Acute Pain in the Ambulatory Setting

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Disclosure

I do not have any financial or research affiliations with any product or pharmaceutical manufacturer displayed in this presentation.

Learning Objectives

• Understand consequences of poor pain control in the ambulatory setting
• Identify ways to improve pain control for outpatient surgeries
• Discuss the suitability of single shot peripheral nerve blocks versus continuous peripheral nerve catheters for ambulatory patients
• Discuss novel management strategies of outpatient peripheral nerve catheters in the setting of limited resources

Consequences of Poor Pain Control

<table>
<thead>
<tr>
<th>Cost Unplanned/ Prolonged admission</th>
<th>Post-operative Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

↑ PACU/Hospital LOS
↑ Satisfaction
↑ Respiratory Cx
↓ Sedation
↓ PW
↓ Opioids

Cost

Respiratory Cx

Unplanned/Prolonged admission

Post-operative Pain

PACU/Hospital LOS
Satisfaction
Respiratory Cx
Sedation
PW
Opioids


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Outpatient Issues: Acute Pain in the Ambulatory Setting

Which Clinical Anesthesia Outcomes Are Important to Avoid? The Perspective of Patients

Alex Macario, M.D., M.Sc., Matthew Weinger, M.S., Stacie Carney, B.A., and Ahn Kim, B.A.

Table 4. Ranking and Relative Value of Anesthesia Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Rank</th>
<th>Relative value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
<td>2.56 ± 0.15</td>
<td>18.05 ± 1.09</td>
</tr>
<tr>
<td>Gagging on endotracheal tube</td>
<td>2.97 ± 1.43</td>
<td>16.96 ± 1.59</td>
</tr>
<tr>
<td>Pain</td>
<td>3.46 ± 0.2</td>
<td>13.82 ± 1.58</td>
</tr>
<tr>
<td>Nausea</td>
<td>4.02 ± 0.17</td>
<td>11.82 ± 0.87</td>
</tr>
<tr>
<td>Constipation</td>
<td>4.85 ± 0.26</td>
<td>7.90 ± 0.48</td>
</tr>
<tr>
<td>Constipation</td>
<td>5.34 ± 0.17</td>
<td>7.90 ± 0.48</td>
</tr>
<tr>
<td>Constipation</td>
<td>7.60 ± 0.6</td>
<td>7.60 ± 0.6</td>
</tr>
<tr>
<td>Constipation</td>
<td>8.02 ± 0.11</td>
<td>7.60 ± 0.6</td>
</tr>
<tr>
<td>Constipation</td>
<td>8.28 ± 0.11</td>
<td>7.60 ± 0.6</td>
</tr>
<tr>
<td>Normal</td>
<td>10.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Values are means ± SD. This means that, for example, patients assigned 100% of 100% to avoid vomiting.

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Effects of Poorly Managed Post-operative Pain

<table>
<thead>
<tr>
<th>System</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td>↑HR, ↑BP, ↑cardiac work load</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>↑Pulmonary, ↓VC, atelectasis, hypoxia</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>↑Post-operative ileus</td>
</tr>
<tr>
<td>Renal</td>
<td>↑Risk oliguria and urinary retention</td>
</tr>
<tr>
<td>Gluagonation</td>
<td>↑Risk thromboembolol</td>
</tr>
<tr>
<td>Immunologic</td>
<td>↓Immune function</td>
</tr>
<tr>
<td>Muscular</td>
<td>↓Fatigue, ↓mobility</td>
</tr>
<tr>
<td>Psychological</td>
<td>Anxiety, fear,↓satisfaction</td>
</tr>
</tbody>
</table>


Consequences of Rescue Opioids

Rescue opioids

Sedation PONV

Post-Operative Sedation

Differential diagnosis of post-operative sedation:
- Hypotension
- Hypoxia
- Hypercarbia
- Hypoglycemia
- Electrolyte abnormalities
- Anemia
- Cerebrovascular injury
- Persistent anesthetic effect


Post-operative Nausea & Vomiting

- Pulmonary aspiration
- Dehydration
- Electrolyte imbalance
- Fatigue
- Esophageal tear
- Wound dehiscence


Additional Sequelae of Poor Pain Control

- Delayed PACU discharge
- ↑delay in OR turnover
- Unplanned hospital admission
- Decreased patient satisfaction
- Patient discomfort with development of late PONV


Ways to Improve Pain Control for Outpatient Surgeries

A 65 year old otherwise healthy male presents for total knee replacement due to severe osteoarthritis. How many days do you anticipate hospitalization?
A 65 year old otherwise healthy male presents for total knee arthroplasty. The surgeon requests he go home the same day you therefore elect the following for his anesthetic plan:

a. Combined spinal epidural, femoral nerve catheter, ketorolac, acetaminophen, diazepam, fentanyl
b. Spinal, ketorolac, fentanyl, acetaminophen, pregabalin, diazepam
c. Spinal, ketorolac, acetaminophen, pregabalin, celecoxib
d. Combined spinal epidural, intraarticular block, ketorolac, acetaminophen
e. General anesthesia, paralytic, fentanyl, ketorolac

Chronic Pain affects us all

- Quality of life
- Psychological
- Social
- Socioeconomic

"Divine is the task to relieve pain." - Hippocrates

Figure 1. Annual per-patient pre- and postindex direct medical costs among patients with chronic pain conditions. Index date was the first date of the ICD-9 code for the chronic pain condition during 2010. *p < 0.001 vs. pre-index.
How pain management impacts health care providers

- Bundled payments for care improvement initiative
- Hospital Consumer Assessment of Healthcare providers and systems (HCAHPS)
  - Comparable data on the patient’s perspective on care
  - Public reporting → improve quality of care
  - Enhance public accountability

Quick Summary Non-Opioid MMA

- Non-selective NSAIDs:
  - ↓ Opioid use 25-45%, pain intensity, PONV, sedation
  - Limitations: COX1 inhibition, renal dysfunction, GI
- Acetaminophen:
  - Good tolerance and safety profile
  - Limitations: cost (IV) vs 1st pass effect; liver dysfunction
- NMDA antagonists (ketamine):
  - ↓ Opioid requirements and hyperalgesia
  - Limitations: neuropsychiatric disturbances, PONV
- Other: alpha-2-agonists, anticonvulsants, antidepressants
  - Limitations: sedation, dizziness

Quick Summary LA Adjuncts

- Epinephrine:
  - Intra-vascular test dose, ↓ absorption from tissues
  - Limitations: ↑ HR, ↓ perineural blood flow
- Dexamethasone:
  - Peripheral vs Systemic dosing
  - Limitations: not approved for peripheral administration
- Alpha-2-agonists:
  - Prolongs sensory and motor blockade
  - Limitations: ↓ HR, ↓ BP, sedation; variation with LA, block, dose
- Opioids:
  - Limitations: no clear benefit
Bupivacaine liposome injectable suspension (Exparel)

- **DepoFoam®** slowly delivers bupivacaine
  - ~72-96 hours analgesia
- **Vial**: 266 mg/20 ml
  - 3% “free” bupivicaine
  - $285/each
  - Vial ≈ 300 mg Marcaine


Bupivacaine liposome injectable suspension

- **Indications:**
  - Wound infiltration to produce post-surgical anesthesia
- **Safety:** 21 clinical studies, >1300 patients
  - Additive toxic effects with other local anesthetics
  - Most common adverse reactions (~10%): nausea, vomiting, constipation
- **1 ml Markaene ≠ 1 ml bupivacaine liposome injectable solution**
- **Maximum dose recommended is 266 mg**
- Caution with liver and/or renal impairment

Patient selection for ambulatory procedures/surgeries

**Patient selection for regional anesthesia**

- Anyone and everyone!

**Contraindications to Regional Anesthesia**

- Patient refusal
- Infection at the site of needle/catheter placement
- Coagulopathy
- Allergy to local anesthetic
- Pre-existing peripheral neuropathy
- Severe neurologic injury with precludes post-operative assessment for complications
Caution! Appropriate candidate for ambulatory surgery?

- Chronic pain disorders
- Cardiac history
- Chronic lung disease
- OSA
- Craniofacial disorders
- Neuromuscular disorders
- Failure to thrive
- Morbid obesity
- Other: sickle cell disease, central hypoventilation syndromes, genetic/metabolic/storage disease, Down’s syndrome, pre-maturity

Single Shot Nerve Block

Pros:
- 12-24 hour analgesia
- Decreased opioid use
- Faster PACU discharge
- Cost effective
- Decreases stress response to surgery
- Decreases post-operative immunosuppression

Cons:
- Neuropraxia
- Hematoma
- Local anesthetic toxicity
- Infection
- Secondary injury

Peripheral Nerve Catheters

Pros:
- Decrease opioid use
- Decrease in adjuvant pain medication use
- Prolonged blockade
- ↑ patient satisfaction

Cons:
- Catheter malfunction
- Catheter site infection or bacteremia
- Increased technical difficulty and increased time
- Post-op catheter management
- “Expensive”

Cost of materials

- Catheter: $475-850
- Single shot block: $10-20

Novel management strategies of outpatient PNC’s

- Potential barriers to PNC’s:
  - How are we going to teach the families about the PNC without on site APS?
  - Who is going to order the pump and manage the catheter?
  - How will follow up be done?
- General information about catheter and medicine inside it
- How the local anesthetic is not like other pain medicines
- Risks of complications
- Care of a child with a PNC:
  - Protect the limb
  - The pump is your friend
  - How to remove the catheter
  - Instructions when to call (i.e. infection, leakage, prolonged block effects, local anesthetic toxicity, etc.)
Patient/Family Education sans APS

Face-to-face education
- Review highlights in the handout
- Use demo pain pump ball
- Pen and paper exchange of contact information

Lessons learned in developing patient/family education materials

Management of PNC
- RN’s connect pump in PACU
- APS follow up via phone +/- provider phone call
- Surgical team (i.e. post-op visits)
- Patient and his/her family
- Product representative

Benefits Experienced
- Improved post-operative pain →
- Decreased PACU length of stay
- Decreased number of unplanned admissions
- Decrease in unplanned hospital cost
Patients that received Combined Block spent less time in the PACU

Fine tuning for the future

- Introduce anesthesia plan to patients pre-operatively to establish expectations and begin education on PNC’s
- Identify patient candidates for pre-operative block to ensure efficacy
- Continue to trial various combinations of the MMA wheel

THANK YOU