Regional Anesthesia Update: Anesthesia for Total Joint Surgery

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Disclosures

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• Speaker Honorarium from AudioDigest
• Short discussion regarding off label use of liposomal bupivacaine for peripheral nerve blockade

Outline

• Case load
• Anesthesia
• Analgesia
  — Falls
  — Additives
  — Liposomal bupivacaine
• Falls
• Tranexamic Acid
• Bundled Payments
• UW Plan
Scope

• In 2013, an excess of 400,000 hip and knee replacement surgeries were performed
• Estimated cost for hip and knee replacement hospitalization exceeded $7 billion
• Some estimates predict that by 2030, 572,000 THA’s (plus another 97,000 revisions) will be performed

Anesthesia Response

• Increased interest and recognition of role that perioperative intervention can have on postoperative recovery
• Increased focus in anesthesia residencies on regional anesthesia and acute pain management
• Nearly 60 fellowships listed on ASRA directory producing an increasing body of fellowship trained experts in acute pain and regional anesthesia

Surgeon Response

• Increased number of surgeons performing joint arthroplasty
• Fellowship training in joint reconstruction is now available at 79 institutions
• Increased number of minimally invasive, partial or robotic procedures
• Increase in joint related hardware products
Protocolized Care

- Benefits of protocolized care that includes multimodal perioperative analgesia and peripheral nerve blockade for joint arthroplasty
  - Decreased pain scores
  - Decreased opioid consumption
  - Improved participation in physical therapy
  - Decreased inpatient days

Where to Start?

Multimodal Analgesia

- Opioids
- NSAIDS
- Acetaminophen
- Gabapentin
- Ketamine
- Local Infiltration/periarticular injections or infusions
Neuraxial Anesthesia of Joint Arthroplasty

Neuraxial Anesthesia

• Significant potential advantages with the use of neuraxial vs general anesthesia
  – Decreased postoperative pain
  – Decreased EBL and transfusion requirements
  – Decreased nausea and vomiting
  – Decreased thromboembolic disease
  – Decreased operating room time
  – Decreased incidence of surgical site infections
  – Decreased fixed and variable costs

Neuraxial Downside

• Much of beneficial data was generated prior to the introduction of new anticoagulants
• Patients present with an increased array of chemically induced bleeding disorders
• May hinder the ability of surgeons to restart anticoagulation postoperatively
• May require urinary catheterization which could increase risk of UTI’s
  – Could result in decreased reimbursement
New Anticoagulants

Interventional Analgesia Techniques
• Epidural/Plexus/Peripheral
• Evidence exists in the literature to support all/most of these techniques
• Each has potential drawbacks that should be considered

Neuraxial Analgesia for Total Joints
• Continuous epidural blockade provides excellent postoperative analgesia
  – Requires urinary catheterization
  – May hinder the ability of patient to participate in physical therapy
  – May hinder the ability to start postoperative thromboprophylaxis
• Intrathecal opioid therapy has been shown to improve patient satisfaction and decrease postoperative opioid requirements
  – Requires training and monitoring to ensure that delayed respiratory depression does not go unnoticed
Regional Anesthesia For THA

- Continuous and Single Shot Lumbar Plexus blockade techniques have been describe
- Continuous and Single Shot femoral nerve blockade have been described
- Sciatic nerve block techniques have been described

Femoral Nerve Block for THA

- Femoral nerve block/Fascia Iliaca block
  - Relatively easy to perform
  - Relatively safe
  - Incomplete analgesia
  - Inconclusive evidence for success
    - Randomized study failed to show advantage to fascia iliaca block vs placebo
    - Potential for significant quadriceps weakness

Lumbar Plexus Block for THA

- Lumbar plexus blockade
  - Advanced regional anesthesia technique
  - Potential for adverse events higher than with other blocks
  - May impact ability to deliver thromboprophylaxis
  - May result in epidural spread or quadriceps weakness that can hinder participation in PT
  - Inconclusive evidence suggesting success
Regional Analgesia For TKA

- Continuous femoral, lumbar plexus and sciatic nerve blockade have been described.
- Single shot femoral, lumbar plexus and sciatic nerve blockade have been described.
- Adductor Canal blockade has emerged as promising mechanism to provide analgesia while minimizing quadriceps weakness.

Adductor Canal Block

- The adductor canal is an aponeurotic tunnel in the middle of the thigh.
- Boundaries:
  - Anteriorly - sartorius
  - Posteromedially - adductor longus, adductor magnus
  - Laterally - vastus medialis

Adductor Canal Block

- Contents:
  - Femoral artery
  - Femoral vein
  - Femoral nerve branches
    - Saphenous nerve
    - Nerve to the vastus medialis

Adductor Canal Block and Efficacy

• Adductor canal compared to femoral nerve catheter
  – Continuous adductor canal blockade associated with decreased time to achieve adequate mobilization for discharge
  – Resting analgesia and opioid requirements similar between blocks
  – Dynamic analgesia improved in femoral nerve catheter group

Adductor Canal Block and Efficacy

• Single Shot ACB vs FNB
  – ACB patients had significantly higher postoperative dynamometer readings
  – ACB non-inferior with respect to pain control and opioid administration

• Femoral nerve catheter vs single shot adductor canal block for TKA
  – Mean length of stay was shorter in adductor canal block group (2.7 vs 3 days)
  – Adductor canal group ambulated further and had improved knee flexion on POD 1 and POD 2
  – No difference in pain scores or opioid consumption on POD 1 or POD 2

Adductor Canal Continuous Catheter

• 90 patients randomized to receive single shot or adductor canal catheter
• VAS better at all time points for catheter technique
• Ambulation ability (timed up and go, 10 m walk test, 30 s chair) and early functional recovery (active SLR, ambulation with walker, staircase competency, ambulation distance, and maximum flexion at discharge) showed no difference between groups
Adductor Canal Block Unknowns

- Impact of epinephrine administration at site of tourniquet application
- Volume of injection that results in adequate sensory blockade without significant weakness

Sciatic Nerve Block for TKA

- Advanced regional anesthesia technique
- May result in increased risk of LE weakness and falls
- Safa et al
  - 100 patients prospectively enrolled
  - Randomized to three groups (control, sciatic block, posterior capsule infiltration)
  - No significant differences with regard to pain, minimal changes in opioid administration beyond 4 hours postop and increased difficulties with ambulation in the sciatic nerve block group.

Regional Analgesia Downside for TKA

- Femoral nerve block in isolation unlikely to result in complete analgesia
- All lower extremity nerve blocks likely associated with increased risk of weakness and falls
- Sciatic nerve blocks have not been demonstrated to decrease time to discharge readiness
Falls

- JCAHO declared in 2005 that reducing risk of harm from falls a national patient safety goal
- 1.6-2.7% reported incidence following TKA
- Associated with higher cardiac and pulmonary complications, 30-day mortality, and higher usage of critical care modalities

Falls and Blocks

- Mechanism for falls following peripheral nerve blocks
  - Impaired proprioception
    - Difficulty with foot placement
  - Impaired limb stiffness
    - Decreased knee stiffness leads to difficulty to post for pivot and balance correction
  - Impaired postural and lateral stability
    - Decreases in stability lead to difficulty with balance during pivoting maneuvers (getting in/out of chair/bed)

Risk factors for fall following TKA

- Anesthesia Type
  - General anesthesia found to have higher incidence of postoperative fall relative to neuraxial
  - Femoral nerve blockade associated with postoperative fall
- Comorbidites
  - Advanced age
  - Obesity
  - Diabetes
  - Vascular Disease
Falls and Blocks

- Use of knee immobilizers may decrease the risk of fall following femoral nerve blockade
- Decreased concentrations of local anesthetics may decrease the risk of fall
- Adductor canal blockade promises to decrease risk of fall without significantly compromising analgesia
- Protocols and preoperative education may result in additional decreases in fall risk

Peripheral Nerve Block Additives

- Dexamethasone
- Clonidine/Dexmedetomidine
- Buprenorphine
- Magnesium

Liposomal Bupivacaine

- OFF LABEL ALERT!!!
- Liposomal bupivacaine is a local analgesic that utilizes bupivacaine in combination with DepoFoam®
- Liposomal bupivacaine is indicated for administration into the surgical site to produce postsurgical analgesia.
Liposomal bupivacaine

- Bilateral single injection femoral nerve blocks in healthy volunteers
- Partial sensory and motor block beyond 24 hours
- High degree of intersubject variability

Liposomal bupivacaine

- Periarticular LB vs Femoral Nerve Block with Bupivacaine
  - No difference with regard to pain, nausea or opioid consumption
  - FNB group had greater flexion
  - Liposomal bupivacaine group had improved early ambulation and hospital LOS

Liposomal bupivacaine

- Periarticular liposomal bupivacaine vs periarticular bupivacaine
  - No difference in pain scores on days 1, 2, 3
  - No difference in opioid consumption
  - Authors concluded that cost ($285) and lack of efficacy precluded routine administration
Tranexamic Acid

- TKA generally associated with 1000-2000 ml blood loss and 10-30% of patients require allogenic transfusion
- Tranexamic Acid (TXA) functions via inhibition of fibrinolysis
- Should be used in caution in patients at risk for MI or CVA
- Studies have evaluated both IV and topical administration of TXA
  - Decreases in blood loss, transfusion rate evident with use of TXA

Bundled Payments

- Why?
  - CMS has noted a wide variability with regard to complications (infections/implant failures) and costs
  - CMS is therefore is attempting to improve care for patients presenting for THA and TKA
  - Reward/Punishment system is to be established for excellent/substandard care
  - Hospital will be responsible for patient outcomes out until 90 days following their surgical procedure

- Bundled Payments are coming (proposed rule published 7/14 - may be here by the time of this meeting).
- Much of the focus is going to be on hospital/ post-hospital programs that enhance recovery and avoid complications and readmissions
Bundled Payments

• How will bundled payments impact the delivery of anesthesia care?
  – Every expenditure will be closely examined.
  – Expenditures will need to be well justified
  – Techniques that expedite discharge will be rewarded
  – Complications need to be avoided
  – Protocols will likely help facilitate improvements

UW’s strategy for anesthesia and analgesia for THA

• Not 100% protocolized or standardized across surgeons/patients but....
  – Preoperative: Acetaminophen
  – Intraoperative: CSE
  – Postoperative: Oxycontin, Oxycodone, scheduled tylenol, +/- celecoxib, +/- ketorolac

UW’s strategy for anesthesia and analgesia for TKA

• Not 100% protocolized or standardized across surgeons/patients but....
  – Preoperative: Acetaminophen, single shot adductor canal nerve block
  – Intraoperative: CSE, periarticular local anesthetic and ketorolac
  – Postoperative: Oxycontin, Oxycodone, scheduled tylenol, +/- celecoxib, +/- ketorolac