PERI-OPERATIVE MULTIMODAL ANALGESIA
Inadequate Postoperative pain relief can

- delay recovery
- necessitate hospitalization
- increase the duration of the hospital stay
- increase health-care costs
- reduce patient satisfaction
- damage our image
Opioid Analgesia

- Patients don't care about the pain rather than have less pain
- Causes adverse side effects like respiratory depression, PONV, sedation, pruritus, ileus, urinary retention, constipation
- Intraoperative opioids may increase postoperative pain because of acute tolerance

- White, 2002, Guignard, 2000

http://syzeeq8.blogspot.com/2012/06/sleeping-beauty-syndrome.html
Be a Super Hero for your Patients

• Think about avoiding pain and adverse side effects from preop to postop

• Customize a plan
Pain Theory - Stop Pain at Every Level.

Ketamine, dextromethorphan, memantine, gabapentin, pregabalin, COX-2 inhibitors, acetaminophen

Ketamine, dextromethorphan, magnesium, clonidine, dexmedetomidine, gabapentin, pregabalin, neostigmine, local anesthetics, COX-1 and COX-2 inhibitors, tapentadol

Clonidine, steroids, neostigmine, local anesthetics

Clonidine, local anesthetic

Steroids, local anesthetics, COX-1 & 2 inhibitors

Links.lww.com/ASA/A225
Acetaminophen

Mechanism of action COX inhibitor in CNS

IV acetaminophen achieves more dependable serum levels, spares narcotic usage

- give 1000mg po qid 2-7 days postoperatively as a fixed schedule

- do not give to patients with hepatic dysfunction

Pasero 2012

Fig. 2. Site of action of NSAIDs.
NSAID's

Ibuprofen has less side effects than other NSAID's
- dose dependent analgesia and side effects
- do not give to patients with prior history of PUD, GI bleed, CHF, significant edema, uncontrolled HTN, significant renal or liver dysfunction, known adverse reactions to NSAID's, elderly and debilitated patients, aspirin-sensitive asthma, and patients taking anti-coagulants, ACE inhibitors, oral corticosteroids, or in late pregnancy
- 800mg po qid is Max dose; causes slightly more dizziness than 600mg dose
- give on a fixed schedule for 2-7 days postoperative

- NSAIDs blunt the hypotensive effects of diuretics, ACEIs, and ARBs
- Diuretics decrease plasma volume which can increase Cr
- Kidney compensates via renin-angiotensin system to constrict efferent renal arteriole to increase glomerular filtration pressure which favors Na and water retention.
- ACEIs and ARBs inhibit efferent arteriolar vasoconstriction which decreases glomerular filtration pressure.
- NSAIDs inhibit prostaglandins and thereby causes afferent renal arteriolar vasoconstriction, so decreasing renal blood flow.
- Creatinine may increase
Celebrex spares renal, platelet dysfunction, and GI side effects, is safe and effective. Short-Course treatment has not caused ASCVD problems - when ibuprofen is contraindicated, think Celebrex. Bowel function recovered an average of one day earlier and patients resumed activities of daily living two days earlier in the Celecoxib group (vs placebo) 

White, 2007

http://insidenorthpoint.org/kids/2010/01/19/celebration-time/active-young-people/
Celebrex is contraindicated for patients:

- with known hypersensitivity to celecoxib, aspirin, or other NSAIDs
- who have demonstrated allergic-type reactions to sulfonamides.
- who have experienced asthma, urticaria, or allergic-type reactions after taking aspirin or other NSAIDs. Severe anaphylactoid reactions to NSAIDs, some of them fatal, have been reported in such patients
- with active gastrointestinal bleeding.
- in late pregnancy

Celebrex.com

http://www.drgreene.com/adam/hives/
Low-dose Short-course corticosteroids

- decrease postoperative pain
- decrease narcotic requirements
- decrease nausea and vomiting
- do not have significant side effects

- 4-5mg IV is enough

Salerno 2006
Safety of Low-dose, Short-course Corticosteroid Therapy

-side effects from corticosteroid use are proportional to the duration and intensity of therapy and that long-term, low-dose corticosteroid use is an independent predictor of numerous serious side effects

-The literature clearly reflects the safety of short-term use of corticosteroids for acute postoperative analgesia in relatively healthy individuals

-adrenocortical insufficiency seems to be rare with short-course steroids

-no increase in incidence of wound infections, and no decrease in wound healing rate

-no increase in serum glucose in non-diabetic patients
Systemic local anesthetics

• Sodium channel blockade affects interneurons modulation of pain signals

• A bolus of lidocaine 100 mg, then 2-3 mg/min provided clear benefits for abdominal surgery patients with decreased PONV, earlier return of bowel function and ambulation, and shorter hospitalization. McCarthy2010

• Recipe: 100-150 mg bolus with induction, then 2 mg/kg/hr until end of surgery
Anticonvulsants for Analgesia
Gabapentin/Pregabalin: Mechanism of Analgesic Action

- Interacts at binding site of the alpha_2 delta subunit of voltage-dependent Ca^{2+} channels
- Correlates with decreased Ca^{2+} channel function and release of neurotransmitters
- Decreased neurotransmitter release is associated with reduced neuronal hyperexcitability

Pregabalin

- A 50% decrease in 24-hour morphine consumption and decreased PONV after a one-time dose of Pregabalin (300mg) in THA patients Baldini 2009

When to use Anticonvulsants

- Total Knee Arthroplasty  Clarke2009
- Total Hip Arthroplasty  Baldini2009.
- Prostatectomy  Trabulsi2010.
- Thoracic.  Clarke2009
- Abdominal or pelvic.  Clarke2009
- Head and neck.  Clarke2009
- Breast  Clark2009

Often!!!!!
Allodynia or Hyperalgesia of Knee

Buvanendran et al: Anesth Analg 2010
Recipe for anticonvulsants

- Pregabalin 150-300 po premed (2 hours pre-op) and 150 mg po bid for 10 days, then 4 day wean
  
  Buvanendran2010

- Gabapentin 600mg po premed and 100-300 po tid for four days
  
  Clarke2009

- Expect sedation. Decrease or stop drug if excessive.
NMDA Receptor Antagonists

- Ketamine limits central sensitization
- Positive effects have been seen with single bolus or continuous infusion
- Opioid sparing effects as well as improved rehabilitation
- Memantine is a noncompetitive NMDA antagonist which is being studied as well
How to use ketamine

• IV ketamine before incision (0.5 mg/kg), and a 24-h infusion (2 microg x kg(-1) x min(-1)) McCartney2004

• 0.5 mg/kg intravenous ketamine on induction of anesthesia, and a continuous infusion at 10 microg kg(-1) min(-1) was begun on induction and terminated at wound closure. Lofitus2010
Alpha-adrenergic agonists

- Produce analgesia, anxiolysis and sedation

- Side effects of hypotension, bradycardia and excessive sedation

- Intraoperative infusion of dexmedetomidine decreased volatile anesthetic dose by 20%, decreased postop opioid needs by 40%, decreased PONV, and decreased PACU stay

Tufanogullari2008

http://clinicaldepartments.musc.edu/anesthesia/intranet/education/journal%20club/november%202012/effect%20of%20perioperative%20systemic%20a2%20agonists%20on%20postoperative%20morphine%20consumption.pdf
How to use Clonidine

• 150 mcg Clonidine po 90 minutes prior to induction

• 3 mcg/kg po 60 minutes prior to induction

• 4 mcg/kg IV over 30 minutes at induction, then 2 mcg/kg/hr

• Transdermal 0.3mg/24 hours plus 1mcg/kg IV premed

Blaudszun2012
How to use Dexmedetomidine

- 0-1mcg/kg IV premed, then 0-0.8mcg/kg/hr

Blaudszu2012
Efficacy of adding clonidine to intrathecal morphine in acute postoperative pain

- Meta-analysis, seven studies, >500 patients
- Morphine dose 100-500 mcg
- Clonidine dose 30-150 mcg
- There was a mean decrease in morphine requirements of 4.45mg IV or SQ inpatients who received intrathecal clonidine when compared with only morphine
- There was a significant increase in hypotension when clonidine was added. (Engelman 2013)

Do alpha-2 agonists work?

- Do decrease opioid consumption; more than acetaminophen, but less than NSAID's or ketamine

- Pain intensity was less at 24 hours; again, an effect greater than that of acetaminophen but less than that of NSAID's

- Reduced the incidence of early postoperative nausea with a NNT of 9. (Weak effect)

- Do decrease BP and HR to varying degrees

- Additional studies that clarify the adverse effect profile of clonidine and dexmedetomidine and that define rational regimens are required before systemic alpha-2 agonists can be recommended as regular components of multimodal analgesia.  Blaudszun2012
Beta-Blockers

- Blunt the sympathetic response of surgery
- Have opioid-sparing effects
- Have anti-catabolic properties Collard2007
Clonidine added to peripheral nerve blocks


- Clonidine combined with a long acting local anesthetic does not prolong postoperative analgesia after brachial plexus block but does induce hemodynamic changes.

- Culebras X, Van Gessel E, Hoffmeyer P, Gamulin Z.

- Source

- Division of Anesthesiology, Geneva University Hospitals, Geneva 14, Switzerland. xavier.culebras@hcuge.ch
Buprenorphine used to lengthen peripheral nerve blocks

- 0.15 mg Buprenorphine added to interscalene block increases duration of block 19%  Behr2012

- 0.3 mg Buprenorphine triples postoperative analgesia duration after axillary block  Candido2002

http://www.aurorahealthcare.org/yourhealth/healthgate/images/nerve_block.jpg
Guiding Principle of Multimodal Analgesia

• Using multiple drugs to treat pain allows using smaller doses of any single drug and thereby (hopefully) avoid side effects
Preemptive multimodal pain regimen reduces opioid analgesia for patients undergoing robotic-assisted laparoscopic radical prostatectomy

- Pregabalin 150 mg, acetaminophen 975 mg, and celecoxib 400 mg two hours before the start of surgery vs ketorolac 15 mg q 6 hours with oxycodone 5 mg and acetaminophen 325 mg, 1-2 tablets q 4 hours prn pain

- Total morphine equivalent dose 49 mg vs 75 mg

References


- McCarthy GC, Megalla SA, Habib AS: Impact of intravenous lidocaine infusion on postoperative analgesia and recovery from surgery: A systematic review of randomized, controlled trials. Drugs 2010; 70:1149-63


- Eid HAE, Shafie MA, Youssef H; Dose-related prolongation of hyperbaric bupivacaine spinal anesthesia by dexmedetomidine. Ain Shams J of Anesth 2011; vol 4-2:83-95
References


• Trabulsi EJ, Patel J et al; Preemptive multimodal pain regimen reduces opioid analgesia for patients undergoing robotic-assisted laparoscopic radical prostatectomy. Urology 2010; 76:1122-4


• Candido KD, Winnie AP, Ghaleb AH et al; Buprenorphine added to the local anesthetic for auxiliary brachial plexus block prolongs postoperative anesthesia. Reg Anesth Pain Med. 2002 Mar-Apr; 27(2):162-7
References


References


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A- lap chole, local anesthetic over dome of liver and in gall bladder bed 40 ml 0.25% Ropivacaine? Or, use intravenous lidocaine infusion. Also have surgeon infiltrate trocar holes.
Lap tubal- inject methosomal B- T4-5 epidural, ropivacaine 1/8% plus fentanyl 5mcg/ml with PCEA function C- for 10-25 kg, celecoxib 50 mg po bid, for >25 kg, 100 mg po bid. Capsules may be opened and sprinkled on applesauce.
D- use for patients taking Suboxone, and patients with prior pain problems. Do cause some sedation/dizziness. Pregabalin seems to cause fewer side effects.

**HOW TO:**

**Acetaminophen:** 1000 mg IV over 15 minutes. 1000 mg po q 6 hours at home for 48-96 hours. Then decrease dose to 500 mg po q 6 hours pm.

**Ketorolac plus Ibuprofen:** 30 mg Ketorolac IV, 15 mg for >65yo. Don’t use for renal insufficiency. Ibuprofen 600 mg with meals and night-time snack for 48-96 hours. Then go to 600 mg po q 6 hours pm.

**Celecoxib:** 400 mg po 2 hours prior to surgery, then 200 mg po bid for 48-96 hours, then pm. NOT for patients with ASCVD.

**Dexamethasone:** 4-10 mg IV intraop

**Ketamine:** 0.5 mg/kg IV either with induction or pre-incision. Infusion of? Until one hour before the end of the case.

**Gabapentin:** 300 mg po 2 hours prior to surgery. Can continue 300 mg po tid while an inpatient. Can decrease dose if sedation limits activity.

**Pregabalin:** 100 mg po 2 hours prior to surgery. May continue 100 mg po bid while an inpatient.
Postoperative Pain Medications

____ Ibuprofen _____ mg with food ____ times a day

____ Celebrex _______ mg twice a day

____ Acetaminophen __________ mg ____ times a day

Oxycodone _______ mg every 3-4 hours as needed for pain. This drug takes an hour to work. Take these pills if you have significant pain after taking the Acetaminophen and Ibuprofen.

As your pain lessens, first stop taking the Oxycodone. Continue taking the Ibuprofen and Acetaminophen for several days after you stop the Oxycodone. It will help your pain and help you to move better.

If you develop a new rash, cannot control your pain, have new symptoms like shortness of breath or chest pain, please call your doctor.