Anesthesia Practice and ERAS

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No Conflicts of Interest
The year is 2002...
70 year old male with colon cancer presenting for colectomy

- History & Physical
- Make sure patient was “NPO after midnight”
ASA Practice Guidelines for Preoperative Fasting

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Anesthesiology 2017; 126:37
Preop: Morning of Surgery

- H&P
- Make sure patient was NPO
- Explain general anesthesia and what to expect in the OR
- Expectations for post op recovery/pain control

- Take patient to the room
  - Premedication – midazolam +/- fentanyl
  - COX-2 inhibitors (Celebrex or Vioxx)
    - Paracoxib – “game changer”
Intraoperative Pain: Pathways

[Diagram showing pain pathways involving the brain, spinal cord, and peripheral nervous system.]

COX 2 Inhibitors

Inhibitors

Peripheral Nociceptor

Limbic Cortex

Sensory Cortex

Thalamus

Mid Brain

Spinal Cord

Descending Pathways

Ascending Pathways

Sensory Fiber

Dorsal Horn

Efferent Fiber
In the OR

• General Anesthesia

• Fluid Management
  – 4-2-1 rule
  – Bowel Prep
  – Evaporative Losses

• PONV prophylaxis

• Pain Management
Predict Fluid Needs and Empirically Replace

• 4-2-1 Rule: 70 kg patient
  – 110 ml/hr

• What about the bowel prep?
  – Add 2-3 L to fluid deficit

• Insensible losses
  – 4-8 ml/kg/hr = 280 – 560 ml/hr

• Blood loss
  – 3 ml crystalloid for every 1 ml blood

110 ml/hr x 8 hrs = 880 ml fluid deficit from being NP

What if patient became hypotensive?

Why so much volume?
Intraoperative Pain Management

- Opioids, Opioids, Opioids
  - Cardiovascular Stability!

- Local infiltration by surgeon

- Epidural – very unlikely for this procedure
  - Lack of outcomes data
  - Difficulty in placing
  - High failure rate
Intraoperative Pain Management

- Opioids, Opioids, Opioids
  - Cardiovascular Stability!
- Local infiltration by surgeon
- Epidural – very unlikely for this procedure
  - Lack of outcomes data
  - Difficulty in placing
  - High failure rate
- Ketorolac – reduced opioid requirement
  - Bleeding
  - Kidney injury
- Dexmedetomidine
- Ketamine
Additional Intraoperative Management

• NGT suction per surgeon’s request

• Appropriate antibiotics prior to incision

• Keep the patient warm

• PONV prophylaxis

  - Female gender
  - Non-smoker
  - Young age
  - Duration of anesthesia
  - Postoperative opioid use
  - History of PONV or motion
# PONV Prophylaxis

Table 2: Ranking and relative value of anesthesia outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Rank</th>
<th>Relative valuea</th>
</tr>
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<tbody>
<tr>
<td>Vomiting</td>
<td>2.56±0.13</td>
<td>18.05±1.09</td>
</tr>
<tr>
<td>Gagging on endotracheal tube</td>
<td>2.97±0.15</td>
<td>17.86±1.43</td>
</tr>
<tr>
<td>Pain</td>
<td>3.46±0.20</td>
<td>16.96±1.59</td>
</tr>
<tr>
<td>Nausea</td>
<td>4.02±0.17</td>
<td>11.82±0.87</td>
</tr>
<tr>
<td>Recall without pain</td>
<td>4.85±0.26</td>
<td>13.82±1.58</td>
</tr>
<tr>
<td>Residual weakness</td>
<td>5.34±0.17</td>
<td>7.99±0.8</td>
</tr>
<tr>
<td>Shivering</td>
<td>5.36±0.20</td>
<td>7.60±0.6</td>
</tr>
<tr>
<td>Sore throat</td>
<td>8.02±0.11</td>
<td>3.04±0.26</td>
</tr>
<tr>
<td>Somnolence</td>
<td>8.28±0.11</td>
<td>2.69±0.25</td>
</tr>
<tr>
<td>Normal</td>
<td>10.00</td>
<td>0</td>
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Values are mean ± sem. aThis means that, for example, patients assigned $18.05 of $100 to avoid vomiting. (adapted from Macario 1999) (18)
Consensus Guidelines for Managing Postoperative Nausea and Vomiting

Gan, Tong J. MD*; Meyer, Tricia MS, FASHP†; Apfel, Christian C. MD‡; Chung, Frances FRCPC§; Davis, Peter J. MD¶; Eubanks, Steve MD¶¶; Kovac, Anthony MD#; Philip, Beverly K. MD**; Sessler, Daniel I. MD††; Temo, James CRNA, MSN, MBA‡‡; Tramèr, Martin R. MD, DPhil§§; Watcha, Mehernoor MD¶¶

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<th>Risk Factors</th>
<th>Points</th>
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<td>History of PONV</td>
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<td>Postoperative Opioids</td>
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<tr>
<td>Sum</td>
<td>0 ... 4</td>
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Evaluate risk of PONV in surgical patient

- Low
  - No prophylaxis unless there is risk of medical sequelae from vomiting (IA)
- Moderate
  - Consider regional anesthesia (IIIA)
  - Not indicated
- High
  - If general anesthesia is used, reduce baseline risk factors and consider using nonpharmacologic therapies (V)

Patients at moderate risk
- Consider antiemetic prophylaxis with monotherapy (adults) or combination therapy (children and adults) (IIA)

Patients at high risk
- Initiate combination therapy with 2 or 3 prophylactic agents from different classes (V)

Gan, Anesthesia & Analgesia, 2003
PACU Management

- More Fluids – 110 ml/hr
- Warm patient
- More Opioids!!
  - Goal of 4/10 pain
  - Bolus with opioids until comfortable then PCA
  - Continue PCA on the floors
Fluid Management

• Goal directed therapy
  – Improved technology/monitors
    • Flotrax, Cheetah, ClearSight
  – Crystalloids (avoid NS if possible)
  – Greater role for colloids
Cheetah’s accurate, precise and 100% noninvasive technology enables clinicians to make more confident and informed treatment decisions to help optimize a patient’s fluid and perfusion status.
Do We Still Need a Bowel Prep?

- If you did not have a bowel prep...
  - Earlier return of bowel function
  - Shorter hospital stay

- No difference in rates of anastomotic leaks or wound infections

Subtract 2-3 L from fluid deficit!!

Kumar et al. Clin Colon Rectal Surg
Reduced Preop Fasting

• Carbohydrate Loading
  – Up to 2 hours prior to surgery
  – Rate of pulmonary aspiration has not increased
  – Reduced thirst, hunger, anxiety
  – Reduced insulin resistance
  – More muscle strength and lean body mass
  – Accelerated recovery
  – Shorter hospital stay
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

- Neuraxial opioids, PCA and regional techniques preferred over PRN opioids
One Problem With Opioids

Roberts et al. Anesthesia and Analgesia, 1
Neuraxial opioids, PCA and regional techniques preferred over PRN opioids

“...anesthesiologists should use multimodal pain management therapy...”

“...patients should receive an around-the-clock regimen of COXIBs, NSAIDs or acetaminophen”
Intraoperative Pain Management

- Volatile Anesthetics
- Opioids
- \( \alpha_2 \)-Agonists
- Acetaminophen
- N-methyl-D-aspartate (NMDA) antagonists

- Local anesthetics (LA) infiltration
- Acetaminophen
- Anti-inflammatory agents, COX-2 inhibitors

- LA via peripheral nerve catheters

- Local anesthetics
- Opioids
- \( \alpha_2 \)-Agonists
- NMDA antagonists
- COX-2 Inhibitors
# Multimodal Pain Management

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Peripheral Nerve Block
Transversus Abdominus Plane (TAP) Block

K Mukhtar, NYSORA, 2009
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https://youtu.be/ab8Dvjauk_U
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Starting ERAS at Cooper: Preoperative Components

Sure. No problem...
• Preop counseling
• Discharge planning
• No/selective bowel prep
• Venous thromboembolism prophylaxis
• Pre warming
• Antibiotic prophylaxis

Are we sure about this?
• Reduced fasting duration
• Carbohydrate loading
Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice

- “Intake of clear fluids should be allowed until 2 h before induction of anaesthesia. Solids should be allowed until 6 h.”
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ERAS at Cooper: Anesthesia Intraoperative Components

OK...

• Active warming

• Multimodal pain management

• Avoid NG tubes

• Multimodal PONV prophylaxis
ERAS at Cooper: Anesthesia
Intraoperative Components

OK…
- Active warming
- Multimodal pain management
- Avoid NG tubes
- Multimodal PONV prophylaxis

Not so sure about this…
- Goal directed fluid therapy
  - Can I potentially damage my patients vital organs by underperfusing?
- Avoid long acting opioids
  - Am I taking care of my patient?
  - Practitioner’s opioid dependence
- Anesthesia is not cookbook!
Barriers to implementing ERAS

• Semi-structured interviews of Surgeons, Anesthesiologists, Nurses and Patients

  – “I think one of the challenges you are going to have is breaking the habits of anesthesiologists as to preoperative fasting...” – surgeon

  – “Whenever you have change you have compliance issues...It is a change from my routine.” – anesthesiologist

  – ”People are skeptical of change” -- nurse

Alawadi et al. Surgery 2016
ERAS at Cooper

• Reduced morphine (equivalent) use

• Improved pain scores

• Decreased length of stay in hospital
Thank You!