Continuous Peripheral Nerve Blocks (CPNB)
What is a nerve block?

- Local anesthetic applied to a nerve for sensory/motor anesthesia to the affected area
  - Interscalene
  - Supraclavicular
  - Femoral
  - Sciatic
  - Popliteal
  - Lumbar Plexus
Evolution of Pain Management

General

Epidural
How does it work?

• Local anesthetic pools at the nerve
• Anesthesia distal to the location of the nerve
• Good placement provides sensory and motor anesthesia
What’s in the pump?

- Local anesthetic – Ropivacaine
- NO Narcotic!
- Pt’s can go home with these pumps and adjust the rates themselves
- Runs at a low percentage (0.2%)
- Usually at a low rate
Local Anesthetic

• Ropivacaine:
  – Sensory and motor block
  – Less risk of cardiotoxicity
  – Less motor block than Marcaine
  – More allowable daily dosage → 770mg/24 hrs
S & S of Ropivacaine Toxicity

- Tinnitus
- Syncope
- Dizziness
- Blurred vision
- Tremors/Restlessness
- Metallic taste
Where is the catheter placed?
Pain from sciatica radiates from the buttock down the leg and can travel as far as the feet and toes.
What are the indications?

- TKRs
- ACLs
- Shoulder surgeries
- ORIFs
- THR$s$ (done with Lumbar Plexus Block)
How will my patients benefit?

• Better pain management with minimal narcotics
  – Less narcotic side effects
• No foley needed (or dc’d am of POD 1)
  – Easier ambulation
• No pca → no pole needed
  – Easier ambulation
• Earlier hospital discharge
  – Less risk of HAIs
• Increased long-term ROM for patients due to better, early pain management
Narcotic Side Effects

• Nausea and vomiting
• Ileus
• Urinary retention
• Respiratory depression
• Restricted ambulation
• Sedation
• Confusion
• Constipation
• Tolerance/abuse

Longer Hospital Stays & Increased Costs
What are my responsibilities?

- **A** – *assessment*: pain & motor function, catheter site
- **P** – *plan* – balance pain mgt & quad function
- **I** – *intervene* – titrate pump/pain meds as needed
- **E** – *evaluate* – as always!
Assessment – 5 P’s

• Pain
  – Location? → Ant vs Post
  – If Anterior → Inc rate on pump
  – If Posterior → Use other pain med

• Pallor – can be a normal finding

• Paresthesia – expected due to block

• Paralysis – expected due to block

• Pulses – locate & document DP
Assessment – Quad Function

• Can the patient dorsiflex?
• Can the patient raise his/her leg off the bed?
  – Place your hand on the pt’s thigh
  – See if you can feel the quad contract
  – If no contraction, pt is too weak to stand.
  – Decrease rate on pump
• JCAHO considers a buckle to be a fall
Assessment – Catheter Site

- Bleeding
- Leaking – expected finding
- Re-enforce dressing
- Monitor just like an IV site
- Be sure all clamps are open
- Be sure dial is on even number
Plan:

- Titrate pump by 2ml/hr as needed for pain management and adequate quad function for optimal PT.
- Provide adjunct pain meds for posterior leg pain after sciatic block wears off.
- If no/minimal quad function morning of POD 1 with no pain, decrease rate on pump for adequate PT.
Intervention:

• Early Discharge → better reimbursement, ↓ risk of HAIs
• Early OOB/Ambulation – better long-term ROM
• Instruct pt NOT to get up unassisted – EVER!
Evaluate

- Re-evaluate pain
- Assess quad function
- Promote ambulation & self-care
Postoperative Pain Experience: Results from a National Survey Suggest Postoperative Pain Continues to Be Undermanaged

Jeffrey L. Apfelbaum, MD*, Connie Chen, PharmD†, Shilpa S. Mehta, PharmD†, and Tong J. Gan, MD‡

*Department of Anesthesia and Critical Care, The University of Chicago Hospitals, Chicago, Illinois; †Pharmacia Corp., Skokie, Illinois; and ‡Department of Anesthesiology, Duke University Medical Center, Durham, North Carolina

- 80% of patients experienced acute pain after surgery
- Most patients had moderate, severe or extreme pain
- Ambulatory patients experienced more pain after discharge than when they were in facilities
Causes for Unanticipated Hospital Readmission Following Ambulatory Surgery

- Pain
- Excessive bleeding
- Intractable vomiting
- > 40% due to pain or narcotic side effects
- Readmission rates increase with age

Table 1. Reasons for Admission

<table>
<thead>
<tr>
<th>Reason for Admission</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>18</td>
</tr>
<tr>
<td>Bleeding</td>
<td>18</td>
</tr>
<tr>
<td>Intractable vomiting</td>
<td>17</td>
</tr>
<tr>
<td>Perforated uterus</td>
<td>7</td>
</tr>
<tr>
<td>Extensive surgery</td>
<td>6</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>5</td>
</tr>
<tr>
<td>Additional surgery required</td>
<td>4</td>
</tr>
<tr>
<td>Postoperative somnolence</td>
<td>3</td>
</tr>
<tr>
<td>Aspiration pneumonia</td>
<td>3</td>
</tr>
<tr>
<td>Suspected myocardial infarction</td>
<td>3</td>
</tr>
<tr>
<td>Bladder laceration</td>
<td>2</td>
</tr>
<tr>
<td>Bronchospasm</td>
<td>2</td>
</tr>
<tr>
<td>Hypotension</td>
<td>2</td>
</tr>
<tr>
<td>Suspected airway obstruction</td>
<td>2</td>
</tr>
<tr>
<td>Vagal response</td>
<td>1</td>
</tr>
<tr>
<td>Suspected bowel perforation</td>
<td>1</td>
</tr>
<tr>
<td>Anemia</td>
<td>1</td>
</tr>
<tr>
<td>Diabetic control</td>
<td>1</td>
</tr>
<tr>
<td>Pulmonary edema</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
</tr>
</tbody>
</table>
This study found a measurable, positive correlation between patient satisfaction and hospital profitability.

17% to 27% variation in financial measures correlated to patient satisfaction.

Bottom-line annual impact estimates
- An increase of 1 point = $2,116 net increase per bed
- $1 million for a typical 500-bed facility

Key Conclusion: “Even small increases in patient satisfaction are associated with millions of dollars in year-end earnings.”

Study from Hospital Corporation of America, 1992 with 15,000 patients and 51 hospitals

1 Journal of Healthcare Marketing, Dec 1992
Research History

- Crile (1913) wound catheter can cut post-op pain and reduce mortality
- Capelle (1935) described wound perfusion with local anesthetics through irrigation apparatus
- Blades and Ford (1950) Used fine catheter for thoracotomy incisions
- Thomas (1983) Intermittent or continuous Marcaine for Cholecystectomy
- Levack (1986) Abdominal wound perfusion
- Narinder Rawal (1996) bolus paper in multiple procedures
- Oakley (1998) Day surgery hernias with elastomeric pump
- ON-Q launched in 1998
- Rawal (2002) PCRA at home
- Ilfeld (2002) Infraclavicular and popliteal blocks at home
- White (2002/3) Popliteal for foot surgery; sternotomy for CABG
- Dowling (2003) CABG
- Currently there is an EXPLOSION in clinical research in this field
ON-Q Clinical Research Summary

• More than 55 completed and presented studies
• Typical Results
  – 90%+ patient satisfaction
  – 1 to 3 day length of stay reduction
  – 40-70% reduction in narcotics
  – 8-30% reduction in treatment costs
  – 22% reduction in chronic pain at 6 months
  – Improved shoulder function at 2 ½ years
  – Infection rates less than national averages
  – Substantial reductions in pain scores
Results

- **Pain scores at rest:** Lower in all groups combined (p< 0.001)
  - 10mm reduction
- **Pain scores with activity:** Lower in all groups combined (p < 0.001)
  - 22 mm reduction
- **Opioid rescue medication:** Fewer patients required in all groups (p< 0.001)
  - 41% vs. 66%
- **Total opioid required:** less in all groups combined (p< 0.001)
  - Reduction of 11 mg/day
- **Post-operative nausea and vomiting (PONV):** less in all groups combined (p< 0.001)
  - 24% vs. 40%
- **Patient satisfaction** better in all groups combined (p< 0.007)
  - 43% vs. 13% had excellent satisfaction
- **No local anesthetic toxicity**
- **Infection rates 0.7% in active group and 1.2% in control group**
Economic Data

• **Length of stay**: 1 day less in all groups combined (p< 0.04)
  – Less in all subgroups

• Reduced PACU Stay
Summary

The **ON-Q Post-Operative Pain Management System** is a win-win for patients and hospitals with substantial:

- Clinical Benefits
- Patient Satisfaction Benefits
- Economic Benefits