Managing the Pain of Kidney Stones

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Disclosure

• Consultant:
  • Dr. Arnie’s, Retrophin, Allena, Alnylam, AstraZeneca

• Past Medical History: CaOx stones
Calcium oxalate
Intravenous pyelogram (IVP), 1995
“I’m a nephrologist and I’m passing a stone,” and then, feeling that famously unparalleled pain, I added what seemed the necessary addendum: “I need 150 mg of Demerol.”
Acute Nephrolithiasis

• Clinical Presentation:
  • Renal colic
    • Sudden onset
  • Radiates
    • Anteriorly
    • Downward
    • Into genitals
  • Progressive
  • “Worst ever”
  • Nausea and vomiting
  • Sudden and complete resolution
Acute Nephrolithiasis Management

**NSAIDs**
- Traditional ER choice: Ketorolac (Toradol)
- Non-sedating
- More expensive
- Diminished ureteral contraction
- Gastric irritation
- Decreased GFR NOT a concern
  - 80% pass, short term issue
  - Passage of stone will improve kidney function
  - Unilateral obstruction doesn’t have a major effect on kidney function
Acute Nephrolithiasis Management

- **Opiates**
  - Morphine: 0.1 mg/kg im or sc q4h
  - Or follow with MS Contin, 30 mg po q12h for outpatients
  - Sedating
  - Potential for addiction
  - Nausea, vomiting (esp. meperidine)
  - Constipation
Other stone-related urological procedures

• Ureteroscopy
  • Up the ureter to laser stones in the ureter or kidney

• Percutaneous nephrostolithotomy
  • Through the back, into kidney, for larger stones
Efficacy of Ketorolac Tromethamine Versus Meperidine in the ED Treatment of Acute Renal Colic


70 participants were randomized to receive:
- 60 mg of ketorolac
- 100 mg of meperidine (weight > 90 kg, 150 mg of meperidine

3 outcomes:
- The degree of pain relief measured on a 0-10 visual analogue scale
- The need for rescue medication
- Time to discharge from the ED
Larkin et al: Ketorolac vs Meperidine

Results

• Patients treated with ketorolac reported more pain relief than patients treated with meperidine

• Greater improvement in the visual analogue scale pain scores was seen with ketorolac at 40, 60, and 90 minutes (P = .0002)

![Graph showing Visual Analogue Scores (VAS) over time](image)

**FIGURE 1.** VAS scores over time: ◆, ketorolac; ■, meperidine (*P < .05).

• Similar proportions of patients in each group were given rescue analgesia and admitted.
• Those treated with ketorolac left the ED earlier than those treated with meperidine (3.5 v 4.3h; P< .05).
**Table 9 – Recommendations for pain relief in renal colic.**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>GR</th>
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</thead>
<tbody>
<tr>
<td>In acute stone episodes, pain relief should be initiated immediately</td>
<td>A</td>
</tr>
<tr>
<td>Whenever possible, a nonsteroidal anti-inflammatory drug should be the first choice, such as diclofenac (^a), indomethacin, or ibuprofen (^b)</td>
<td>A</td>
</tr>
<tr>
<td>The second choice should be hydromorphone, pentazocine, or tramadol</td>
<td>C</td>
</tr>
<tr>
<td>Use (\alpha)-blockers to reduce recurrent colic</td>
<td>A</td>
</tr>
</tbody>
</table>

GR = grade of recommendation.
What do the AUA guidelines say?

• The guidelines on surgical management of kidney stones do not specifically address management of renal colic.

• But...
In most randomized, blinded studies of NSAIDs versus narcotics, NSAIDs have shown equal or greater efficacy of pain relief and a shorter time to reach adequate analgesia with equal or fewer side effects.

NSAIDs may pose a threat to renal function with decreased blood flow from obstruction, particularly if patients have pre-existing renal impairment.

Also, if surgical intervention is warranted, NSAIDs cause platelet inhibition and risk increased surgical bleeding.

Intractable renal colic pain is effectively controlled by decompressing the obstruction via percutaneous nephrostomy or ureteral stenting.

https://www.auanet.org/education/auauniversity/for-medical-students/medical-student-curriculum/kidney-stones
Don’t continue opioid analgesia beyond the immediate postoperative period; prescribe the lowest effective dose and number of doses required to address the expected pain.

The use of opioid analgesia for pain is often appropriate in surgical patient care. However due to the emergence of opioid use disorder as a public health epidemic, the appropriate use of opioid therapy must begin with adherence to minimum prescribing in terms of dose, duration and quantity.
Using opioids safely after surgery
Stick to the lowest dose for as few days as possible

- Talk to your doctor before surgery
- If your doctor says opioids aren’t necessary...
- If your doctor says opioids are necessary...
- Stick to the lowest dose
- Know the risks and side effects
- Don’t take opioids for long-term pain
Nonsteroidal anti-inflammatory drugs (NSAIDS) versus opioids for acute renal colic (Review)

Holdgate A, Pollock T

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in The Cochrane Library 2009, Issue 1

http://www.thecochranelibrary.com

Cochrane Review: Results

- 20 trials, 9 countries
- 1613 participants
- Both NSAIDs and opioids lead to clinically significant falls in patient-reported pain scores.
- 10/13 studies reported lower pain scores in patients receiving NSAIDs.
- Patients treated with NSAIDs were significantly less likely to require rescue medication.
- The majority of trials showed a higher incidence of adverse events in patients treated with opioids.
- Less vomiting in patients treated with NSAIDs especially compared with pethidine (meperidine).
Cochrane Review: Conclusions

• Both NSAIDs and opioids can provide effective analgesia in acute renal colic.
• Opioids are associated with a higher incidence of adverse events, particularly vomiting.
BE: You know, the joke of it is that at the American Urological Association meeting, EVERY friend of mine from EVERY foreign country was like “why do you guys give opioids”.

DG: Wow, that’s amazing

BE: Oh yeah - they were flabbergasted - South America, Europe, Asia - no opioids - they were like “why is the AUA meeting so focused on this - it doesn’t exist in our country”
Examples of tweets from abroad

• Mexico: “I never use opiates after ureteroscopy or percutaneous procedures; our patients usually can tolerate the pain or uncomfortable sensation with only NSAIDs given as needed”

• India: “Diclofenac plus paracetamol (acetaminophen) sufficient here; we don’t use morphine or pethidine (meperidine) at all and rarely use tramadol because of nausea”

• UK: “Always try and give NSAIDs; short term risks are small. Rarely give opiates and in fact if pain is that bad then I do think they should be in hospital and having something done about the stone. Regarding post-op, in the UK people are giving more codeine and shying away from NSAID’s. Pre-op counselling has a lot to do with it to prevent opiate use.”
Consensus regarding opioids **exists**

- Most patients do better with NSAIDs
- NO study clearly suggests superiority of opioids
- The risk of addiction and overdose are not addressed (or mentioned) in these comparative studies
- I do NOT think that we need further data
- Then what is the reality?
• National Health and Nutrition Examination Survey (NHANES) data
• Questions included: history of nephrolithiasis, number of stones passed and medication use in the last 30 days.
• Subjects were classified as using an opioid if 1 or more of the prescriptions was labelled as narcotic analgesic or narcotic analgesic combination.
• A multivariable logistic model examined the relationship between individual variables and current opioid use.
Results: Shoag et al

23,100 subjects included in the analysis

History of kidney stone: 2,035 (8.8%)

History of opioid use within last 30 days: 1,516 (6.4%)

Use of narcotic medication in the last 30 days according to history of nephrolithiasis and number of stones passed
Results: Shoag et al

- **Percentage of participants reporting current opioid use**:
  - No: 6.10%
  - Yes: 10.90%
  - 0: 6.10%
  - 1: 9.10%
  - ≥2: 13.70%

- **History of kidney Stones**: 10.90%
  - No
  - Yes

- **Number of kidney stones passed**: 13.70%
  - 0
  - 1
  - ≥2
Shoag et al, conclusions:

- There is a robust association between history of kidney stones and current opioid use even after adjusting for confounders.
- While limited by the cross-sectional design and absence of detailed stone history, this study highlights the impact prescribing urologists can have in the opioid epidemic.
Reducing Opiate Use in the Emergency Department Management of Acute Renal Colic
Portis et al, U. Minnesota; AUA 2019

• 57 ED physicians in 3 EDs received structured education on the efficacy of acetaminophen and ketorolac in the management of renal colic.

• They were encouraged to consider initiating care with oral acetaminophen and/or IV ketorolac rather than opiates.

• Treatment patterns were observed in patients presenting with CT confirmed, unilateral ureteral stones
## Results of ED MD Intervention

<table>
<thead>
<tr>
<th>Initial analgesia</th>
<th>Before</th>
<th>After</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No opioid</td>
<td>36%</td>
<td>51%</td>
<td>P&lt; 0.001</td>
</tr>
<tr>
<td>Opioid Only</td>
<td>24%</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Opioid Plus</td>
<td>40%</td>
<td>31%</td>
<td></td>
</tr>
<tr>
<td>Opioid at Discharge</td>
<td>79%</td>
<td>71%</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

• Opiate use in ED management of renal colic declined after commencement of an opiate reduction program

• Introduction of acetaminophen provided an additional non-narcotic analgesic option

• Changing care protocols was achieved without compromising clinical outcomes.
Portis et al.

Impact of Intervention on Medications

- Any Ketorolac: p = 0.921
- Any Acetaminophen: p = <0.001
- Any Opiate: p = 0.034

Before vs. After comparison.
My Conclusions

• Gaps in the evidence do not seem important
• The AUA could be more explicit in recommending NSAIDs and acetaminophen over opioids
• Gaps in implementation are a different story
My prescription: How to pass stones

- Increasing water intake is NOT useful
- Alpha blockers are controversial
- NSAIDs (my choice: OTC naproxen 2 tabs q12h)
- RELAX
- Warm bath
- Turn down lights
- Light a candle
- Beer, wine
- Keep head OUT of water
Other questions

• Stones are common, aiding the ability to perform RCTs for stone passage and analgesia
• Not easily studied but my colleagues and I would like to know:
• What are the relative benefits of:
  • Alcohol
  • Benzodiazepines
  • Medical marijuana
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Rare Diseases Clinical Research Network
NIH National Center for Advancing Translational Sciences
NCATS Catalyzing Innovation