG/hemodynamic changes).
- Sedation/anesthesia

  - A QL block can be done under sedation or general anesthesia prior to surgery or after surgical closure.
- Patient positioning
  - Lateral decubitus position with the upper hip flexed or semi-lateral position with a pillow or blanket placed under the ipsilateral hip is suitable for bilateral QL blocks, with the operator facing the spine patient.
  - As always, careful positioning of a patient under general anesthesia is critical.
- Procedure
  - After prepping and draping the skin, the transducer should be placed in a transverse orientation adjacent to the iliac crest in the midaxillary line.
  - Start placing the ultrasound in the midaxillary line between the rib and the iliac crest until the three muscles of the TAP block are identified (external oblique, internal oblique, and transversus abdominis) (Figure 1).
  - The QL is identified as a dark oval-shaped muscle medial and posterior to the hyperechoic fascial layer of the TAP muscles.
  - The probe should then be moved posteriorly and aimed obliquely until the erector spinae (ES) muscle adjacent to the vertebral transverse process (TP), psoas major (PM), and quadratus lumborum, latissimus dorsi (LD) muscles are identified.
  - The latissimus dorsi can be identified superficial and lateral to the QL.
  - The psoas muscle should be identified deep and anterior to the QL.
  - The transverse process of the lumbar spine is identified as a dark shadow, and the QL is attached to its lateral tip.
  - The QL should be positioned in the middle of the screen.
  - The needle is inserted posterior to the probe, in-plane, and in a posterior-to-anterior trajectory.
  - For the QL3 (anterior or trans-muscular approach), local anesthetic is deposited in the fascial plane between the QL and the PM. The anterior QL block should be used if higher coverage (to T7) is desired (Figure 2). A curvilinear probe may be helpful for a trans-muscular QL approach.
  - For the QL1 (lateral), the needle is advanced in an anterior-to-posterior position, and the local anesthetic is deposited at the anterolateral aspect of the QL deep to the thoracolumbar fascia and superficial to the transversalis fascia.
  - For the QL2 (posterior), the needle is advanced dorsal (shallow) to the QL, and local anesthetic is deposited adjacent to the QL, ES, and LD posterior to the middle layer of the thoracolumbar fascia.
- Complications
  - Block failure, inadvertent intraperitoneal injection, intravascular injection, and bruising.

Images

Figure 1: Please add table legend

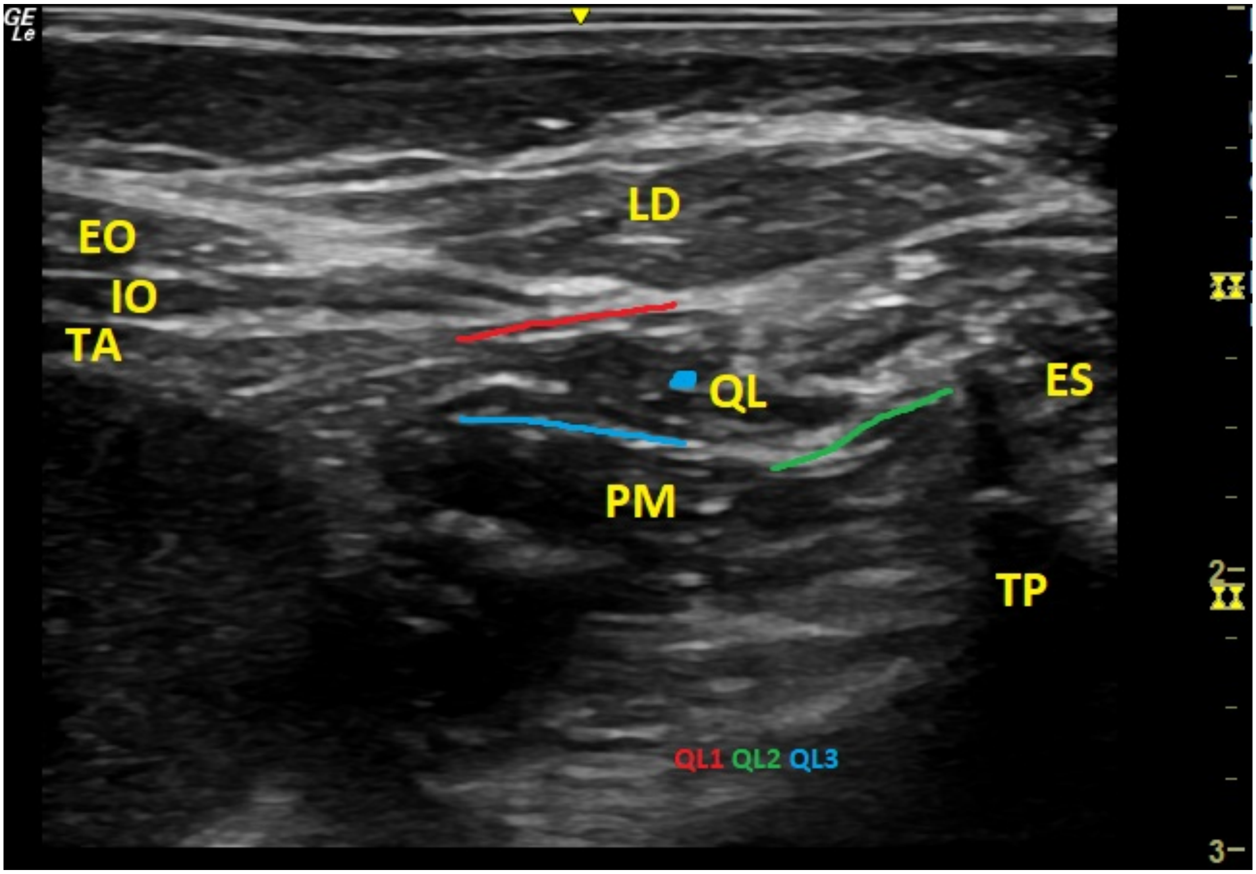

Figure 2: Ultrasound image of muscles identified in quadratus lumborum block, and local anesthetic injection sites for QL1, QL2, and QL3.

EO=external oblique, IO=internal oblique, TA=transverse abdominis, LD=latissimus dorsi, QL=quadratus lumborum, PM=psoas major, ES=erector spinae, TP=vertebral transverse process

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