New Modalities for Treating Perioperative Pediatric Pain

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I. Emerging non-pharmacologic therapeutic interventions
II. Regional anesthesia in children
III. New uses for intravenous analgesics

OPIOID-ASSOCIATED SIDE EFFECTS

- Sedation
- Respiratory depression
- Nausea and vomiting
- Constipation
- Pruritus
- Tolerance
- Hyperalgesia

12 y/o girl with h/o UC on oxycodone & gabapentin ATC at home presents for SIL Colectomy

Shianne
Emerging non-pharmacologic therapeutic interventions

- Pediatric hypnosis: hypno-anesthesia
- Acceptance & commitment therapy (ACT) and mindfulness-based stress reduction
- Medical acupuncture

Pediatric Hypnosis: Hypno-anesthesia

- What is it?
  - An altered state of consciousness
  - Involves narrowing of attention and suspension of critical judgments
  - Characterized by concrete and primary process thinking
- Post-hypnotic suggestions possible
- Benefits:
  - Decreases anxiety in preparation for anesthesia & surgery
  - Adjunct for pain management, PONV, and behavioral problems perioperatively
  - Method of inducing a sense of comfort and trust during recovery
  - Shortens hospital stays
  - Portable and cost-effective

The Magic Glove: an example of hypno-anesthesia

To know what is happening, but not be bothered
A common CBT technique is distraction
- Directing attention away from noxious stimulus towards an alternative
- Used by parents and health-care professionals
- Alleviate both acute and chronic pain in children

If distraction doesn’t work, then what’s next?
Acceptance & commitment therapy and mindfulness-based stress reduction
- Mindfulness
  - Paying attention in a particular way on purpose in the present moment and non-judgmentally
- Acceptance
  - Willingness to let things be as they are as soon as we become aware of them.
  - Experiencing pain without reaction, disapproval or attempts to reduce or avoid it.

References:
Acceptance & commitment therapy and mindfulness-based stress reduction

- Change the way the children think about pain.
- Strive to live a ‘meaningful life’ by pursuing activities in line with one’s values whether or not one has pain
- Emphasizes exposure to experiences previously avoided
- Pain reduction is not the primary goal but a byproduct


Medical acupuncture

- Treatment for PONV, pain, and certain illnesses pre- or post-operatively
- Can it be done intra-operatively under GA?
  - Reduced postoperative pain
  - Reduced agitation
  - Upon arrival in PACU and 30 minutes later


Regional Anesthetics

- Acupuncture points are along or connected by 20 meridians
- Meridians are paths which life energy known as “qi” flow
- >600 points

Bilateral Tranverse Abdominis Plane Blocks

- Ropivacaine 0.2% <0.3ml/kg
- Clonidine 2mcg/kg

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Extended-release local anesthetics
- Liposomes
- Lipospheres
- Polyglycolic acid microspheres
- Hydrogels
- Neosaxitoxin (neoSTX)
- Site 1 sodium-channel toxin

New regional medications:

- Dexmedetomidine
  - Reduce opioid consumption
  - Improve centrally mediated analgesia
  - Reduce emergence agitation at 0.3mcg/kg

- Clonidine
  - Reduce emergence agitation at 2mcg/kg
  - Enhance & prolong regional anesthetics
  - Adjuvant for weaning opioids and benzodiazepines
  - Intravenous, transdermal, or oral administration

- Clonidine
  - Reduce emergence agitation at 2mcg/kg
  - Enhance & prolong regional anesthetics

WHAT ABOUT KETAMINE?

Phenylpiperidine (PCP or ‘angel dust’) derivative
- Dissociative anesthetic
- Historical usage:
  - Cardiovascular stability with increased SVR and CO maintaining blood pressure (even in cases of hypovolemia)
  - Spontaneous breathing and laryngeal reflexes preserved
- Side effects including psychodysphoric symptoms, sialorrhea, & nystagmus limit its use

Ketamine:
- Decreases emergence agitation in children
  - Single dose of 0.25mg/kg IV
  - Treats hyperalgesia
  - May reduce proinflammatory effects

Why Methadone?
- Long-acting opioid with high bio-availability
- Racemic mixture
  - l-isomer – u opioid agonist
  - Analgesia
  - d-isomer – non-competitive NMDA antagonist in brain, spinal cord, and peripheral nerves
  - Analgesia
  - Reduction in hyperalgesia
  - Partial reversal of tolerance to u opioids

Start at 0.1mg/kg IV or PO every 12 hours & titrate slowly every 24 hours

2. Abu-Shahwan, Chowdary K. Ketamine is effective in decreasing the incidence of emergence agitation in children undergoing dental repair under sevoflurane general anesthesia. Paediatric Anaesthesia 2007;17:189-190
Summary

- Don’t always rely on opioids to treat perioperative pain in children
- Consider regional techniques
- Think outside the box, and consider alternative therapies
  - Hypno-anesthesia & the Magic Glove
  - Acupuncture,
  - ACT & mindfulness
- Consider adding adjuvants that provide analgesia without opioid-associated side effects
  - Dexmedetomidine
  - Clonidine
  - Ketamine
- Add methadone to help treat your patients with a h/o opioid use & tolerance or suspected hyperalgesia.

References:

3. Abu-Shahwan, Chowdary K. Ketamine is effective in decreasing the incidence of emergence agitation in children undergoing dental repair under sevoflurane general anesthesia. Paediatric Anaesthesia 2007;17:189-190