**Regional Anesthesia and Acute Pain Medicine Update: CRASH 2014**

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**Disclosures**

- I have no disclosures

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**Objectives**

- To present a thorough review of the relevant regional anesthesia and pain medicine literature for the year of 2013.
- In discussing this data, utilize evidenced based medicine to potentially implement changes into your daily management of perioperative pain.

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**“For every study, an equal and opposite study exists”**

-Anesthesia attending, circa 2004

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**Review of the 2012 Literature**

1. National guidelines/recommendations exist from the ASA and JCAHO that strongly recommend multimodal analgesia.
   - Minimizing opioids
2. Dexamethasone, Ketamine, and Dexmedetomidine are all useful multimodal adjuvants
   - Safe and effective at opioid sparing
3. Spinal Anesthesia possesses many benefits
   - Lower Mortality/morbidity in elderly hip fracture patients
   - Lower incidence of infection, blood loss, and surgery length of stay in total knee arthroplasty patients

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**Review Cont.**

4. Epidural Analgesia possesses a complication rate of:
   - Insufficient Analgesia ~ 10% (Mostly Targeting)
   - Intravenous Placement ~ 3% (Mostly Elderly)
   - Dural Puncture ~ 1.5% (Mostly Elderly)
5. Epidural Analgesia benefits consist of:
   - Decreased morbidity in general surgery and orthopedic surgery populations
   - Decreased mortality in cancer patients
   - Utilized even such as intrathecal use and assurance of pain
6. Incidence of Chronic Pain after joint replacement is significant and associated with poor perioperative pain control:
   - 38% for THR
   - 53% for TKA
7. Peripheral Nerve Blocks:
- Are more beneficial when administered in a continuous fashion
- Ideal anesthetic volume: 10-15mL
- Accurate needle placement is crucial
- Avoid puncture of the caudal vein
- Required rates for epidurals are variable
- TAP blocks are best performed under ultrasound guidance

8. Anticoagulation and the neuraxial:
- Thrombolytic agents must be used with caution
- Antithrombin consumption may be up to 50% higher when used with epidurals
- Consider use of anticoagulants in the obstetric population

9. Local Anesthetics:
- Local anesthetics are still the horizon
- Knowledge of local anesthetic toxic levels (LATs) and the subsequent algorithm is essential to any practicing anesthesiologist

**Neuraxial Anesthesia: Thoracic Epidurals**

- Epidurals superior to subcostal TAP blocks which are superior to intravenous opioids in patients undergoing radical pneumonectomy (Wu et al. Anesth A 8/2013)
- In one prospective trial, total systemic opioid consumption was lower in the epidural group (Kobayashi Surg Today 5/2013)
- Epidurals in CABS surgery decreased postoperative pain significantly vs. IV opioids (Dean J Card Surg 5/2013)
  - Visual analog scores (VAS) of 3.0 vs. 6
  - Decreased postoperative pain, ICU stays, and hospital stays
- Epidurals placed in 10SG low to moderate risk cardiac surgery patients (CABS, MVR, AVR) (Stenger, J Card Vasc Anesth 5/2013)
  - Reduced pain scores at 4 hours and less frequent analgesics

**Neuraxial Anesthesia: Obstetrics**

- Moore et al. concluded that labor epidurals do not increase the risk of caesarian section (Moore)
  - They also concluded that other independent risk factors, associated with early epidural initiation, do increase the risk of caesarian section
  - Labor augmentation, pulmonary complications, rupture of membranes, and increasing maternal weight

- Two studies examined the efficacy of labor epidural vs. combined spinal epidural
  - Nelson concluded that although CSE is associated with more reliable positioning, lower epidural replacement rates, and lower unilateral block rates, no consistent benefit was seen (Nelson Anesth Analg 5/2013)
  - Gambling determined that CSE provided better first stage analgesia and required less top-up injections (Gambling Anesthesia and Analgesia 3/2013)

**Neuraxial Anesthesia: Thoracic Epidural Cont.**

- Comparison of paravertebral block to thoracic epidural after thoracotomies (Kobayashi Surg Today 9/2013)
  - VAS scores comparable at 2.34 and 4.68
- Comparison of paravertebral blockade vs. epidural after thoracic surgery (Dango BSA 3/2013)
  - Postoperative pain scores lower in epidural group: 4.4 vs. 5.7 with movement
  - Clinical course felt to be similar

**Neuraxial Anesthesia: Obstetrics Cont.**

- Use of ultrasound for spinal placement in pregnant patients (Sahin J Anesth 10/2013)
  - Ultrasound scanning performed in oblique and lean patients
  - High level of success utilizing the preprocedure ultrasound-determined point
  - In all patients (especially obese), ultrasound can facilitate fast and reliable spinal anesthesia
Adductor

\[\begin{align*}
&\text{Peripheral Nerve Blockade: Upper Extremity} \\
&\text{Dose ranging studies: MEV90 of 0.5% bupivacaine with epinephrine required for ultrasound-guided interscalene block (Falcao BJA 3/2013)} \\
&\quad \text{- MEV90 was 0.95mL} \\
&\quad \text{- However, 2-3x-4.2x mL required for adequate postoperative analgesia} \\
&\quad \text{- Reduced diaphragmatic paradox seen with these volumes} \\
&\text{Literature review to provide recommendations for shoulder analgesia (Bowens Anesth Res Pract 2013)} \\
&\quad \text{- Recommends single shot blocks for procedures of mild to moderate pain} \\
&\quad \text{- Continues interscalene blockade for procedures of moderate to severe pain} \\
&\quad \text{- Ultrasound reduces the amount of local anesthetic required (compared to nerve stim)} \\
&\quad \text{- Dorsal scapular and suprascapular blocks are inferior to interscalene blockade} \\
&\quad \text{- Intraarticular injections should be avoided due to potential chondrolysis} \end{align*}\]

\[\begin{align*}
&\text{Peripheral Nerve Blockade: Upper Extremity cont.} \\
&\text{Stroke and shoulder surgery} \\
&\quad \text{Intercostal and Pudendal nerve block are both extremely rare when shoulder surgery is} \\
&\quad \text{conducted in the beach chair position in conjunction with regional anesthesia (Rehbein RAPM 3/2013)} \\
&\quad \text{Patients undergoing shoulder surgery had less cardinal oxygen desaturation events when} \\
&\quad \text{receiving only regional anesthesia for their anesthetic (Koh JS Shoulder Elbow Surgery 10/2013)} \end{align*}\]

\[\begin{align*}
&\text{Peripheral Nerve Blocks: Lower Extremity} \\
&\text{Dose Ranging Studies} \\
&\quad \text{10mL of 0.25% bupivacaine necessary for onset of sensory and motor block within 60 minutes} \\
&\quad \text{(Nader RAPM 11/2001)} \\
&\quad \text{- Volume greater than 10mL did not reduce any faster} \\
&\text{LIA blocks saline required for successful ultrasound guided femoral nerve block in 90% of} \\
&\text{patients (MEAC 90, Minimal Effective Anesthetic Concentration (Thau BJA 6/2013))} \\
&\text{Adductor Canal (Saphenous Nerve) Blockade} \\
&\quad \text{Adductor Canal Blockade and local infiltration analgesia (LIA) are superior to LIA alone (Henning RAPM 3/2013)} \\
&\quad \text{Lessens stimulated well in both groups} \\
&\quad \text{Ultrasound guided adductor canal block resulted in significantly greater quadriceps strength as} \\
&\quad \text{compared to femoral nerve block (Kaufte RAPM 7/2013)} \end{align*}\]

\[\begin{align*}
&\text{Peripheral Nerve Blocks: Lower Extremity Cont.} \\
&\text{Adductor Canal Blocks cont.} \\
&\quad \text{Adductor Canal Blockade resulted in better quadriceps strength than femoral nerve block in} \\
&\quad \text{patient undergoing TKA (Langer RAPM 11/2012)} \\
&\quad \text{- Pain was the same} \\
&\quad \text{Continuous adductor canal blockade in combination with LIA resulted in better pain control} \\
&\quad \text{than LIA alone in TKA patients, (Aherns RAPM 5/2018)} \\
&\quad \text{Adductor Canal Blockade and LIA was superior to femoral nerve block for ambulation after TKA} \\
&\quad \text{(Perin RAPM 7/2013)} \\
&\quad \text{- From these five studies, it is safe to assume that adductor canal blockade provides} \\
&\quad \text{some level of analgesia with little quadriceps weakness after TKA. However, only one study directly} \\
&\quad \text{compares adductor canal vs. femoral nerve block for pain. More studies are needed} \end{align*}\]

\[\begin{align*}
&\text{Peripheral Nerve Blocks: Lower Extremity Cont.} \\
&\text{Total Hip Arthroplasty (ideal mode of analgesia)} \\
&\quad \text{Comparison of LIA (ropivacaine 300mg, Ketorolac 30mg, and epinephrine 0.5mg) with} \\
&\quad \text{intrathecal morphine (Kuchalik BJA 11/2012)} \\
&\quad \text{- Morphine group had lower pain intensity} \\
&\quad \text{- Analgesic consumption, pain at mobilization, and side effects were lower in the LIA group} \\
&\text{5 year review of HLSIA in TKA and THA patients determined that it is impossible to state that} \\
&\text{this technique provides any benefits for postoperative pain (Fowler Anesth Intensive Care}} \\
&\text{7/2013)} \\
&\text{Comparison of fascia iliaca block vs. sham block in THA patients (Sharlat RAPM 5/2013)} \\
&\quad \text{- No benefit of fascia iliaca compared to sham} \\
&\text{Gold standard should remain lumbar plexus, intrathecal morphine, or epidural analgesia after THA} \end{align*}\]
Outcomes

- Implementation of a regional anesthesia block nurse team (Russell J PeriAnesth Nurs 2/2013)
  - Improved patient safety
  - Improved perioperative efficiency and productivity

- Patients receiving spinal anesthesia (a general) for total knee arthroplasty had a lower complication rate (Jagoda J Bone Joint Surg Am 2/2013)
  - Lower superficial infection rate in the spinal group
  - Reduced length of surgery and reduced length of stay

- Patients receiving spinal anesthesia for TKA had lower adjusted odds of both pneumonia as well as any systemic infection (Liu A A 10/2013)
  - Vaccination was the cause

- Addition of a single shot or continuous sciatic nerve block does not affect long term pain or disability at 5 and 12 months after TKA (Morgan J Pain 1/2013)

Outcomes Cont.

- POISE trial refutes the safety of neuraxial anesthesia (Leslie B 9/2013)
  - Neuropraxia block in patients with increased risk for cardiovascular mortality suffered a higher incidence of adverse cardiovascular events
  - Findings unexplained and recommendations have yet to be made

- Tranexamic acid reduces both blood loss and transfusion requirements in joint replacement surgery (Lee J Clin Anesth 2013)

- Patients undergoing total hip arthroplasty under spinal anesthesia are at low risk of urinary retention (Miller J Bone Joint Surg Am 2013)
  - Only rare reports of urinary retention

Outcomes Cont:

- Interim bolus dosing x continuous infusions
  - Patient intermittent epidural bolus (PIEB) is superior to patient controlled epidural analgesia (PCEA) (Gia Anesthesia 2013)
    - Higher satisfaction scores with costs effects
  - Decreased PCA consumption in patients treated with block population (Hillegass J Clin Anesth 2013)
  - Hematocele reduction intervention methods

- Chronic pain after high risk surgery
  - Study assessing the effects of regional anesthetic vs conventional analgesia in high-risk surgery patients (Kapoor 2013)
  - Lower rates of hospital stay
  - Epidural anesthetics and patient controlled analgesia provide excellent complementary painkillers in similar patient populations

Adjuvant Medications

- Ketamine
  - Epidural ketamine (Kent A 4/2010)
    - Approved in the US superior to epidural magnesium in patients undergoing thoracic surgery (Kent BBQ 1/2010)

- Alpha-2 Agonists
  - dexmedetomidine (Hillegass J Clin Anesth 2013)
    - Reduced when administered separately from titrated dose to support its peroneal use
  - Guanfacine
    - 2-4 mg/day of solution when administered via an epidural
      - Early trials showed blocks limited the onset and prolonged duration of both the sensory and motor block
      - Higher doses did not help

Two Content Layout with Table

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Group A
- Task 1
- Task 2

Group B
- Task 1
- Task 2

Group C
- Task 1