

Regional Anesthesia and Pain Medicine Update: 2013 CRASH

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Disclosures

- I have no disclosures

Objectives

- To present a thorough review of the relevant regional anesthesia and pain medicine literature for the year of 2012.
- In discussing this data, utilize evidenced based medicine to potentially implement changes into your daily management of perioperative pain.

ASA Task Force

- Practice Guidelines for Acute Pain Management in the Perioperative Setting (Anesthesiology Jan 2012)
 - A directed pain history, physical examination and pain control plan should be included in the preop evaluation of every patient
 - “Whenever possible, anesthesiologists should use multimodal pain management therapy”
 - ATC regimen of COXIBs, NSAIDs, or acetaminophen

Joint Commission Sentinel Event Alert

- JCAHO released a sentinel event alert in August of 2012 regarding **the safe use of opioids in hospitals**
 - Identified characteristics of patients who are at risk for oversedation or respiratory depression
 - Sleep apnea, obesity, age, opioid naivety, concomitant meds, multiple comorbidities
 - Recommendations:
 - Improved patient education
 - Improved physician education
 - Improved systems (respiratory monitoring/ETCO2 v. pulse ox)
 - Avoidance of opioids
 - Multimodal analgesia

Adjuvant Medications

Adjuvant Meds: Ketamine

- Double blinded, randomized study of parturients undergoing elective repeat c-sections with spinal anesthesia (Minerva Anesthet July 2012):
 - Ketamine v. Placebo
 - Ketamine group received 0.5mg/kg bolus after delivery as well as 2mcg/kg/min infusion for 12 hours
 - Ketamine group had reduced morphine consumption out to 24 hours
 - ~30%
 - No differences in residual pain after 3 years
- Double blinded, randomized trial of parturients undergoing caesarian section with spinal anesthesia (Int J of Obst. Anest July 2012):
 - Ketamine v. Placebo
 - Ketamine group received 0.15mg/kg bolus after spinal placement
 - Ketamine group displayed lower 24 hour analgesic requirement, longer times to analgesic administration, and lower 24 hour pain scores

Adjuvant Medications: Dexamethasone

- Metaanalysis of perioperative dexamethasone effects on postoperative analgesia showed: (BJA 1/15/2013)
 - 45 studies, dose ranging from 1.25-20mg
 - Decreased postoperative pain at 2 and 24 hours
 - Decreased morphine consumption at 2 and 24 hours
 - No increased incidence of wound healing or postoperative infection
 - Higher glucose levels at 24 hours

Adjuvant Meds: Alpha 2 Agonists

- Metaanalysis of 30 studies and 1792 patients examining the effects of alpha-2 agonists (clonidine and dexmedetomidine) when administered systemically in surgical patients (Anesthesiology June 2012):
 - Both drugs decreased morphine consumption for 24 hours
 - Decreased pain at 24 hours with both
 - Decreased nausea with both
 - Increased hypotension with clonidine
 - Increased bradycardia with dexmedetomidine

Intravenous Regional Anesthesia: Bier Blocks

Bier Blocks Cont.

- Addition of either 0.5mg/kg of ketamine or 1mcg/kg of dexmedetomidine to 20cc of 1% lidocaine to bier block showed (JACP 12/20/2012):
 - Ketamine reduced the block onset time, delayed the tourniquet pain time, and had improved patient satisfaction over lido or lido/dex groups
 - Dexmedetomidine and ketamine reduced postoperative analgesic requirements

Spinal Anesthesia

Spinal Anesthesia: Safety

- In vitro studies with chlorhexidine antiseptics have shown that the cleaning solution is toxic to both neurons and schwann cells
- However, a four year review at the Mayo clinic (12,465 spinal anesthetics) in which chlorhexidine was utilized showed (RAPM March-April/2012):
 - A neurologic complication rate of 0.04%
 - Same as the complication rate of spinals performed without chlorhexidine

Spinal Anesthesia: Safety/Benefits

- 45 patients older 75 years old or greater undergoing hip fracture repair under either continuous spinal anesthesia, TIVA, or sevoflurane anesthesia (RAPM 7/2012)
 - Blood pressure stability was best in the continuous spinal group
 - No hypotensive episodes
 - Achieved by 2.5mg bupivacaine boluses
- 180 patients undergoing planned outpatient laparoscopic cholecystectomy randomized to receive spinal or general anesthesia (Journ of Laparoend Adv Surg Tech July/2012)
 - Spinal group had less:
 - Postoperative pain
 - Nausea/Vomiting
 - Overnight admissions (8 v. 0)
 - Four conversions to GETA for shoulder pain

Spinal Anesthesia: Benefits

- 18,158 patients undergoing hip fracture surgery with either regional or general anesthesia (Anesthesiology July 2012):
 - 29% Regional, 71% General
 - Lower odds ratio for mortality and respiratory complications in regional group
 - 0.71 v. 0.54
 - Results more prevalent with intertrochanteric fractures

Spinal Anesthesia: Adjuvants

- **Dexmedetomidine:**
 - The addition of 0.25-0.5mcg/kg of intrathecal dexmedetomidine to hyperbaric bupivacaine (JofA 1/11/2013)
 - Significantly increased the duration of motor and sensory block
 - 165min. V. 210 min.
 - No increased hypotension/bradycardia noted in dex groups
- **Neostigmine:**
 - Patients undergoing TKA, received a spinal anesthetic (bupivacaine/fentanyl) with and without neostigmine 1mcg (JACP 12/2012):
 - Neostigmine group had increased duration of analgesia with decreased opioid consumption (210 v. 270 min)
 - No increased side effect in neostigmine group (n/v)

Spinal Anesthesia: Intrathecal Morphine

- 256 patients undergoing idiopathic scoliosis surgery randomized to receive intrathecal morphine or nothing (Ped An 1/2013)
 - Intrathecal morphine group showed decreased blood loss, transfusion requirements, and improved hemodynamic stability
- 60 patients undergoing total hip arthroplasty randomized to receive either local infiltration analgesia (LIA) with levobupivacaine or intrathecal morphine (Acta Anesthe Scand July/2012):
 - IT morphine group had less opioid consumption on the day of surgery
 - Equal consumption on P.O.D. 1 and 2
 - Comparable pain scores and patient satisfaction
 - Comparable PONV

Spinal Anesthesia: Intrathecal Morphine cont.

- 50 patients undergoing laparoscopic colon resection under general anesthesia randomized to receive intrathecal morphine or nothing (Br J Anesth May/2012):
 - Less postoperative opioid consumption in the IT group
 - No other benefits
 - Return of bowel function
 - Length of stay
 - Readiness for discharge

Epidural Anesthesia

Epidural Anesthesia: Efficacy and Dosing

- Obstetric patients in labor randomized to receive either standard automated boluses v. continuous infusion (both had PCEAs) (Anaesth 1/2013)
 - Automated bolus group displayed higher satisfaction
 - 96% v. 89%
 - No difference in maternal/fetal side effects or outcomes
- Obstetric patients scheduled for elective caesarian section with epidural to receive either morphine, sufentanil, or both showed (JACP 12/2012):
 - Faster onset of action and prolonged duration of analgesia in the combined morphine/sufentanil group (2mg/25mcg)

Epidural Anesthesia: Complications

- Study of 8000 non obstetric epidurals to assess known epidural complications: intravenous placement, dural puncture, and insufficient analgesia (BMC anesthesiology 12/2012)
 - Unsuccessful catheter placement occurred in smaller individuals and at lower sites (1%)
 - Insufficient analgesia (9%) seen more often with high thoracic or low lumbar blocks
 - Intravenous placement more common in the elderly (3%)
 - Dural perforation more common in the elderly (1.6%)

Epidural Anesthesia: Benefits

- Looking at 8610 patients who underwent a Whipple procedure, 11% received epidurals. (Am J of Surg 12/2012)
 - Epidural use associated with lower odds of complications including death
- 15,687 patients undergoing bilateral total knee arthroplasty with general, neuraxial, or combined general-neuraxial anesthesia (RAPM 11/2012)
 - Neuraxial anesthesia group had lower rates of transfusion and subsequently morbidity (28% v. 45%)
- Epidurals **shortened the length of hospital stay** in 1312 patients undergoing anterior resection for colorectal cancer (Int J of Colorectal Disease Sept/2012)
 - Did not affect anastomotic breakdown

Epidural Anesthesia: Benefits

- Case report of the use of epidural anesthesia to treat a intractable paralytic ileus (Acta Anesth Taiwan June/2012)
 - 65 year old man s/p colectomy develops an ileus unresponsive to traditional therapies
 - Thoracic epidural placed for four days
 - Resolution of ileus
- 19 yo G1PO at 28 weeks with sickle cell disease in vasoocclusive crisis unresponsive to high dose IV opioid therapy (J Anaesth Oct 2012)
 - Lumbar epidural placed with complete resolution of symptoms
- 42 patients undergoing elective coronary artery bypass surgery randomized to receive thoracic epidural (Acta Anaesth Scand July 2012) or nothing:
 - Less stress hyperglycemia and subsequent insulin use seen in thoracic epidural group

Education

Education: Patient Education

- As adequate pain control becomes a potential point of reimbursement, more pain assessment questionnaires have been developed:
 - Perioperative Satisfaction Questionnaire in Regional Anesthesia (anesthesiology 1/2013) EVAN-LR
 - Demonstrated adequate postoperative assessment
 - Patients greater than 55 reported higher satisfaction scores
- 1030 patients undergoing either THA or TKA were interviewed regarding chronic pain after surgery
 - 38 % after THA
 - 53% after TKA
 - Risk factors were female sex, younger age, prior surgery, knee replacement, and **poor perioperative pain control**

Education: Resident Education

- ABA accredited residency programs were surveyed regarding their ultrasound use (Pain Med Oct 2012):
 - 82 programs responded
 - 75% of programs used ultrasound as their first choice technique
 - 20% used a concurrent nerve stimulator
 - Three most common reasons for ultrasound use were:
 - Improved teaching ability
 - Achieved a higher success rate
 - Safer
 - Three most common barriers for ultrasound use were:
 - Decreased efficiency
 - Lack of equipment
 - Lack of training

Peripheral Nerve Blocks

Peripheral Nerve Blocks: Benefits

- Continuous Blocks
- Metaanalysis comparing continuous nerve blocks with single injection nerve blocks (RAPM Nov 2012)
 - Including femoral, paravertebral, lumbar plexus, interscalene, infraclavicular, and popliteal
 - Continuous nerve blocks associated with:
 - Improved pain control
 - Decreased opioid analgesic consumption
 - Less nausea
 - Greater patient satisfaction
 - Functional outcome data unclear

Peripheral Nerve Blocks: Benefits Cont.

- Addition of a single shot sciatic or continuous sciatic to a femoral catheter in patients undergoing TKA (RAPM Jan 2013):
 - Did not yield improved pain, physical function, or stiffness at 3 or 12 months

Peripheral Nerve Blocks: LA volume

-What is the correct local anesthetic volume for any given nerve block??

-30 patients received either 15mL or 40mL of mepivacaine for an ultrasound guided axillary brachial plexus block (RAPM May 2012):
 -Reducing the dosy to 15mL shortened the time to first request for postoperative analgesia by 30%

-Patients undergoing ultrasound guided interscalene brachial plexus block (BJA 12/2012):

- MEV90 was 1mL
- 2.34 provided adequate postoperative analgesia (as defined by 6 hours)
- No phrenic nerve blockade was noted with less and 4.29mL

Peripheral Nerve Blocks: Anesthetic Volume Cont.

- Minimal Effective Volume of lidocaine 1.5% for double injection ultrasound guided axillary block (RAPM Jan 2013)
 - 50 patients enrolled
 - Success defined by surgical block
 - MEV90 was 5.5mL for musculocutaneous nerve
 - MEV90 was 23.5mL for axillary block
- Subjects undergoing rotator cuff repair with surgical interscalene block were randomized to receive either 5, 10, or 20mL of 0.75% ropivacaine and then started on an infusion of 0.2% ropivacaine (BMC Anesth March/2012):
 - All doses provided adequate surgical anesthesia
 - 5mL volume associated with higher PACU pain scores
 - 20mL volume associated with higher incidence of dyspnea

Peripheral Nerve Blocks: Safety

- Excellent Lipid Emulsion Review article by Guy Weinberg in Anesthesiology July 2012:
 - Excellent case reports
 - Discusses mechanisms of action
 - Partitioning (lipid sink)
 - Metabolism
 - Modulation of cardiac sodium channels
 - Superiority over epinephrine, vasopressin, epi/vaso
 - Avoidance of high dose epinephrine
 - Dosing
 - 1-3 mL/kg
 - 0.25-0.5 mL/kg/min

Peripheral Nerve Blocks: Safety

- 325 patients underwent a subgluteal, ultrasound guided sciatic nerve block (RAPM May 2012):
 - 16% resulted in intraneural injection
 - Intraneural injection resulted in faster block onset but did not result in neural injury
- 12,688 patients undergoing ultrasound guided peripheral nerve blocks (RAPM Sept 2012):
 - Incidence per 1000 blocks of side effects:
 - 1.8 for temporary neurologic symptoms (~5 days)
 - 0.9 for prolonged neurologic symptoms (> 6 months)
 - 0.08 for seizure
 - 0 for pneumothorax (1500 supraclavicular blocks)
 - 0.6-1.2 for unintended vascular puncture

Peripheral Nerve Blocks: Safety cont.

- 1569 patients undergoing total shoulder arthroplasty (TSA) (RAPM Sept 2012):
 - Neurologic injury seen in 35 cases (2.2%)
 - Average follow up was 2.5 years
 - 10 of 35 had residual effects at 2.5 years
 - Use of interscalene block **did not** increase risk of neurologic injury
- 15,014 patients undergoing shoulder arthroscopy under regional blockade in beach chair position (RAPM Jan 2013)
 - No perioperative strokes

Peripheral Nerve Blocks: Adjuvants

- 120 patients undergoing shoulder surgery randomized to receive different brachial plexus blocks (Minerva Anesth Feb/2012):
 - 40 Received 0.5% levobupivacaine
 - 40 Received 0.5% levobupivacaine with 1.5mg/kg of perineural tramadol
 - 40 Received 0.5 levobupivacaine with 1.5mg/kg of I.M. tramadol
 - Block durations were 7.6 hours, 14.5 hours, and 10 hours for the three groups

Peripheral Nerve Blocks: Axillary

- 120 patients randomized to receive either a double, triple or quadruple injection axillary brachial plexus block (RAPM May 2012):
 - Musculocutaneous block done for all groups (one block)
 - Double block added deposition of local at 6 o' clock position
 - Triple block added deposition of local at 6 and 12 o' clock position
 - Quadruple block added deposition of local at 2,6, and 10 o' clock pos.
 - Success rates similar between all groups
 - Double Block therefore recommended

Peripheral Nerve Blocks: Paravertebrals

- 84 patients undergoing open thoracic surgery randomized to receive either thoracic epidural or paravertebral block + intrathecal morphine (BJA 11/2012)
 - Epidural group showed lower VAS scores at rest and with cough (first 72 hours)
 - However, pain control in the paravertebral group was still good
 - TEA: 1.2, 1.3
 - PVB/IT: 1.9, 3.5

Peripheral Nerve Blocks: Popliteal Fossa

- Using three dimensional ultrasound, the effects of subfascial v. extrafascial local anesthetic spread were compared for a popliteal fossa block (RAPM 10/2012)
 - The subfascial spread group displayed better local anesthetic spread
 - Perineural volumes of 5.57mL v. 1.48mL
 - The subfascial group displayed a complete sensory block of 90% v. 63% for the extrafascial group
- Anatomic studies on cadavers showed that injection (RAPM 7/2012)
 - inside the fascial sheath resulted in 10-15cm of spread longitudinally along the sciatic nerve
 - Outside the fascial sheath resulted in 5-6cm of spread

Peripheral Nerve Blocks: TAP Blocks

- 69 women undergoing elective caesarian section received either 100mcg of intrathecal morphine or bilateral TAP blocks (IJ of Obst Anesth 4/2012):
 - Intrathecal morphine group had lower pain scores and morphine consumption (2.5mg v. 7.5mg)
 - IT group displayed higher opioid related side effect profile
- Metaanalysis of women undergoing caesarian section to determine if addition of TAP block to intrathecal morphine is beneficial (312 Patients) (BJA Oct/2012):
 - TAP blocks alone reduced 24 hour morphine consumption by 24 mg.
 - TAP blocks in combination with IT morphine offered **no additional benefit**
 - **TAP blocks are useful in the setting of caesarian section when intrathecal morphine was not administered**

Peripheral Nerve Blocks: TAP Blocks cont.

- 40 women undergoing caesarian section with general anesthesia randomized to receive transversis abdominis plane block v. no block (Eur J Anesth Feb/2012):
 - TAP group consumed one third as much morphine in the first 24 hours
 - No difference between pain scores, nausea and vomiting, or sedation

Peripheral Nerve Blocks: Sciatic Nerve

- Patients undergoing total knee arthroplasty randomized to received femoral nerve block plus a sciatic nerve block or selective tibial nerve block (A and A July 2012):
 - Pain scores and opioid consumption similar between the two groups
 - No foot drop seen in selective tibial nerve block group

Anticoagulation and the Neuraxis

Anticoagulation Cont.

- Review of 928 patients who received a thoracic epidural in conjunction with subcutaneous unfractionated heparin 5000U three times daily (RAPM 11/2012)
 - No Neuraxial bleeding
 - 34% of patients received ketorolac
 - 7% of patients had a thrombotic event (PE or DVT)
- German review of 33,142 non obstetric epidurals placed over a two year time span (Eur J Anesth April/2012)
 - Incidence of epidural hematoma was 1:6628

Anticoagulation Cont.

- French patients undergoing total knee or total hip arthroplasty with neuraxial anesthesia and receiving either rivaroxaban or enoxaparin for postoperative DVT prophylaxis (Acta Anesth Scan Jan/2013):
 - 4086 Rivaroxaban patients (10mg qd)
 - No hematomas
 - 4090 Enoxaparin patients
 - 1 hematoma requiring evacuation

Local Anesthetics

Local Anesthetics: The future

- Microsphere encapsulated bupivacaine significantly reduced pain levels in rats for four days (single dose) (RAPM Nov 2012)
- Liposomally encapsulated bupivacaine administered epidurally resulted in a longer duration of sensory blockade than normal bupivacaine
 - Duration of numbness to pinprick was 36 hours v. 11 hours
 - Duration of numbness to cold was 69 hours v. 12 hours

Cancer Recurrence and Regional Anesthesia

Cancer and Regional Anesthesia

- 275 patients undergoing lower extremity lymph node dissection for malignant melanoma (BJA Sept/2012):
 - Increase in survival duration in the spinal group
 - 95 months v. 70 months
- Retrospective analysis of patients undergoing laparoscopic colon resection for cancer from 2003-2010 receiving either epidural, spinal or morphine PCA (BJA August 2012):
 - No difference in overall or disease free survival
- 42,151 patients undergoing colectomy for colon cancer retrospectively examined (Anesthesiology April 2012)
 - 23% had epidurals
 - 5 year survival rate in epidural group was **61%**
 - 5 year survival rate in non epidural group was **55%**
 - No association between epidural use and cancer recurrence

Thank You

References

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