POSTOPERATIVE PAIN MANAGEMENT IN PEDIATRICS

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OBJECTIVES

▶ PHARMACISTS
  ▶ Identify risk factors for narcotic induced respiratory depression in children with OSA
  ▶ State the current recommendations for perioperative pain management in children with OSA
  ▶ Compare benefits and side effects of narcotics and NSAIDS in general surgery and orthopedic surgery in children
  ▶ Acknowledge the importance of and adopt a position of “Narcotic Stewardship”

▶ TECHNICIANS
  ▶ Recognize two serious complications of adeno-tonsillectomy (AT) in children
  ▶ Explain why the FDA issued a black box warning regarding the use of codeine in children after AT
  ▶ Acknowledge the importance of “Narcotic Stewardship”
GENERAL PRINCIPLES OF PAIN PREVENTION AND INTERVENTION
POSTOP ENT MANAGEMENT
POSTOP GENERAL SURG MANAGEMENT
POSTOP ORTHOPEDIC MANAGEMENT
THE WORSENING U.S. OPIOID EPIDEMIC
NARCOTIC STEWARDSHIP

RISK FACTORS ASSOCIATED WITH INCREASED POSTOPERATIVE PAIN

- PREOPERATIVE ANXIETY
- AGE
- OBESITY
- ETHNICITY AND RACE
THE 3 P'S OF PAIN PREVENTION AND INTERVENTION

PHARMACOLOGICAL

PSYCHOLOGICAL

PHYSICAL

PAIN ASSESSMENT AND MANAGEMENT OF A CHILD

PAIN ASSESSMENT—WHEN?
ON ADMISSION AND ONCE A SHIFT
BEFORE/DURING/AFTE PAINFUL PROCEDURES OR
SURGICAL INTERVENTIONS

PAIN ASSESSMENT—HOW?
USE DEVELOPMENTALLY APPROPRIATE TEST

PIPP NEONATES
FLACC 2-6M-7YO
PAIN WORD SCALE 3-7YRS
FACES 5-12YRS
NRS >7YRS
NCCPC NONCOMMUNICATIVE 3-18YRS

IS PAIN
PRESENT?

NO

YES

MANAGEMENT AND INTERVENTIONS

PHARMACOLOGICAL
• GIVE ANALGESICS REGULARLY
• USE LEAST INVASIVE ROUTE
• FOLLOW WHO STEP TREATMENT

PHYSICAL
HEAT OR COLD
MASSAGE
PRESSURE
AMBULATE

PSYCHOLOGICAL
EXPLANATION TO CHILD AND PARENT
DISTRACTION
RELAXATION
CHILD LIFE OR BEHAVIORAL HEALTH

REASSESS
PHARMACOLOGICAL


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ENT
ADENOTONSILLECTOMY
Adenotonsillectomy (AT) most common surgical treatment for obstructive sleep apnea (OSA) in childhood
• OSA during childhood has a prevalence of 1-5%
• First line medical treatment includes nasal steroids, leukotriene inhibitors, oral or topical decongestants
• Many of these children end up with surgical intervention for persistently disturbed sleep, excessive daytime sleepiness, daytime neurobehavioral and mood disorders
• 530,000 AT’s for OSA in children annually

OBSTRUCTIVE SLEEP APNEA

MAJOR
RESPIRATORY COMPROMISE
HEMORRHAGE

MINOR
PAIN
NAUSEA
VOMITING
DEHYDRATION

POSTOP COMPLICATIONS OF ADENOTONSILLECTOMY
RISK OF RESPIRATORY COMPROMISE OR HEMORRHAGE

AT FOR OSA
- At extubation, 43.3% with O2 desaturation
- In PACU, 63.3% required O2
- 5-fold increased risk of respiratory complications

AT FOR RECURRENT TONSILLITIS
- At extubation, 6.6% with O2 desaturation
- In PACU, 10% required O2
- 2.5-fold increased risk of hemorrhage

CODEINE METABOLISM

- In most individuals ~10% of an administered codeine dose is metabolized to the bioactive analgesic, morphine
- The metabolism is controlled by the CYP2D6 enzyme pathway.
- The gene encoding CYP2D6 is highly polymorphic and shows a gene-dose effect
  - Poor metabolizers—Metabolize <10% codeine to morphine, 5-10% patients
  - Extensive metabolizers (EM)—Normal metabolism, 77-92% patients
  - Ultra-rapid metabolizers (UM)—Multiple gene copies resulting in >10% conversion of codeine to morphine more quickly, and the risk of morphine overdose, 1-2% patients
Commonly acetaminophen-codeine was used for post-op AT pain control

- 2009, case report of a toddler death post-AT who was found at postmortem to be an ultra-rapid metabolizer (UM) of codeine
- May 2012, 3 additional deaths; 2-UM and 1-EM metabolizer
- FDA issued warning in August, 2012 warning of the rare but life threatening respiratory compromise in OSA children following T+/-A treated with codeine or other analgesics that utilize CYP2D6
- January 2013, FDA update reports 13 additional children with fatal or near fatal respiratory compromise with appropriate dosages of codeine; 8/13 were tonsillectomy patients

THE CODEINE CONUNDRUM

- Increased use of morphine and oxycodone postoperatively
- Reluctance to use NSAID’s because of concerns of an increased risk of bleeding
- Intraoperative administration of acetaminophen and dexamethasone to pre-emptively treat pain and nausea

PRACTICE SHIFT FOLLOWING THE 2012 BLACK BOX WARNING
MCMASTER UNIVERSITY, THE HOSPITAL FOR SICK CHILDREN, 2012-2014 STUDY COMPARED IBUPROFEN AND MORPHINE POST-AT

- Faces pain scale on post-op Days 1 & 5
- Objective Pain Scale scores on post-op Days 1 & 5
- # of days until back to normal diet
- # of children with post-tonsillectomy bleeding events
- Adverse drug reactions
  - Sedation
  - Constipation
  - Nausea/Vomiting
  - Dizziness/Confusion
  - Refusing fluids/Anorexia
  - Agitation
  - Night terrors
  - Fever
  - Diarrhea

<table>
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<tr>
<th></th>
<th>IBUPROFEN</th>
<th>MORPHINE</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Δ Lowest O₂ saturation (95% CI)</td>
<td>3.96 (12.65)</td>
<td>2.38 (12.30)</td>
<td>.64</td>
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<tr>
<td>Mean O₂ saturation (%)</td>
<td>Preoperative: 97.41 (1.02)</td>
<td>97.20 (1.22)</td>
<td>Postoperative: 96.55 (2.07)</td>
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<td>Δ Mean O₂ saturation (%)</td>
<td>0.79 (2.33)</td>
<td>2.13 (1.42)</td>
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<td>Total number of desaturation events/h</td>
<td>Preoperative: 4.52 (7.87)</td>
<td>3.64 (3.71)</td>
<td>Postoperative: 3.04 (3.27)</td>
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<tr>
<td>Number of children improved</td>
<td>65% (17/26)</td>
<td>13% (4/30)</td>
<td>&lt;.01</td>
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</table>
SECONDARY OUTCOMES

- FACES PAIN SCALE DAY 1 & 5 0.29
- OBJECTIVE PAIN SCALE DAY 1 & 5 0.95
- # DAYS BACK TO PRE-OP DIET 0.89
- # POST-OP BLEEDING EVENTS 0.67
- # ADVERSE DRUG REACTIONS 0.16-0.51

INTRA-OPERATIVE
- 40MG/KG ACETAMINOPHEN RECTALLY OR 15MG/KG IV
- DEXAMETHASONE 0.1-0.5MG/KG IV
- ONDANSETRON 0.1MG/KG IV
- SHORT ACTING OPIOID, FENTANYL 1MCG/KG IV

POST-OPERATIVE
- IBUPROFEN 10MG/KG Q6HR INITIALLY ROUTINE, THEN PRN
- ACETAMINOPHEN 15MG/KG Q4HR PRN

CURRENT RECOMMENDATIONS FOR ANALGESIA FOR AT
GENERAL SURGERY

- UNDERLYING SURGICAL PATHOLOGY
  - RUPTURED APPENDIX WITH OPEN LAPAROTOMY VS. “LAP-APPY”
- TAKE INTO ACCOUNT OTHER RISK FACTORS
  - ANXIOUS, OBESE ADOLESCENT AFRICAN-AMERICAN FEMALE
- DEVELOPMENTALLY DELAYED WITH POOR COMMUNICATION
  - PARENTAL HELP IN REPORTING USUAL SIGNS AND EXPRESSION OF PAIN
- PREVIOUS HISTORY OF SURGERY
  - WHAT WORKED WELL AND WHAT DID NOT

CONSIDERATIONS
ORTHOPEDIC PAIN
2007 STUDY FROM OTTOWA, CANADA

- RANDOMIZED CHILDREN AGED 6-17 Y.O. TO INITIAL ANALGESIA WITH IBUPROFEN (10MG/KG), ACETAMINOPHEN (15MG/KG) OR CODEINE (1MG/KG)

- PAIN SCALES (VAS) AT PRESENTATION, 30, 60, 90, 120 MIN. NO SIGNIFICANT PAIN IMPROVEMENT OR DIFFERENCE BETWEEN GROUPS AT 30 MIN.

- AT 60 MIN ONLY THE IBUPROFEN GROUP HAD SIGNIFICANTLY, P < .001, BETTER PAIN CONTROL AND ACHIEVED ADEQUATE ANALGESIA, P < .001, COMPARED TO ACETAMINOPHEN OR CODEINE.

STRONGLY RECOMMEND CONSIDERATION OF SITE-SPECIFIC PERIPHERAL REGIONAL ANESTHESIA AS PART OF MUTIMODAL ANALGESIA PLAN

UPPER AND LOWER EXTREMITY SURGERY

- SOME RELUCTANCE BECAUSE OF ANIMAL MODEL STUDIES SHOWING DELAYED BONE FUSION
  - OBSERVATIONAL EVIDENCE IN ADULTS, NO RCT, OF HIGH DOSE NSAIDS AND NONUNION IN SPINAL FUSION SURGERY
  - PEDIATRIC LITERATURE, RETROSPECTIVE REVIEWS, NO ASSOCIATION OF NSAIDS AND NONUNION IN SPINAL SURGERIES
  - CLEARLY NEEDED PROSPECTIVE RCT

NSAID USE AS PART OF MUTIMODAL ORTHOPEDIC PAIN MANAGEMENT
OUR NARCOTIC EPIDEMIC

WHAT IS THE COMMON DENOMINATOR?
In 2014, the five states with the highest rates of death due to drug overdose were West Virginia, New Mexico, New Hampshire, Kentucky and Ohio.

**Alternatives**
Options for treating pain due to back pain, migraines, surgical pain:
- NSAIDs +/- acetaminophen
- Physical therapy
- Acupuncture
- Chiropractic care
- Cognitive behavior therapy

**Impediments**
- Insurance non-coverage, high co-pay for alternative treatments
- Relative low cost of narcotic RX
- Patient demands for RX

**Strategies**
- Opioid RX's low doses and for limited period of time
- Close attention to state monitoring programs
- Steer abusing/addicted patients to treatment programs
**TURN THE TIDE**

- Surgeon General’s, Dr. Vivek Murthy, Campaign Fighting the Opioid Epidemic
- Safe and Effective Management of Pain
- http://turnthetidex.org/

**REFERENCES**

REFERENCES


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