Acute Pain Management in Children - an update

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Overview

• Some pain basics
• Why we don’t treat pain and why we should
• Non-pharmacologic approaches to pain management
• Topical pain management
• Intranasal medications for pain management
• New uses for older drugs

What is pain?

• Broadly speaking, a sensation caused by injury to the body, sometimes iatrogenic (IV start, vaccinations, etc), and sometimes physiologic (appendicitis, broken bone, etc)
• A series of ascending neural pathways transmit pain to the brain
• Non-pain pathways compete with pain impulse to mitigate pain response, the so-called “gate theory”
Why we DON’T treat pain

- “Is it pain or anxiety? I can’t tell…”
- No time
- No IV
- Will I mask symptoms and/or delay diagnosis?
- Lack of confidence treating pediatric patient
- Lack of support from medical control

Why we SHOULD treat pain

- For the good of the child
  - Immediate physiologic stress from pain
  - Long term physiologic changes to brain
  - Emotional response to later medical care
- For the good of the practitioner
  - More cooperative patient
  - More likely to have success with procedures
  - Better assessment of underlying problem
  - Less stressful to provider, child and family!
Non-pharmacologic interventions to treat acute pain

- Pain and anxiety are linked; decreasing anxiety can help manage pain.
- Calm atmosphere
- Age appropriate prep for procedures
- Parents role: coach but don’t add to stress!!
- Sucrose: best for 0-6 month age
- Remember, taking the time to “set the stage” will help in the long run!

Topical Anesthetics

- Work by binding Na+ channels of free nerve endings, inhibiting repolarization of the cells
- To be effective agent must penetrate epidermis to get to nerve endings in dermis
  - More lipophilic agent is better
  - Areas of thinner skin better
  - More vascular areas better
- Time, heat, occlusive dressings can improve penetration into dermis

EMLA

- lidocaine 2.5% and prilocaine 2.5%
- Fatty acid emulsion so highly lipophilic
- Most effective after 60 minutes, but benefit at 30-45 minutes
- Prilocaine (and others?) can induce methemoglobinemia
  - Congenital methemoglobinemia
  - Agent left on skin too long
  - Agent on area of significant mucosal injury
LMX-4

- Liposomal suspension of 4% lidocaine
- Effect within 30 minutes
- No (?) risk for methemoglobinemia
- After removal, anesthetic effect may not be as long lasting as EMLA
- Cost comparison:
  - EMLA $7/5 gm tube
  - LMX $4/5 gm tube

SYNERA

- Tetracaine 7%/lidocaine 7%
- Delivered as a patch containing an iron powder warming agent, resembles an adhesive bandage
- Greater depth of anesthesia than EMLA or LMX
- Given Fe component, REMOVE BEFORE MRI!!!
- More expensive the EMLA or LMX: $13/patch
LET

- Lidocaine 4%/epinephrine 0.18%/tetracaine 0.5%
- Can be used on broken skin
- Generally good effect after 20 minutes
- Effect lasts 20-30 minutes after removal
- Plastic surgery literature suggests safe to use on fingers/fingertips
- Cost: roughly $3/3 ml syringe

Injectable local anesthetics

- Typically lidocaine 1 or 2%
- Consider bupivicaine 0.25% 1:1 with lidocaine for more prolonged effect
- Injection pain can be minimized by
  - Buffering lidocaine with bicarb, 1:10
  - Using finest gauge needle possible (30 g optimal)
  - Slow infiltration rate
  - Subcutaneous (vs intradermal) injection
  - Warming medication to body temp

Intranasal medications- benefits

- Convenient
  - No IV required
  - “low tech” delivery equipment
- Safe- very low risk of resp depression compared with IV
- Effective
  - Quickly enter blood stream through vascular mucus membranes
  - Quickly achieve high CNS levels through “nose-brain barrier”
Intranasal meds - limitations

- Less effective if child has significant rhinorrhea
- Less effective if active nosebleed
- Less effective if decreased mucosal blood flow
  - recent vasoconstrictive medication
  - Cocaine abuse, chronic or acute

Delivery techniques

- Maximize mucus membrane surface
- Use both nostrils - ½ volume per nostril
- Use small particles given by brisk delivery (atomize, don’t drip!)
- Use most concentrated form of medication to limit volume - limits “run-off”
- Ideal volume per nostril: 0.3 ml, but as much as 1 ml/nostril ok
- Point applicator up and out (to top of ear on same side as nostril being medicated)
More about IN medications

- Doses will be higher than with IV equivalent
- Medications can be titrated, as with IV, with repeated doses every 10-15 minutes
- Depending on clinical situation:
  - consider IN as bridge to getting IV started
  - repeat IN dosing as needed
  - consider po pain med shortly after IN to allow po to have effect as IN wears off
Dosing of IN medications

- Fentanyl
  - 2 mcg/kg, titrate every 10-15 minutes
  - Consider pulse ox to monitor

- Ketamine (for pain)
  - 0.5-1 mg/kg (subdissociative dosing)
  - Titrate every 15 minutes

IN Ketorolac

- Sold under trade name Sprix
- Limited information for pediatric use
- One study of kids 12-17, only 20 patients
  - Pharmacokinetics similar to IM
  - Effect in 15 min, peak at 45 min
- 30 mg dose for patient >50 kg
- 15 mg for pediatric dosing?
- Current trial in early stages 8-17 yo

IN med doses for indications other than pain

- Versed
  - for anxiolysis: 0.5 mg/kg, max 10-12 mg
  - for seizures: 0.2-0.3 mg/kg, max 10 mg
- Ketamine
  - for sedation: 10 mg/kg
  - for pain: 0.5-1 mg/kg
- Dexmedetomidine for sedation: 3 mcg/kg
- Naloxone for opiate overdose: 2 mg
Ketamine- old drug, new use

• Low-dose (sub-dissociative)
• IV- 0.1-0.5 mg/kg, IN- 1 mg/kg
  • Bolus dosing
  • Can be titrated
• NMDA receptor antagonist
• Decrease need for opiates
• Opioid tolerance
• 2014 article in Annals of EM- equivalent pain control when compared with IN fentanyl

Propofol- for acute pain??

• Most literature is in adult medicine, all focused on intractable migraine pain
• Small study in PEC 2012 in kids
  • Excellent pain relief
  • Decreased LOS (122 min vs 203 min!)
• Propofol also effective antiemetic
• Give as slow boluses, q3-5 minutes
  • 0.5 mg/kg, max 50 mg
  • Monitor as with procedural sedation

Summary

• Treating pain (or not) has long term consequence for kids
• Treatment options are not “either/or”, but rather multi-modal
• For IN meds, maximum concentration, minimum volume
• For more IN med information, check out intranasal.net
No Pain, ALL GAIN!!