Talking Points:
Outcomes Are Improved

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The contents of the following presentation are solely the responsibility of the speaker without input from any of the above companies.
Learning Objectives

- Discuss regional analgesic techniques and applications in acute pain management
- Discuss evidence to date regarding regional anesthesia/analgesia and short-term outcomes
- Discuss evidence to date regarding regional anesthesia/analgesia and long-term outcomes

Overview

- Continuous peripheral nerve blocks (CPNB) and acute pain
- Other short-term outcomes
- Long-term outcomes
Outcomes Are Improved

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What is CPNB?

Ilfeld & Mariano. RAPM 2010;35:123
CPNB and Acute Pain

- **RCT:** 32 patients scheduled for outpatient shoulder surgery with an US-guided interscalene nerve block
- All subjects received a nerve block catheter and one-time ropivacaine bolus
- After surgery, subjects discharged home with portable infusion device
  - Half received ropivacaine infusion for 2 days
  - Half received saline infusion for 2 days

## Possible CPNB Insertion Sites

<table>
<thead>
<tr>
<th>Catheter Site</th>
<th>Surgical Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interscalene Brachial Plexus</td>
<td>Shoulder, proximal humerus</td>
</tr>
<tr>
<td>Supra- or Infraclavicular Brachial Plexus</td>
<td>Elbow, forearm, wrist, hand</td>
</tr>
<tr>
<td>Axillary Brachial Plexus</td>
<td>Wrist, hand</td>
</tr>
<tr>
<td>Posterior Lumbar Plexus or Femoral Nerve/Fascia Iliaca</td>
<td>Hip, thigh</td>
</tr>
<tr>
<td>Femoral Nerve/Adductor Canal</td>
<td>Knee</td>
</tr>
<tr>
<td>Sciatic Nerve</td>
<td>Leg, ankle, foot</td>
</tr>
</tbody>
</table>

## Meta-analysis: CPNB vs. Opioids

<table>
<thead>
<tr>
<th>Site</th>
<th>24h Mean VAS</th>
<th>48h Mean VAS</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infraclav</td>
<td>1.0 vs. 4.3</td>
<td>0.6 vs. 4.0</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Interscal</td>
<td>1.4 vs. 3.6</td>
<td>0.5 vs. 2.8</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Fem/LP</td>
<td>2.1 vs. 4.0</td>
<td>1.6 vs. 3.2</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Sciatic</td>
<td>0.9 vs. 4.6</td>
<td>0.9 vs. 3.5</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>

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Anesthesia Type and Mortality

Perioperative Comparative Effectiveness of Anesthetic Technique in Orthopedic Patients

Stavros G. Memtsoudis, M.D., Ph.D., F.C.C.P., † Xuming Sun, M.S., † Ya-Lin Chiu, M.S., † Ottokar Stundner, M.D., ‡ Spencer S. Liu, M.D., § Samprit Banerjee, Ph.D., M.Stat., || Madhu Mazumdar, Ph.D., M.A., M.S., ‡ Nigel E. Sharrock, M.B., Ch.B., ¶

- 30-day mortality was lower for neuraxial and neuraxial/GA vs. GA alone for TKA
- Most in-hospital complications were lower for neuraxial and neuraxial/GA vs. GA alone
- Transfusion requirements lowest for neuraxial

Anesthesia Type and Mortality

Regional versus general anesthesia for carotid endarterectomy: The American College of Surgeons National Surgical Quality Improvement Program perspective

- No difference in 30-day mortality between regional anesthesia and GA
- Regional anesthesia patients are more likely to have shorter operative time and next-day discharge


Anesthesia Type and Mortality

Results of endovascular aortic aneurysm repair with general, regional, and local/monitored anesthesia care in the American College of Surgeons National Surgical Quality Improvement Program database

- N=6009; no difference in 30-day mortality based on anesthesia type
- Increased pulmonary complications and length of stay for GA vs. spinal or local/MAC

Regional Anesthesia is Selective

- Injectate administered distal to the femoral triangle in *adductor canal*
- Many variations on technique
- Effective vs. placebo injection
- Decreases quad strength but less than FNB

Manickam B, et al. RAPM 2009;34:578
Krombach & Gray. RAPM 2007;32:369
Tsui & Ozelsel. RAPM 2009;34:178

We Changed Our Clinical Pathway

- In April 2012, clinical pathway changed from CFNB to continuous adductor canal blocks due to concern over quad weakness
- Hypothesis for retrospective cohort study: patients with continuous adductor canal blocks ambulate further than those with continuous femoral nerve blocks on postoperative day (POD) 1 without reduction in analgesia

Mudumbai & Mariano, et al. CORR 2014;472:1377
Outcomes Are Improved

Results

- Patients in the adductor canal group walked 37 (0-90) meters vs. 6 (0-51) meters in the femoral catheter group (p=0.003).
- Pain scores, opioid consumption, and hospital length of stay were similar.

Lower Extremity CPNB and Falls

- Pooled analysis of 3 published RCTs (knee and hip arthroplasty) with CPNB x 4 days
  - 85 subjects received ropivacaine 0.2%
  - 86 subjects received saline
- No falls in the saline group vs. 7 falls in the ropiv group (P=0.013)

Memtsoudis & Mariano, et al. Anesthesiology 2014;120:551
Premier Perspective Database; n=191,570
- PNB in 12.1% of cases; no association with falls
- Risk factors=higher age, greater comorbidity burden

Ultrasound Guidance Reduces the Risk of Local Anesthetic Systemic Toxicity Following Peripheral Nerve Blockade

Michael J. Barrington, PhD, MBBS, FANZCA and Roman Klages, MBBS, FAZNCA, PG Dip Biostat

- 22 cases of LAST in 25,336 blocks (overall incidence=0.87 per 1000)
- LAST cases: 12/20,401 blocks with US vs. 10/4745 blocks without US (p=0.004)

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Long-Term Outcomes

- 1 yr Western Ontario and McMaster Univ Osteoarthritis Index (WOMAC) scores


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Long-Term Outcomes

- Retrospective review of patients with palpable breast lesions who underwent mastectomy and axillary clearance with paravertebral CPNB x 48h vs. opioid IV PCA

- Primary outcome: metastases or cancer recurrence over 2.5-4 year follow-up (fixed time point)

129 patients met inclusion criteria
- 50 patients received PVB (2 failures)
- 79 patients received IV PCA

No demographic, tumor quality, or therapeutic differences between groups

Recurrence/metastasis rates:
- 19/79 (24%) in IV PCA group
- 3/50 (6%) in PVB group
- \( p=0.013 \)


14 studies met criteria EA±GA vs. GA (including Cummings study, n=42,151)

Improved overall survival with EA

No difference in cancer recurrence

Chen & Miao. PLOS ONE 2013;8:e56540
Chronic Pain after Breast Surgery

- Meta-analysis: 3 studies assessed this outcome (n=167)
- All PVB-GA vs. GA
- At 6 mos, RR=0.16, 95% CI (0.02-1.13)  
  - *No difference (crosses 1)*
- At 12 mos, RR=0.61, 95% CI (0.08-4.90)  
  - *No difference (crosses 1)*


Chronic Pain after Thoracotomy

- Incidence is approximately 50%  
  - 3-16% report pain as moderate-severe
- Heterogeneity in study designs
- Many contributing factors: patients, surgical technique, pre- and postop pain
- To date, *no convincing evidence* that PVB decreases chronic pain after thoracotomy

Outcomes Are Improved

One Size Does Not Fit All

What Is Multimodal Analgesia?

Practice Guidelines for Acute Pain Management in the Perioperative Setting

An Updated Report by the American Society of Anesthesiologists Task Force on Acute Pain Management

V. Multimodal Techniques for Pain Management

Multimodal techniques for pain management include the administration of two or more drugs that act by different mechanisms for providing analgesia. These drugs may be administered via the same route or by different routes.

Anesthesiology 2012;116:240
What Is Multimodal Analgesia?

V. Multimodal Techniques for Pain Management

- Whenever possible, anesthesiologists should use multimodal pain management therapy.
  - Unless contraindicated, patients should receive an around-the-clock regimen of NSAIDs, COXIBs, or acetaminophen.
  - Regional blockade with local anesthetics should be considered.
- Dosing regimens should be administered to optimize efficacy while minimizing the risk of adverse events.
- The choice of medication, dose, route, and duration of therapy should be individualized.

Potential Limitations of Big Data

- Lack of randomization
- Bias
- Missing or wrong data
- Inability to determine causality
- Restrictions to data access
- Cost to access data
- Lack of skills necessary to use data
Summary

- Strong evidence supports regional techniques for postoperative analgesia
- There is evidence for short-term outcome benefits from regional anesthesia and analgesia
- Long-term outcome studies do not yet show clear benefits but may be confounded by multimodal approaches