Multimodal Analgesia Including Regional Anesthesia: Time to Revisit the Basics?

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British-Ukrainian Symposium (BUS – 11): Innovative Technologies and Techniques in Anaesthesiology and Intensive Care

Kyiv, April 18, 2019
Learning Objectives

• Review evidence for the use of multimodal analgesic modalities post-operatively

• Review rationale for inclusion of peripheral nerve blockade

• Discuss implications of perioperative management on patient-relevant outcomes
Post-Operative Pain

• **Acute** Pain

• Recent onset & probable limited duration

• Starts with surgical trauma and usually ends with tissue healing

• Identifiable **temporal** and causal relationship to injury/disease

• Typically worse in the first few days

• Influenced by previous medical, social, cultural, and psychological experiences
Mechanisms of Postoperative Pain

- Nociceptive
  - Somatic
    - Incisional
  - Visceral
    - Ileus
- Neuropathic
  - Direct nerve damage

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Opioids: Adverse Effects

- Nausea & vomiting
- Constipation
- Urinary retention
- Pruritus & urticaria
- Sedation & dizziness
- Euphoria & hallucinations
- Addiction
- Muscle rigidity
Alternatives to Opioids

- Regional anesthesia
  - Local anesthetics
- NSAIDs and acetaminophen
- Anticonvulsants
- Antidepressants

Non-pharmacological
- Acupuncture
- Hypnosis
- Meditation
- Physical therapy / Massage
- Neuromodulation

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Regional Anesthesia

Safety

Efficacy
Use of Regional Anesthesia

- Attenuated Proinflammatory Response
- Improved Diaphragmatic Function
- Less Insulin Resistance
- Greater coronary perfusion
- Optimal Pain Control
- Improved Tissue Perfusion
- Improved Gut Motility
- Attenuated Endocrine Stress Response

Carli, Reg Anesth Pain Med, 2011
Total Hip and Knee Arthroplasty

- Performed in more than 1 million patients per year
- Highly protocolized practice
- Amenable to regional anesthesia techniques
Perioperative Multimodal Analgesia

- Assists pre-, intra- & post-operative planning
- Enhances postoperative recovery
- Reduces hospital length of stay
- Reduces cost
- Minimizes chronic pain syndromes

Duncan CM et al. Reg Anesth Pain Med 2013
Use of Regional Anesthesia for Total Joint Arthroplasty

• Neuraxial versus general anesthesia associated with superior perioperative outcomes
  • Reduced 30-day mortality
  • Reduced complications (cardiopulmonary, GI)
  • Reduced resource utilization

Memtsoudis SG et al. Anesthesiol 2013
Use of Regional Anesthesia for Total Joint Arthroplasty

- **Peripheral nerve blockade** associated with superior perioperative outcomes
  - Reduced 30-day mortality
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The impact of peripheral nerve blocks on perioperative outcome in hip and knee arthroplasty-a population-based study.
Memtsoudis, Stavros; Poeran, Jashvant; Cozowicz, Crispiana; Zubizarreta, Nicole; Ozbek, Umut; Mazumdar, Madhu
DOI: 10.1097/j.pain.0000000000000654

Figure 1. Hospital variation in PNB utilization; hospital-specific percentage of hip/knee procedures in which a peripheral nerve block was used.

- >3000 hospitals
- ICD-9 and CPT billing codes
FIGURE 3. Neuraxial anesthesia and PNBs by hospital size. All trends significant (P < 0.001) with the Cochran-Armitage trend test.
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Neuraxial vs General Anesthesia for Total Hip and Total Knee Arthroplasty: Systematic Review of Comparative-Effectiveness Research

<table>
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<tr>
<th>Outcome*</th>
<th>Studies (n)</th>
<th>Patients (n)</th>
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<th>P-value</th>
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<tr>
<td>Surgery duration (min)</td>
<td>21</td>
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Peripheral Nerve Blockade: Frequency

Block Use (%)

Surgery Year
Use of Peripheral Nerve Blockade in Total Hip or Knee Arthroplasty
# Use of Peripheral Nerve Blockade in Total Hip or Knee Arthroplasty

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<td>Myocardial Infarction</td>
<td>0.47 (0.36-0.62)</td>
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<tr>
<td>Death</td>
<td>0.24 (0.15-0.38)</td>
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<tr>
<td>Any complication</td>
<td>0.43 (0.36-0.53)</td>
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Tien M et al. *in revision*
Regional Anesthesia

Safety

Efficacy
Incidence of Nerve Injury

Frequency (per 10,000)
• Neuraxial: 0.4-11.8
• Peripheral nerve blockade: 2.7-3.8

• **TKA** (97/12,329) = **0.79%** (UL 95%CI: 0.96%)
• **THA** (93/12,998) = **0.72%** (UL 95%CI: 0.88%)

Not associated with peripheral nerve blockade or type of anesthesia

Perioperative Multimodal Analgesia

OPIOIDS:
INCREASED RISK FOR PROLONGED POSTOPERATIVE USE

Dynorphin (κOR)
β-Endorphin (μOR)
Enkephalin (μOR)
Endomorphin

Inhibition
Facilitation

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Opioid Tolerance

• **Organ specific:**
  - Euphoria
  - Nausea / Vomiting
  - Sedation
  - Cognitive impairment
  - Analgesia
  - Respiratory depression
  - Constipation

Collett BJ. *Br J Anaesth* 1998;81:58-68
Patient Satisfaction

• Opioid based IV PCA satisfaction is comparable to Epidural analgesia (even though epidurals have better efficacy)
  Capdevila X et al. Anesthesiology 1999;91:8-15

• Poor correlation between patient satisfaction and experienced pain
  Ward SE. Pain 1994;56:299-306

• Satisfaction depends on quality of communication
Perioperative Outcomes

- Patient Factors
- Surgery & Procedure
- Local & Regional Practices