Objectives

- Describe the data available on whether or not neuraxial anesthesia/analgesia prevents postoperative mortality or morbidity
- Discuss quality of analgesia provided by alternatives to thoracic epidural analgesia
- Review data comparing thoracic epidural analgesia to other techniques
- Discuss whether thoracic epidural analgesia and other peripheral nerve blocks should be a compulsory part of ERAS protocols

PRO/CON DEBATE: Thoracic Epidural Analgesia vs TAP Block, et al.

YOUR patient is having open abdominal surgery for removal of a tumor, which is your analgesic of choice?

- A) TAP block or other type of infiltration block
- B) Thoracic epidural catheter
- C) IV PCA opioid
- D) Multimodal analgesia

What are important outcomes?

- Analgesia
- Decrease side effects
- Morbidity – cardiac, pulmonary, DVTs, other
- Length of stay
- Readmission
- Complications
- Functional status
- Quality of life
- Patient satisfaction
- Mortality

YOU are having open abdominal surgery for removal of a tumor, which analgesic technique would YOU choose?

- A) TAP block or other type of infiltration block
- B) Thoracic epidural catheter
- C) IV PCA opioid
- D) Multimodal analgesia

TEA is no longer a standard for postoperative analgesia in 2018?

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MIPS

- CMS Anesthesiology Specific Measure Set 2018
  - MIPS #44: CABG: Preoperative Beta-Blocker in Patients with Isolated CABG Surgery
  - MIPS #76: Prevention of CVC-Related Bloodstream Infections*
  - MIPS #404: Anesthesiology Smoking Abstinence*
  - MIPS #424: Perioperative Temperature Management*
  - MIPS #426: Post-Anesthetic Transfer of Care Measure: Procedure Room to PACU*
  - MIPS #427: Post-Anesthetic Transfer of Care Measure: Procedure Room to ICU*
  - MIPS #430: Prevention of PONV - Combination Therapy*
  - MIPS #463: Prevention of Post-Operative Nausea/Vomiting (PONV) - Combination Therapy (Pediatrics)*

Thoracic Epidural Analgesia

- Long history of effectiveness
- We all learn how to do it during training
- Standard procedure
- Can perform quickly in most patients
- Minimal variation
- Ultrasound can assist with placement on difficult patients

Benefits of Epidural Analgesia

- Effective, prolonged analgesia
- Less side effects than systemic analgesia/opioids - less sedation, less nausea/vomiting
- Earlier ambulation, return of bowel function
- Decreased incidence of pulmonary complications and DVTs
- Decreased stress response

Contraindications of Epidural

- Patient refusal or inability to cooperate
- Uncorrected hypovolemia
- Coagulopathy/expected postop anticoagulation
- Increased intracranial pressure secondary to a mass lesion
- Infection (systemic, local)
- History of spine surgery?
- Lack of supporting staff
  - qualified nursing
  - acute pain service

Complication of Neuraxial Analgesia/Anesthesia

- Back pain
- Headaches
- Infection
- Nerve damage
- Hypotension
- Epidural abscess
- Bleeding
- Epidural hematoma
Nerve injury after Neuraxial Blockade
- Between 1/1,000 and 1/1,000,000
- Higher rate for spinal versus epidural
- 85% of patients with neurological deficits had completed recovery within 3 months (Auroy et al.)
- Causes
  - Mechanical injury from catheter and/or needle
  - Adverse physiologic responses
  - Drug toxicity

Complications of Neuraxial Blockade
- Post dural puncture headache – incidence up to 7%
- Backache
- Transient neurological symptoms – related to lidocaine used for spinal anesthetics
- Total spinal anesthesia
- Cardiac arrest

Epidural Hematoma
- Rare but serious complication
- 1: 150,000 for epidural blocks
- 1: 220,000 for spinal anesthetics (Tryba)
- Risks
  - Female gender
  - Increased age
  - Traumatic placement
  - Abnormalities of spinal cord or vertebral column
  - Underlying coagulopathy
  - Indwelling catheter and LMWH pre, intra or postop

Prevention of Epidural Hematoma
- Optimization of coagulation status
- Timing of placement and removal of catheter
- Make decisions on individual patients
- Frequent neuro checks
- Vigilance!
Prevention of Postoperative Morbidity and Mortality

- 141 trials, 9595 patients
- Randomized trials with epidural/spinal vs not
- Did not exclude trials with GA in addition to neuraxial
- Reduces DVT 44%
- Reduces PE 55%
- Reduces transfusion requirements 50%
- Reduces pneumonia 39%
- Reduces respiratory depression 59%
- Reductions in MI and renal failure
- No difference in mortality

Prevention of Postoperative Morbidity and Mortality

- 20 studies with 3006 participants
- Neuraxial anesthesia compared to GA reduces 0-to-30 day mortality for patients undergoing surgery with an intermediate-high cardiac risk level
- Neuraxial anesthesia decreased risk of pneumonia
- No difference compared to GA or GA with neuraxial in myocardial infarction
Prevention of Postoperative Morbidity and Mortality

  - Meta-analysis and small RCTs show similar analgesia between continuous perineural techniques and Epidural.
  - Not enough evidence comparing epidural to continuous wound catheters or single shot nerve blocks.
  - Regional anesthesia techniques overall associated with improved pain scores, but clinical significance not consistently apparent.
  - Analgesic related side effects cloud measured outcomes.
  - No high quality data on health related quality of life, quality of recovery, or patient satisfaction.

  - Failure rate of epidural catheters between 13-47%.
  - Pain score benefit in the 6-17 mm range on a scale of 0-100 mm.
  - Influence of epidural analgesia on pulmonary complications is limited to high-risk intrathoracic procedures and high-risk patients.

Prevention of Postoperative Morbidity and Mortality

  - Insufficient evidence to confirm or deny ability of postoperative analgesic techniques to affect major postoperative mortality or morbidity.
  - Current low incidence of postoperative complications due to increased use of minimally invasive surgery, perioperative DVT prophylaxis, multimodal fast track programs for thoracic/abdominal surgery.

Prevention of Postoperative Morbidity and Mortality

  - Epidural PCA statistically superior analgesia vs systemic or IV PCA opioids for first 3 postop days.
  - Epidural analgesia fails to significantly reduce cardiovascular complications in general surgical population.
  - Insufficient evidence to confirm or deny ability of postoperative analgesic techniques to affect major postoperative mortality or morbidity.

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Risks of Peripheral Nerve Blocks
Peripheral nerve injury

- Residual paresthesia
- Hypoesthesia
- Permanent paresis
- Review of 30 studies from 1995-2005 by Brull 2007
  - Neuropathy
    - Spinal/epidural- 0.04%
    - Peripheral nerve block- 3%
- Overall incidence of PERMANENT damage
  - 0.02% to 0.4%


- Pathophysiology and Etiology of Nerve Injury Following Peripheral Nerve Blockade.
- No data confirming superiority of one nerve localization technique over the other
- Intraneural injection or paresthesia is not entirely predictive of functional nerve injury
- Injury risk is greater during intraneural injection
- Ultrasound CAN detect intraneural injection
- Preop neurological deficits puts patients at increased risk
- Postoperative neurological features more likely related to patient and surgical factors
- Tourniquet neuropathy can be associated with clinical deficits, duration and pressure both important

Alternatives: TAP blocks et al.

TRANSVERSUS ABDOMINIS PLANE BLOCK

Approaches

Midline Incision

Figure 4. USG EL block. PC: peritoneal cavity. LA: local anesthetic.
Others
- Subcostal TAP
- Rectus Sheath
- Quadratus lumborum
- Erector spinae

Let's Compare!

Open vs laparoscopic colorectal surgery randomized to TAP (Bilateral with liposomal bupivacaine) vs Epidural (0.0625% bupi with 2 mcg/ml fentanyl) in the setting of an ENHANCED RECOVERY PROTOCOL

- Acetaminophen, ketorolac, alvimopan (Entereg), early mobilization, dietary advancement, oral analgesics
- Epidurals discontinued POD 2
- Similar procedures each group
- More postoperative urinary retention in epidural group (29.7% vs 14.6%)
- Time to discharge 2.8 (TAP) vs 3.3 (Epi) – IS THIS A REAL DIFFERENCE?
- More PONV in TAP group (32.7% vs 15.5%)

Conventional Epidural vs Transversus Abdominis Plane Block with Liposomal Bupivacaine: A Randomized Trial in Colorectal Surgery

- Randomized to Bilateral TAP block (liposomal bupivacaine and 0.3% bupivacaine 1:2 ratio) vs T7 epidural with bupivacaine/fentanyl
- No multimodal regimen- but used IV Tylenol, NSAIDS and gabapentin PRN
- Primary endpoint - episodes of hypotension (systolic < 90)- TAP (0.6) vs Epi (3) in POD1
- POD 2 pain scores the same
- Total morphine equivalents less for TAP group POD 0-3
- 90% PATIENT SATISFACTION in pain control for both groups
- 84% of TAP group needed IV PCAs vs 18% Epi group

Effectiveness and safety of transversus abdominis plane blocks versus thoracic epidural anesthesia in patients undergoing major abdominal oncologic resections: A prospective, randomized controlled trial

- TAP block with ropivacaine 0.5% VS T9-T10 epidural with ropivacaine 0.2% + morphine
- Acetaminophen 1 g q 8 h, rescue NSAIDS
- Same pain intensity
- TAP group had less PONV, postop ileus
- No difference in hospital stay, complications, urinary retention

Transversus Abdominis Plane Block Improves Perioperative Outcome After Esophagectomy Versus Epidural

- RETROSPECTIVE look at esophagectomy patients
- 32 patients Bilateral TAP block with PCA
- 29 patients thoracic epidural T5-T8
- Similar average pain scores over 72 hours
- Less hypotension in TAP group- 25% vs 76%
- Faster return of bowel function in TAP block- 5 vs 6.7 days
- Less time in ICU for TAP block- 3.2 vs 4.6 days
Ten trials, 505 patients
Pain scores POD 1 at REST equivalent
Epidural- higher rate of hypotension
Length of stay- shorter in TAP group (~0.6 days)

Paravertebral Block

Thoracic Paravertebral Block

Paravertebral vs Thoracic Epidural
• 14 studies, total of 698 patients – low quality evidence
• PVB less hypotension, PONV, pruritus, urinary retention
• No difference in 30-day mortality, major complications, hospital stay
• Equivalent in controlling acute pain

Duration of Analgesia after Plane Blocks?
• Liposomal bupivacaine
  • Can it really provide analgesia for 48-72 hours?
  • How good is the analgesia?
  • Should it be combined with bupivacaine 0.25%/0.5%
  • Cost/benefit ratio
  • Liposomal bupivacaine - 20 ml - $3.54
  • Bupivacaine 0.25%/0.5% - 30 ml - $3.48/$3.85
  • Approved for infiltration blocks
  • Approved for TAP blocks
  • Recent approval for interscalene blocks
  • Catheters
  • Infection risk?
  • Secondary failure rate

Liposomal Bupivacaine vs Regular Bupivacaine
  • Liposomal bupivacaine vs bupivacaine 0.25%
  • Lower max pain scores at all time periods and less PONV in liposomal group
  • Less 72 hour morphine equivalents (14.9 vs 21.7 mg) in liposomal group
  • Satisfaction- 97% vs 85%
Liposomal Bupivacaine vs Regular Bupivacaine

- Liposomal bupivacaine vs 0.25% bupivacaine with adrenaline
- Decreased maximal pain scores (6 hours, 24-48h, 48-72 h) in liposomal group
- Decreased opioid use (48-72 hours)

Wound Infiltration

- Need long acting agents
- No comparison to epidural
- Barron et al. 2016- Lap/robot assisted hysterectomy
  - Liposomal bupivacaine vs 0.25% bupivacaine
  - Decrease in pain scores DAY 3 with liposomal
  - No difference in pain Day 1, Day 14, or while in hospital
  - No difference in opioids, side effects
- Kalogeris et al. 2016- laparotomy for GYN malignancy
  - Retrospective
  - Liposomal bupivacaine vs 0.25% bupivacaine
  - No difference in pain scores
  - Less use of IV PCA (1.4% vs 8.3%) and less rescue opioids (15.3% vs 28.6%) in liposomal groups

Wound infiltration options

- ERAS Protocols
  - Colorectal surgery
  - GYN- Abdominal Hysterectomy
  - Urology- Radical cystectomy and nephrectomy
Pick what is best for each patient!!!