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)
    * Assiduous of opioids
      - Multimodal analgesia

Adjuvant Medications
Adjuvant Meds: Ketamine

• Double blinded, randomized study of parturients undergoing elective repeat c-sections with spinal anesthesia (Minerva Anesthesiol 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 alpha2 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

• 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

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Spinal Anesthesia: Safety

- In vitro studies with chlorhexidine antisepsis 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 spine performed without chlorhexidine

Spinal Anesthesia: Benefits

- 18,158 patients undergoing hip fracture surgery with either regional or general anestheis (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 Aneste 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 laparascopic colon resection under general anesthesia randomized to receive intrathecal morphine or nothing (Br J Anes 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: 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 (1.8%)

Epidural Anesthesia: Benefits
- Case report of the use of epidural anesthesia to treat intractable paralytic ileus (Acta Anesthesiol 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

- 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 anastamotic breakdown

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: Education

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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
    - 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: 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 dose to 15mL shortened the time to first request for postoperative analgesia by 30%
  - Patients undergoing ultrasound guided interscalene brachial plexus block (BHA 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: LA volume
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
  - Discussed mechanisms of action
  - Metabolism
  - Modulation of cardiac sodium channels
  - Superiority over epinephrine, vasopressin, epi/vaso
  - Avoidance of high dose epinephrine
  - Dosing
    - 1-1.5mL/kg
    - 0.25-0.5 mL/hour

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 position
  - 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 24mg.
  - 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

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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: 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

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Cancer Recurrence 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 59%
  - No association between epidural use and cancer recurrence
Thank You

References

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- International Journal of Anesthesia