The Science & Art of Providing Thoracic Epidural Analgesia in the Adult Thoraco-Abdominal Surgical Population

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Conflict of Interest Disclosure

Authors Conflicts of Interest;

– Jason Sawyer. Has received financial compensation from Purdue Pharma for preparing & providing pain management lectures. Last lecture: Winter 2013

1212 beds - 677 acute care
16 000 operative procedures/year
1.2 million patient visits/year
10 000 + employees
5th largest cancer centre in North America
Acute Pain Service

- 2 Nurse Practitioners Monday-Friday
- Staff or Fellow Anesthesiologist 7 days – Tues-Tues
- 3300-3500 patients/year
- 400-500 surgical thoracic/trauma epidurals
  - Colorectal, hepatobiliary, gynecological, urological, CV, trauma rib #’s

Agenda

- Unrelieved postoperative pain
- Overview of thoracic epidural analgesia (TEA)
  - Anatomy of the epidural space
  - Review of commonly used local anesthetics and opioids
- Overview of the advantages of TEA
- Describe common TEA related side effects and their treatment
  - Hypotension, pruritus, nausea, vomiting, urinary retention
- Describe our experience with epinephrine as a substitution for opioid in thoracic epidurals
- Describe how Organizational Development courses helped guide improvements in delivering safe and effective TEA

What Do We Know……

- Pain is still poorly managed postoperatively (Sawyer et al. 2008, 2010)
- Higher in-hospital pain scores correlate with higher post-discharge pain scores (Vandenkerkhof, 2006)
- Post-discharge health care utilization is greater in those with higher pain scores in-hospital and post-discharge (Vandenkerkhof, 2006)
What Do We Know……

• Pain severity adversely effects quality of life in the immediate postop period (Wu, 2003)

• Post-op pain contributes to decreased HRQL 1 month post-discharge, & interfered with ADL’s and sleep (Strassels, 2004)

• Patients that experienced severe pain and utilized the most analgesics the first 7 days postop have ↑ risk of developing chronic post surgical pain (CPSP) (Visser 2006)

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Investigated factors thought to be involved in the development of chronic post-surgical pain

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Table 3: Pain characteristics and pain-related interference

<table>
<thead>
<tr>
<th>Type of pain</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truncal</td>
<td>42</td>
<td>88</td>
</tr>
<tr>
<td>Upper body</td>
<td>92</td>
<td>47</td>
</tr>
<tr>
<td>Lower body</td>
<td>107</td>
<td>136</td>
</tr>
<tr>
<td>No pain area</td>
<td>36</td>
<td>98</td>
</tr>
<tr>
<td>Other</td>
<td>37</td>
<td>20</td>
</tr>
</tbody>
</table>

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If you were given a strong pain killer like morphine after surgery, how worried would you be about becoming addicted?

1. Not worried at all
2. A little bit worried
3. More than a little bit worried
4. Very worried

Would you try to limit how much strong painkillers like morphine you use because you worried about becoming addicted?

1. Yes
2. No
“Oh, Just Give Them IV-PCA”…..

- Opioids are not benign
- Opioid Induced Hyperalgesia (OIH)
- Significant increase in addiction to legal opioid prescriptions
- 5 –fold increase in prescription opioid related deaths in the US (CDC 2013)
- This does not reflect patient concerns regarding opioids

Brief Summary

- Effective postoperative pain management remains an elusive goal
- Severe pain in the postoperative period is a key factor in developing CPSP
  - But not everyone with severe acute pain develops chronic pain
- Negative impact on quality of recovery, quality of life, relationships
- Patients and families have strong beliefs/misconceptions about the side effects of opioids

What to do…..what to do…..
Epidural anaesthesia and survival after intermediate-to-high risk non-cardiac surgery: a population-based cohort study

- Postop matched pair cohorts: epidural and PCA (88188 patients) across surgical populations
- Epidural associated with small reduction in 30 day mortality (1.7 vs 2.0 RR 0.89 CI 0.81-0.98 p= 0.02 NNT=477)
- Epidural patients generally had a higher co-morbidity burden
- “Furthermore, the increased burden of co-morbid illness in patients who received epidural anaesthesia would suggest that our study, if anything, is biased against epidural anaesthesia” pg 567

Thoracic Epidural Analgesia and Acute Pain Management

Table 1. Open Surgeries in Which Thoracic Epidural Analgesia Can Be Used

<table>
<thead>
<tr>
<th>Thoracic Surgery</th>
<th>Upper Abdominal Surgery</th>
<th>Colorectal Surgery</th>
<th>Urologic Surgery</th>
<th>Gynecologic Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracotomy</td>
<td>Esophagectomy</td>
<td>Colectomy</td>
<td>Cystectomy</td>
<td>Ovarian tumor debulking</td>
</tr>
<tr>
<td>Repair of pectoral arteries</td>
<td>Gastrectomy</td>
<td>Billroth resection</td>
<td>Nephrectomy</td>
<td>Pelvic examination</td>
</tr>
<tr>
<td>Thoracic aorta aneurysm repair</td>
<td>Pancreatectomy</td>
<td>Abdominal aortic aneurysm repair</td>
<td>Ureteral repair</td>
<td>Radical aortic aneurysm ligation</td>
</tr>
<tr>
<td>Thyroidectomy</td>
<td>Hepatic resection</td>
<td>Radical cystectomy</td>
<td>Radical abdominal hysterectomy</td>
<td></td>
</tr>
</tbody>
</table>
Brief Summary

The analgesic benefits of TEA are well described in the literature across many surgical populations.

Efforts to find reductions in morbidity and mortality are difficult because incidence rates of serious outcomes are very low. Despite epidurals are often placed in less well patients.

Need to focus on TEA (and ultimately quality pain management) related to:
- Quality of recovery
- Quality of life
- Chronic post surgical pain
Where It All Started

August Bier 1861-1949
surgeon

James Leonard Corning 1855-1923
neurologist

1885 Spinal cocaine

Assisted by August Hildebrandt

1898 Spinal Anesthetic
### Epidural Anatomy

- Epidural space is a potential space, containing crevices around the epidural contents (fat, veins, lymphatics, nerve roots, dural sac)
- These layers and textures affect the flow of analgesics through the space
- Epidural venous flow is predominantly located anteriorly
- Veins lack valves


### Epidural Anatomy

- Ligamentum flavum is non continuous and not pain sensitive
- Proximity to CSF/Spinal Cord is crucial
- Sympathetic fibres T1-L2

### Factors Affecting the Distribution of Neural Blockade by Local Anesthetics in Epidural Anesthesia and a Comparison of Lumbar Versus Thoracic Epidural Anesthesia

#### Some effect

- Age
  - 40% less dose for (60-79) vs (20-39)
  - Diminished fatty tissue
  - Decrease in myelinated nerves
  - Increased epidural space compliance
  - Dura more permeable

#### Minimal/no effect

- Height, weight BMI
- Positioning
- Gravity
- Needle direction
Factors Affecting the Distribution of Neural Blockade by Local Anesthetics in Epidural Anesthesia and a Comparison of Lumbar Versus Thoracic Epidural Anesthesia

Some effect
- Site of insertion determines distribution
- Total mass of LA more important than concentration or volume
- Distance into epidural space – 4-6 cm threaded into epidural space

Minimal/no effect
- Fractional vs single bolus injection
- Epidural pressures
- Pressure in adjacent body cavities

What Analgesics?
- Local Anesthetics
- Opioids
- Epinephrine
Epidural Local Anesthetics

• Primary route of action is spinal nerve roots
  – Weak effect on spinal cord and paravertebral nerves
• Majority absorbed systemically via venous system (peak 10-30 mins) - highly lipid soluble (lipophillic)
  – Epidural fat
  – Diffusion across dura
• Ester local anesthetics metabolized by plasma pseudocholinesterase (rarely used for epidural analgesia)
• Amide local anesthetics metabolized in the liver
  – Most commonly used are bupivacaine and ropivacaine

Smaller nerves more susceptible to effects of LA
  – Pain, temperature, touch, motor
• Myelinated fibres are more susceptible to effects of LA
  – Myelination speeds conduction in Nodes of Ranvier which contain high concentrations of Na+ channels
• Positive temperature or pin prick (qualitative) assessments do not necessarily equal analgesia- only let you know where the LA is spreading

Evidence Basis for Regional Anesthesia in Multidisciplinary Fast-Track Surgical Care Pathways

Francisco Cordero, MD, MPH, FCA, FRCP • Hansel Kibler, MD, PhD • Gabriel Balducci, MD • Ananta Smail, MD, MHS, MRCPE, FRCA • Jose M. Karen McRae, MD • Peter Stenger, MD • Thomas Proctor, MD, MD, CCA • Francis Salinas, MD • and Joseph M. Neal, MD

![Diagram showing physiological advantages of different neural blocks]

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**Questions Without An Answer**

- Ideal mixture of solution (LA and/or opioid) still debatable
  - LA only no opioid side effects but possibly more hypotension
  - Opioid only no better than systemic opioids and ↑ side effects
  - LA + opioid best?
  - Is benefit of fentanyl primarily systemic or spinal?
  - Other adjuncts?

SPECIAL ARTICLE

Major complications of neuraxial block: report on the
Third National Audit Project of the Royal College of Anaesthetists1

T. M. Cook**, R. Connel† and J. A. W. Whitbourn* on behalf of the Royal College of Anaesthetists Third National Audit Project

Results. The census phase identified a denominator of 707 435 CNB. Eighty-four major complications were reported, of which 52 met the inclusion criteria at the time they were reported. Data were interpreted ‘presanitically’ and ‘postsanitically’. Presanitically there were 30 permanent injuries and ‘postsanitically’ 14. The incidence of permanent injury due to CNB (expressed per 100 000 cases) was ‘presanitically’ 4.2 (95% confidence interval 2.6–6.6) and ‘postsanitically’ 3.0 (1.1–3.3). Presanitically there were 11 deaths or paraplegias, ‘postsanitically’ five. The incidence of paraplegia or death was ‘presanitically’ 1.8 per 100 000 (0.8–2.8) and ‘postsanitically’ 0.7 (0.1–1.6). Two-thirds of initially disabling injuries resolved fully.

Conclusions. The data are reassuring and suggest that CNB has a low incidence of major complications, many of which resolve within 6 months.

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**Epidural anaesthesia and survival after intermediate-to-high risk non-cardiac surgery: a population-based cohort study**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Epidual n=44074</th>
<th>No epidural n=46405</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous use of recommended screening tests*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macroglossy</td>
<td>0.05% (42)</td>
<td>0.2% (271)</td>
</tr>
<tr>
<td>Coughing</td>
<td>0.16% (56)</td>
<td>0.16% (56)</td>
</tr>
<tr>
<td>Fetal monitors</td>
<td>0.05% (23)</td>
<td>0.05% (23)</td>
</tr>
<tr>
<td>Outcome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-day mortality</td>
<td>0.2% (8)</td>
<td>0.2% (8)</td>
</tr>
<tr>
<td>Postoperative mechanical ventilation</td>
<td>0.02% (1)</td>
<td>0.01% (1)</td>
</tr>
<tr>
<td>Tracheal intubation</td>
<td>0.02% (1)</td>
<td>0.02% (1)</td>
</tr>
</tbody>
</table>

Within 2 years before hospital admission for surgery: 10% within 5 days after surgery. 10% within 20 days after surgery.

Table 2: Presence of care and outcome in the propensity-matched pairs.

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**Respiratory and haemodynamic effects of acute postoperative pain management: evidence from published data**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Presented as Mean %</th>
<th>Respiratory depression by decreased respiratory frequency</th>
<th>Respiratory depression by increased PaCO2</th>
<th>Haemodynamic depression due to decreased coronary flow</th>
<th>Haemodynamic depression by increased PaCO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>3.2</td>
<td>3.6</td>
<td>0.8</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>IM</td>
<td>1.4</td>
<td>3.6</td>
<td>0.8</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>IV-PCA</td>
<td>1.9</td>
<td>0.7</td>
<td>1.2</td>
<td>11.5</td>
<td>1.3</td>
</tr>
<tr>
<td>Epidural</td>
<td>0.1</td>
<td>0.6</td>
<td>0.8</td>
<td>1.5</td>
<td>6</td>
</tr>
</tbody>
</table>

Respiratory and haemodynamic effects of acute postoperative pain management: evidence from published data.
What intervention do you use FIRST for pruritus you suspect is from opioid in the thoracic epidural? N= 70

- Administer Benadryl
- Administer Nalbuphine
- Administer Naloxone
- Administer Naloxone Infusion
- Administer Ondansetron
- Reduce/change the opioid in the epidural
- Remove the opioid from the epidural

Review Article
Neuraxial opioid-induced pruritus: An update
Karnell Herman, SalDita Sookh, Sivaphan
Department of Anesthesiology, UBC Hospital, Vancouver, Canada

- Mechanism of Opioid Induced Pruritus (OIP) is poorly understood
- Mu opioid receptors seem to play a key role
  - Spinal cord not brain or periphery
- Histamine release has very little role
  - So antihistamines will most likely not help!
- The more invasive the opioid administration, the higher the incidence of OIP

Pathophysiology and Management of Opioid-Induced Pruritus
Herman Karnell

- Very few trials
- Propofol (IV) 10-20 mg
- Nalbuphine (IV) 4 mg
- Naltrexone (PO) 6 mg
- Naloxone infusions (2mcg/kg/hr)
- Ondansetron (IV) 8 mg
- Antihistamines – sedating effect may break the itch/scratch cycle
Postoperative Nausea & Vomiting (PONV)

101 (Watcha & White 2002)

Table 1. Decrease the effects of nausea drugs modified from Pressman et al. and Ruckley et al.

<table>
<thead>
<tr>
<th>Nausea Drug</th>
<th>Effect</th>
<th>Time to Max Effect</th>
<th>Maximum Efficacy</th>
<th>Side Effects</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metoclopramide</td>
<td>++-----</td>
<td>1-4 hr</td>
<td>++----</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Ondansetron</td>
<td>+++++</td>
<td>1-2 hr</td>
<td>++++</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>+++++</td>
<td>1-2 hr</td>
<td>++++</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Prochlorperazine</td>
<td>++-----</td>
<td>1-4 hr</td>
<td>++----</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

The number of signs (+) indicates degree of activity or exposure. The negative (-) signs indicate no activity.

Gan 2007

Table 2. Risk Factors for Postoperative Nausea and Vomiting

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>OR (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 65</td>
<td>1.5 (1.1-2.1)</td>
<td>0.03</td>
</tr>
<tr>
<td>Male</td>
<td>1.2 (1.0-1.4)</td>
<td>0.05</td>
</tr>
<tr>
<td>History of motion sickness</td>
<td>1.3 (1.0-1.6)</td>
<td>0.03</td>
</tr>
<tr>
<td>Previous PONV</td>
<td>1.4 (1.1-1.7)</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Figure 3. Flowchart for the treatment of PONV in approximately 1000 patients.
Hypotension- Local Data
N=64  Epidural 35  IV-PCA 29

<table>
<thead>
<tr>
<th>Category</th>
<th>Epidural</th>
<th>IV-PCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>68.1*</td>
<td>57.8</td>
</tr>
<tr>
<td>Surgical Time</td>
<td>326* (min)</td>
<td>193 (min)</td>
</tr>
<tr>
<td>Mean Blood Loss</td>
<td>700* ml</td>
<td>274.4 ml</td>
</tr>
<tr>
<td>LOS</td>
<td>7.67</td>
<td>8.1</td>
</tr>
<tr>
<td>Post op Comp.</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

* = statistical significance
No difference between groups in Sex, preop BP, comorbidities, postop complications, or pts that were receiving BP meds preop.

- Significance of analgesia mode on SBP was dependent on definition of hypotension
  - If definition was 20% drop from baseline SBP then there was significantly more patients hypotensive in the epidural group in the initial postop period
  - If the definition was a SBP less than 90, there was no difference between epidural and PCA patients regardless of timing
  - Females much more likely to be hypotensive
Urinary Retention

Is Urinary Drainage Necessary During Continuous Epidural Analgesia After Colonic Resection?

Linda Roser, M.D., Mark Weiser, M.D., Ph.D., and Henrik Kehlet, M.D., Ph.D.

Side Effect Summary

- Incidence of nausea, vomiting and naloxone use lower in epidural groups vs IV-PCA

- No single agent will be universally effective for PONV
  - evidence that algorithms are beneficial in appropriately screened patients (Krancke 2007)

- Incidence of pruritus with epidurals is much higher, but not histamine mediated. Evidence supports Ondansetron (Zofran) and opioid reversal agents

- Incidence of urinary retention with TEA is approximately 10% and demonstrates a decrease in UTI

Survey Results
What do you do FIRST when a patient has an appropriate bilateral sensory block in the surgical area, but still has moderate/severe pain with coughing? (Epidural solution is Ropivacaine 0.2% + HYDMorphine 0.01mg/ml, rate 6ml/hr, PCEA 3ml, lockout 15 minutes) Incision is midline. Sensory block is T4-12 bilateral, covering the entire incision. N=57

- Bolus the epidural with more of the same epidural solution infusing through the epidural catheter and increase the rate?
- Bolus the epidural catheter with a more potent, different, local anesthetic (e.g. lidocaine), then resume with the same epidural solution.
- Bolus the epidural catheter to comfort with a more potent dose of ropivacaine, then resume the infusion at the more potent dose of ropivacaine.
- Continue the current epidural solution and add intravenous route of opioid.

If you have more than 1 epidural solution to choose from, how do you decide which one to use on your patients? (N=64)

- Anesthesiology preference
- Acute Pain Service preference
- Customized based on patient factors

How long, on average, do you keep your thoracic epidurals infusing? N=74

- 1 day
- 2 days
- 3 days
- 4 days
- 5 days
- 6 days
- 7 days
- >7 days
Do you routinely use etCO2 or continuous pulse oximetry for your patients with thoracic epidurals that contain opioids? N=73

- Some sites still require ICU monitoring for epidurals (opioid)
- Published incidence of respiratory depression requiring Naloxone (Narcan) approximately 0.1%....

Online Survey

- Local anesthetics
  - 2/3 bupivacaine (most common 0.1%)
  - 1/3 ropivacaine (most common 0.1-0.2%)

- Opioids
  - 55% fentanyl (1-5mcg/ml)
  - 40% Hydromorphone (4-20mcg/ml)

- Epinephrine (2) Clonidine (1)
- Vast majority LA/opioid combination
- Very few had multiple options
- % of patients receiving IV-PCA & Epidural
  - Highly variable

Historical TEA delivery at Sunnybrook

- Choice of a single ropivacaine (Naropin) concentration (0.2%) with options for hydromorphone (Dilaudid) 5 or 10 mcg/ml
- No PCEA component
- Trouble shooting involved large doses of lidocaine (Xylocaine)-continue with original epidural solution
- High infusion rates (15-20ml/hr)
• Perceived excessive failure rate

• Not uncommon to add IV-PCA opioid to epidural

• Suboptimal outcomes for chronic pain/chronic opioid users that receive epidurals

• Aggressive multimodal analgesia with NSAIDS, Gabapentinoids, Acetaminophen (Tylenol) > 10 years

• TEA care provided on surgical units for > 15 years

Lessons Learned…

• Quickly
  – Adding epinephrine (Adrenaline) to Ropivacaine (Naropin) /HYDROMorphone (Dilaudid) combination frequently caused pruritus when none existed before (particularly with 10 mcg/ml)-in the same patient)

  – Ropivacaine (Naropin) 0.2% with Epinephrine (Adrenaline) 5mcg/ml did not seem to work consistently as well as we would have liked

• Can we have an opioid free epidural program?

• Can we do a better job individualizing TEA?

• Can we trouble shoot more effectively- especially at night?
Can We Have An Opioid Free Epidural Program?

- History of Epinephrine Use
- Saddle Block for labor
- 1mg of epinephrine (1cc of 1:1000 epinephrine with 1cc of 5% dextrose into CSF)
  - “complete relief of pain of uterine contraction”
  - No systemic effects noted
  - (Priddle & Andros 1950)

How Neuraxial Epinephrine Works

- Independently causes segmental hypoalgesia when given epidurally to pinprick (100 mcg) (Curatolo et al 1997) & pinprick/ice (50mcg) (Bromage et al 1983)
- Absorbed into the CSF and binds to α2 adrenoreceptors in substantia gelatinosa of the dorsal horn (Curatolo et al 1997)

- Epidural Epinephrine (100mcg) reduced peak plasma concentrations of 20ml of 0.5% bupivacaine or 2% lidocaine by 25% in 40 patients undergoing minor general/ortho procedures (Brom et al 1996)
- Epidural Epinephrine (100 mcg) reduced peak plasma morphine levels (10mg epidural) by 60% in a study of 3 healthy volunteers (Bromage et al 1983)
### Adding Fentanyl (20 pts)

- **2001**
  - Bupiv 1mg/ml fent & epi 2mcg/ml
  - Without fentanyl pain with coughing significantly worse after 3 hours
  - Pain decreased within 15 mins and no difference within 1 hr of reintroducing fentanyl
  - No change in sensory blockade during non-fentanyl times
  - No difference in any side effects with or without fentanyl
  - No difference in time out of bed

### Adding Epinephrine 12 pts

- **2002**
  - Ropiv 1mg/ml fent/epi 2mcg/ml
  - Without Epi pain at rest & with coughing significantly worse within 2 hrs
  - Pain decreased within 15 mins and no difference within 1 hr of reintroducing epi compared to baseline
  - Significant regression of sensory blockade with removal of epinephrine
  - Nausea increases significantly when epinephrine removed
  - Significantly more mobilization with epinephrine

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### Overview of Epinephrine for TEA

- Epinephrine given epidurally:
  - Has its own antinociceptive properties
  - Likely increases the amount of opioid and LA reaching the spinal cord & nerve roots
  - More intense and prolonged analgesic effect
  - Wider sensory coverage
  - Reduced concentrations of each class of analgesia are required
    - (Niemelä et al 2002)
  - Reduces systemic absorption of opioids and LA by 25-60%

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### Graphs

- **# of Patients With Thoracic Epidural Containing Epinephrine (5mcg/ml)**
  - July 2011–June 2012: 0
  - July 2012–June 2013: 100
  - July 2013–June 2014: 200

- **# of Patients Exposed to Each Ropivacaine Concentration**
  - 0.125
  - 0.2
  - 0.3
  - 0.4
  - 0.5
Can We Do A Better Job Individualizing TEA?

- Lean Healthcare
- Identifies the least wasteful way to provide better, safer care
- Doing more with resources available
- 5 principles
  - Specify Value
  - Identify the value stream/patient journey
  - Make the process and value flow
  - Deliver care on demand, with the resources required
  - Pursue perfection
- 7 types of waste
  - Correction, waiting, transportation, over processing, inventory, motion, over production

Pharmacological optimisation

Dose
Volume
Concentration
Choice of medications

Technical Aspects - Placement
- Paravertebral, pleural cavity and intracerebral placement
- Secondary migration after insertion
- Impact on catheter placement
- Method of epidural space identification

Higher success rate
- with placement >5cm into epidural space

Technical Aspects – Catheter & Line
- Tunneling
- Test dose
- Line patency

Correction
- Initial epidural plan as per OR
- APS not involved until POD #1
- Limited TEA solutions available

Waiting
- Patients waiting until “Pain Service arrives”
- Hoping initial interventions work

Transportation
- LA not available on high volume epidural units
- Vasopressors also not available
TEA Management At Sunnybrook
Implementation Fall 2014

- Transition to opioid free epidural analgesia regimen
- Consultation with Pharmacy (clinicians and manufacturing)
- Continuous infusion + PCA component
- Epinephrine (Adrenaline) 5mcg/ml and Ropivacaine (Naropin) 0.3% standard solution
- Additional solutions available for individualizing TEA

Primary Approach

- Collaborate with Anesthesia Intraop
- Normotensive preop
- No chronic pain/opioid use
- Epidural placed T6-10
- Plan
  - Ropivacaine (Naropin) 0.3% and Epinephrine (Adrenaline) 0.005mg/ml
  - Rate: 6ml/hr (range 3-8ml/hr) PCEA 3ml Lockout 15 minutes
Customization Option 1

- Collaborate with Anesthesia
- No chronic pain/opioid use + any of the following
  - "hypotensive" preoperatively
  - Elderly/frail
  - Epidural placed T10-12 (increased risk for motor block)

**Plan**
- Ropivacaine (Naropin) 0.125% and Epinephrine (Adrenaline) 0.005mg/ml
- Rate: 6ml/hr (range 3-8ml/hr) PCEA 3ml Lockout 15 minutes

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Customizing Option 2

- Normotensive preop
- Chronic pain/opioid use and/or
- Painful procedure
- Epidural placed T6-10

**Plan**
- Ropivacaine (Naropin) 0.5% and Epinephrine (Adrenaline) 0.005mg/ml
- Rate: 6ml/hr (range 3-8ml/hr) PCEA 3ml Lockout 15 minutes
- Preoperative opioids by same route
- Plasma concentrations peak in about 67 hrs (of 120 hrs) (Wiedemann)

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Painful Procedure (this is a single procedure!)
- Small bowel resection, closure of loop ileostomy, abdominal wall hernia repair with components separation, placement of biological mesh (10x25cm), intraperitoneal underlay implant, excision of large skin flaps

- In all instances
  - Adjuncts as able
  - Midodrine 10 mg po q 8h pm x3 for SBP <90 mmHg
  - PONV algorithm
Can We Do A Better Job of Troubleshooting?

- Uncontrolled Pain – bilateral/unilateral, +/- sensory block
- Bolus epidural with more potent Ropivacaine (Naropin) as opposed to Lidocaine
  - 1% Ropivacaine vials and
t  - cassettes with 0.125/0.2/0.3/0.4/0.5% available on high volume unit
  - If satisfactory relief with more potent bolus- start infusion with same
  - Rescue epidurals significantly reduced
  - When required- perform on the patient unit
  - Minimal hypotension requiring intervention (vs. using Lidocaine)

Trouble Shooting

- Appropriate analgesia and dense motor block
  - If shutting off until motor block resolution and restarting at a lower rate not satisfactory
  - Lower concentration of Ropivacaine available
Patient Education

- There is not a needle in your back
- Sedation/nausea/vomiting/pruritus NOT from your pain medication
- Leave TEA > 3 days to minimize exposure to opioids
- Epidurals are a way to avoid opioids
- Outline daily process of epidural removal.
  - What to expect
  - How soon to go home
  - Considering handing out little “key messages”

Benefits Of Our New Approach

- Perhaps the combination of Epi +LA is “Just Right”
- No more
  - Pruritus
  - Opioid contribution to ileus
- Reduced systemic absorption when using more potent LA concentrations
- No increased incidence of motor block observed to date with increased LA concentration

- Reduction in replacement epidurals
- Reduction in epidural failure rate
- Many patients not exposed to opioid during hospital admission
Conclusions

- Epidurals continue to be the mainstay for analgesia for many post-surgical populations
- Evidence for improved analgesia compared to all traditional modes of analgesia is indisputable
- We still have not identified the ideal medications/combinations

Room to improve individuality of epidural analgesia

- Need to dedicate key people to deliver this service and provide continuity of care
- Research should focus on quality of life/recovery, and effect on chronic pain/opioid use

Thank You

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