Regional Anesthesia Update 2014

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Disclosures
I have no commercial conflicts of interest

Objectives
1. Discuss the clinical applications and potential future directions of liposomal bupivacaine
2. Review the current literature regarding dexmedetomidine and regional anesthesia
3. Discuss the implications of regional anesthesia in patients with documented or suspected obstructive sleep apnea
4. Compare the effects of adductor canal blockade versus femoral nerve blockade in the management of patients undergoing total knee arthroplasty
5. Recognize the novel anticoagulants in clinical use and discuss the recent and potential modifications to the ASRA consensus guidelines concerning regional anesthesia and anticoagulation

Do Peripheral Nerve Blocks Last Long Enough?

Are Patients Satisfied After Peripheral Nerve Blockade? Results From an International Registry of Regional Anesthesia


Physical complaints were common, especially pain after surgery and particularly pain after (peripheral nerve block) recension. Moderate or severe complaints of motor weakness were associated with unwillingness to undergo repeat PNB. Patients who reported severe symptoms in response to any of the questions in the pain domain were less willing to undergo repeat PNB

Peripheral Nerve Catheter
Catheter-Over-Needle (Pajunk)

Perineural Catheter Toxicity

Serum Free Ropivacaine Concentrations Among Patients Receiving Continuous Peripheral Nerve Block Catheters: Is It Safe for Long-Term Infusions?
Lisa Blackmer, MD,* Alba Scola, MD,⁎†, Gader S. Flotta, BS,⁎†, Robert Howard, MA,⁎†, Carola E. Morris, BS,⁎‡, and Chester C. Budziszek, MD,⁎§

CONCLUSIONS: In this study, free serum ropivacaine concentrations remained well below toxic values despite large amounts of drug administration in combusted-wound patients. The administration of continuous ropivacaine infusions over prolonged time periods, coupled with usual dose drug delivery, did not produce toxic or near-toxic serum concentrations. (Anesth Analg 2013;116:225-30.

Pediatric Ambulatory Perineural Catheters

Ambulatory Continuous Peripheral Nerve Blocks in Children and Adolescents: A Longitudinal 8-Year Single Center Study
Elisa de Camargo MA, BM, MPH,† E. Roschen Comece MA, BM,† Lynne Maxwel, MA,† Melissa T. Molsky, MD,† Laura Schleien MA, BM, and Alunan Sarhadi, ABMS

Perineural Catheter Dislocation

Dislocation rates of perineural catheters: a volunteer study
D. Manzoni1,2,°, M. Manzoni1, L. Welker1, M. Schubart1, M. Ewig1 and M. Zeitzig1

RESULTS: We observed an overall dislocation rate of 12% (17/138) for interscalene catheters, 26% for femoral nerve catheters and a significant correlation between time and rate of dislocations (r=0.99, P=0.001). US visualization of the spread of fluid was possible in all cases.
Liposomal Bupivacaine (Exparel®)

- DepoFoam®
  - Multivesicular spherical lipid particles in a honeycomb formation
  - Aqueous center containing encapsulated drug
  - Same delivery system as DepoDur®

- Approved only for surgical site infiltration
  - Contraindicated for paracervical blocks
  - Phase 2 and 3 trials for peripheral nerve blocks
Liposomal Bupivacaine: Femoral Block

Liposomal Bupivacaine: Ankle Block

Epidural Liposomal Bupivacaine: Motor Blockade

Epidural Liposomal Bupivacaine: Sensory Blockade

Liposomal Bupivacaine Systemic Toxicity

Toxicity of Bupivacaine Encapsulated into Liposomes and Injected Intravenously: Comparison with Plain Solutions

- Ciarallo, Christopher, MD, FAAP Regional Anesthesia Update 2014

- Slow infusion of liposomal bupivacaine titrated to toxicity required larger doses
- No bolus, no temporal evaluation, no attempts at resuscitation
- Not using proprietary DepoFoam®
Liposomal Bupivacaine Local Toxicity

Research Article

The Safety of EXPAREL® (Bupivacaine Liposome Injectable Suspension) Administered by Peripheral Nerve Block in Rabbits and Dogs

In conclusion, a single administration of EXPAREL was demonstrated to be safe by peripheral nerve block in rabbits and dogs when tested in comparison with bupivacaine HCl and saline. EXPAREL did not cause overt irritation or local tissue damage even when injected at high dose or concentration around the brachial plexus nerves bundle.

Bupivacaine did not impact directly on neural tissue, and the findings of granulomatous inflammation were more consistent with a nonspecific foreign—body type reaction most likely mediated by the DepoFoam particles.

OSA and Neuraxial Anesthesia

Sleep Apnea and Total Joint Arthroplasty under Various Types of Anesthesia

A Population-Based Study of Perioperative Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Combined (N=206)</th>
<th>General (N=395)</th>
<th>95% CI</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined complications</td>
<td>0.33 (0.21-0.5)</td>
<td>0.69</td>
<td>0.05</td>
<td>0.209</td>
</tr>
<tr>
<td>Pulmonary complications</td>
<td>0.29 (0.12-0.5)</td>
<td>0.48</td>
<td>0.13</td>
<td>0.229</td>
</tr>
<tr>
<td>Cardiac complications</td>
<td>0.08 (0.02-0.5)</td>
<td>0.16</td>
<td>0.05</td>
<td>0.209</td>
</tr>
<tr>
<td>Blood transfusion</td>
<td>0.13 (0.03-0.5)</td>
<td>0.17</td>
<td>0.05</td>
<td>0.209</td>
</tr>
<tr>
<td>Other complications</td>
<td>0.13 (0.03-0.5)</td>
<td>0.17</td>
<td>0.05</td>
<td>0.209</td>
</tr>
<tr>
<td>Mortality rate</td>
<td>0.08 (0.02-0.5)</td>
<td>0.16</td>
<td>0.05</td>
<td>0.209</td>
</tr>
</tbody>
</table>

Therefore, in order to reduce phrenic nerve involvement after ISB, the following essential points are suggested:

1. Ultrasound guidance;
2. A low volume of local anesthetic on initial injection and low-volume continuous perfusion;
3. Injection through the catheter;
4. Needle and catheter placement at the C7 root.

OSA and Neuraxial Anesthesia

Obesity and Interscalene PNB

Review Article

Review of interscalene block for postoperative analgesia after shoulder surgery in obese patients

There are neither evidence-based data nor studies on the use of ISB for postoperative analgesia after shoulder surgery in the obese population. However, the overall consensus supports the concept of multimodal analgesia and the preferential use of regional anesthetic technique.
“painful ambulatory surgery may not be suitable if postoperative pain relief cannot be predominantly provided with nonopioid analgesic techniques. Local/regional analgesia, acetaminophen, and nonsteroidal anti-inflammatory drugs or cyclooxygenase-2 specific inhibitors should be used as primary analgesic techniques.”

“the potential risks can last for several days after surgery”

“Patients who undergo surgery under regional anesthesia should have the regional anesthetic continued into the PAR and beyond if possible. Other patients should be evaluated for placement of regional analgesia for postoperative pain control.”

“The literature is insufficient to evaluate outcomes associated with postoperative peripheral regional versus systemic analgesic techniques on patients with OSA.”
Interventional Pain Techniques

Assessment of Bleeding Risk of Interventional Techniques: A Best Evidence Synthesis of Practice Patterns and Perioperative Management of Anticoagulant and Antithrombotic Therapy

**Recommendations:** The recommendations derived from the best evidence assessment of the literature and guidelines are as follows:

- **Unfractionated Heparin (IV):**
  - Time from last medication dose to neuraxial block: 4 hours
  - Time from neuraxial block to subsequent medication dose: Immediate
  - Pharmacologic reversibility: None
  - Lab monitoring: APTT

- **Unfractionated Heparin (SQ):**
  - Suggest block first, possible risk at 1-2 hours
  - Immediate Immediate Immediate Protamine No

- **Low-molecular weight heparin (daily prophylaxis):**
  - 10-12 hours
  - Not recommended

- **Low-molecular weight heparin (twice daily prophylaxis):**
  - 24 hours
  - Not recommended

- **Warfarin:**
  - CHRONIC: 4-5 days
  - INITIATING: <24 hours

- **Aspirin:**
  - Immediate
  - 7 days?

- **NSAIDS + heparin/warfarin:**
  - Not recommended

- **Thienopyridines:**
  - CLOPIDOGREL: 7 days or 5 with normal platelet function
  - TICLOPIDINE: 14 days
  - PRASUGREL: likely 7 days

- **Glycoprotein IIb/IIIa Receptor Antagonists:**
  - EPTIFIBATIDE: 8 days
  - TIROFIBAN: 8 days
  - ABCIXIMAB: 24-48 hours

- **Fibrinolytic/Thrombolytic Medication:**
  - 10 days

- **Fondaparinux:**
  - Not recommended

- **Direct Thrombin Inhibitors:**
  - Not recommended

- **Dabigatran Etexilate:**
  - 48-84 hours

- **Rivaroxaban:**
  - 24 hours

- **Herbals:**
  - Immediate

**Table 1:** Headache as a consequence of treatment with anticoagulants. "We have been unable to obtain data for dabigatran, rivaroxaban, and apixaban. For those drugs, we have recommended a PO load of 150 mg, followed by maintenance doses of 150 mg every 12 hours, 200 mg every 12 hours, and 150 mg every 12 hours, respectively.

**Figure 1:** Anticoagulants – Half Lives

**Figure 2:** Anticoagulants – Lab Monitoring

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**Spinal Epidural Hematoma After Spinal Cord Stimulator Trial Lead Placement in a Patient Taking Aspirin**

**Epidural Hematomas After Removal of Percutaneous Spinal Cord Stimulator Trials: Two Case Reports**