Challenging Cases in Kidney Stone Disease: The Multidisciplinary Approach

Floyd A. Fried Advances in Urology Symposium

Friday, June 19, 2015
Panelists

• Brian Matlaga, MD, MPH
  • Johns Hopkins, Department of Urology

• Cindy Denu-Ciocca, MD
  • UNC, Division of Nephrology

• Susannah Southern, RDN, LDN
  • UNC, Department of Family Medicine

• Davis Viprakasit, MD, FACS (Moderator)
  • UNC, Department of Urology
Cases
Case 1

- 19 year old male
  - Presentation to ER with transient gross hematuria
  - No flank pain or urinary symptoms
  - PMH: Mitral valve prolapse, no prior stones
  - PE: Afebrile, 118/71, no CVAT
  - Labs: Creatinine 0.87, Calcium 9.6, UA 6 rbc, UCx negative
Case 1

8 x 10 mm UPJ stone without hydronephrosis (HU 950)
Poll

What option would you recommend?
1. Observation +/- Medical Expulsive therapy
2. Shock wave lithotripsy
3. Ureteroscopy without stent placement
4. Ureteroscopy with stent placement
5. Percutaneous nephrolithotomy
Panel Discussion

• What is reasonable duration of observation?
Panel Discussion

• Use of medical expulsive therapy?

Medical expulsive therapy in adults with ureteric colic: a multicentre, randomised, placebo-controlled trial

Robert Pickard, Kathryn Starr, Graeme MacLennan, Thomas Lam, Ruth Thomas, Jennifer Burr, Gladys McPherson, Alison McDonald, Kenneth Anson, James N’Dow, Neil Burgess, Terry Clark, Mary Kilonzo, Katie Gillies, Kirsty Shearer, Charles Boachie, Sarah Cameron, John Norrie, Samuel McClinton

www.thelancet.com Published online May 19, 2015 http://dx.doi.org/10.1016/S0140-6736(15)60933-3
Panel Discussion

• Factors determining surgical approach?

Trends and inequalities in the surgical management of ureteric calculi in the USA

Stephan Seklehner*,†, Melissa A. Laudano*, Asha Jamzadeh*, Joseph J. Del Pizzo*, Bilal Chughtai* and Richard K. Lee*

BJU Int 2014; 113: 476–483
wileyonlinelibrary.com

Patient Decision Making for Asymptomatic Renal Calculi: Balancing Benefit and Risk

Carl Sarkissian, Mark Noble, Jianbo Li, and Manoj Monga

Case 1

• Trial of stone passage with flomax
  • Repeat KUB at 3 weeks shows stone
  • Scheduled for SWL
  • Cancelled due to family emergency

• Returns 8 months later with 2 episodes flank pain
  • Afebrile, 152/85, no CVAT
  • Creatinine 1.26, UA 1 rbc, Ucx negative
Case 1
Case 1
Case 1

8 x 10 mm UVJ stone with hydronephrosis / ureter
Case 1

- Patient undergoes ureteroscopy with stent
  - Stone analysis: 100% calcium oxalate
  - 6-week postop Renal ultrasound without hydronephrosis
Panel Discussion

• Role of metabolic testing?
  » Complete vs. limited evaluation
  » Compliance of nutritional recommendations in this population
Panel Discussion

• Concern for renal health in the future?

Chronic Kidney Disease in Kidney Stone Formers

Andrew D. Rule,⁷ Amy E. Krambeck,⁸ and John C. Lieske—as


Figure 1. Risk for a clinical diagnosis of CKD between stone formers and control subjects in Olmsted County. X-axis is years. Reprinted from reference 2, with permission.
Case 2

- 30 year old female
  - Presentation to ER with acute onset right flank pain, urinary urgency and frequency and nausea
  - G3P2 currently at 16w4d
  - PMH: Asthma, Stones with 2 prior pregnancies
  - PE: Afebrile, 132/70, + right CVAT
  - Labs: Creatinine 0.50, Calcium 9.2, WBC 11, UA 180 rbc, 5 wbc, N/LE negative
Case 2
Case 2
Case 2

Moderate R hydronephrosis, proximal ureteral dilation, 0.5cm LP stone x2
Case 2

- Patient admitted to OB service for pain control, antiemetics, medical expulsive therapy
- Increased requirement for IV narcotics
- Ucx = mixed flora
Poll

- What option would you recommend?
  1. Additional imaging (CT, KUB, IVP, MRI)
  2. Ureteral stent placement
  3. Nephrostomy tube placement
  4. Ureteroscopy with stone treatment
Panel Discussion

• Stone management during pregnancy

The Safety of Ureteroscopy During Pregnancy: A Systematic Review and Meta-Analysis

Michelle J. Semins, Bruce J. Trock and Brian R. Matlaga*

Vol. 181, 139-143, January 2009
Case 2

- Patient taken for ureteroscopy
  - Abdomen shielded except RUQ
  - Fetal heart tones confirmed pre/post-op
- Noted with 9mm right mid-ureteral stone, 3mm renal stone x2
- Ureteral stent placed for 1 week
- Fluoroscopy usage = 3 sec, 0.2mGy
Case 2

- Patient follow-up postpartum
- Renal ultrasound without stones / hydronephrosis
- Stone analysis 100% calcium phosphate
- 24-hour urine study (3 months after delivery)

<table>
<thead>
<tr>
<th>Volume 24</th>
<th>SS CaOx</th>
<th>Calcium 24</th>
<th>Oxalate 24</th>
<th>Citrate 24</th>
<th>SS CaP</th>
<th>pH</th>
<th>SS UA</th>
<th>Uric acid 24</th>
<th>Sodium 24</th>
<th>Creatinine/Kg</th>
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<tbody>
<tr>
<td>0.84</td>
<td>6.88</td>
<td>103</td>
<td>24</td>
<td>530</td>
<td>2.46</td>
<td>6.32</td>
<td>0.71</td>
<td>0.575</td>
<td>151</td>
<td>17.9</td>
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<tr>
<td>0.5-4 L</td>
<td>6-10</td>
<td>&lt;250 male</td>
<td>&lt;200 female</td>
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<td>50-150</td>
</tr>
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<td></td>
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<td>male &lt;200</td>
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<td>18-24 male</td>
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<td>female</td>
<td>female</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15-20 female</td>
</tr>
</tbody>
</table>

*Note: SS = Stone Synthetic, CaOx = Calcium Oxalate, SS CaP = Stone Synthetic Calcium Phosphate, SS UA = Stone Synthetic Uric Acid.*
Panel Discussion

• Stones in pregnancy
  » Increased risk factors?
  » Stopping stone preventive medication?
Changes in GFR in Pregnancy

- ↑ GFR beginning at 4 weeks, peaks at 13 weeks (50%), remains ↑ until end of pregnancy
  - 2/2 elevation in cardiac output and renal blood flow

![](image)
## Normal Lab Values in Pregnancy

<table>
<thead>
<tr>
<th>Variable</th>
<th>Average values in pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma osmolality</td>
<td>270 mOsm</td>
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<tr>
<td>Sodium</td>
<td>135</td>
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<tr>
<td>Potassium</td>
<td>3.8</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>18-20</td>
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<tr>
<td>Blood Urea Nitrogen</td>
<td>9</td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.5</td>
</tr>
<tr>
<td>Uric acid</td>
<td>2-3</td>
</tr>
</tbody>
</table>

Panel Discussion

• Nutritional recommendations in at risk patients during pregnancy?
Case 3

• 75 year old male
• 15 year history of recurrent stones and R proximal ureteral stricture
• Rare right flank pain, no urinary complaints
• PMH: morbid obesity, SBO, DM, HTN, HL, CAD, OSA
• PSH: Open R pyelolithotomy, bowel resection, ventral / right flank hernia repair
• Meds: Actos, Theophylline, Quinapril, ASA, crestor
• PE: 142 kg, BMI 43, Afebrile, 132/70, + large right flank hernia
• Labs: Creatinine 1.2, Calcium 9.6, Uric acid 6.8
Case 3
Case 3
Case 3
Case 3
Case 3
Case 3
Case 3
Case 3

Right sided 1.4, 1.2, 1cm pelvic stones, 1.4cm proximal ureteral stone
Left sided 1.5, 1.7cm pelvic stone
Large right lateral small / large bowel containing ventral hernia
Poll

• What option would you recommend?
  1. Shock wave lithotripsy
  2. Ureteroscopy
  3. Percutaneous nephrolithotomy
Case 3

- Patient undergoes staged procedures
  - Right percutaneous nephrolithotomy
  - Attempted Left percutaneous nephrolithotomy
  - Left ureteroscopy x2
- Stone analysis: 70% calcium phosphate, 30% calcium oxalate
- Postop Renal ultrasound without significant obstruction and small left punctate stones
### Case 3

- **24-hour urine study:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Volume 24</th>
<th>SS CaOx</th>
<th>Calcium 24</th>
<th>Oxalate 24</th>
<th>Citrate 24</th>
<th>SS CaP</th>
<th>pH</th>
<th>SS UA</th>
<th>Uric acid 24</th>
<th>Sodium 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>2.6</td>
<td>8.0</td>
<td>424</td>
<td>51</td>
<td>949</td>
<td>3.5</td>
<td>6.5</td>
<td>0.3</td>
<td>1.0</td>
<td>317</td>
</tr>
<tr>
<td>Day 2</td>
<td>3.5</td>
<td>5.8</td>
<td>503</td>
<td>51</td>
<td>909</td>
<td>3.1</td>
<td>6.8</td>
<td>0.1</td>
<td>1.0</td>
<td>364</td>
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<td>0.5-4 L</td>
<td>6-10</td>
<td>&lt;250 male</td>
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<table>
<thead>
<tr>
<th>Date</th>
<th>K 24</th>
<th>Mg 24</th>
<th>PO4</th>
<th>NH4</th>
<th>Cl</th>
<th>Sul</th>
<th>UUN</th>
<th>PCR</th>
<th>Cr</th>
<th>Creatinine /Kg</th>
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<tr>
<td>Day 1</td>
<td>78</td>
<td>169</td>
<td>1.8</td>
<td>41</td>
<td>239</td>
<td>32</td>
<td>11</td>
<td>0.7</td>
<td>1920</td>
<td>14.3</td>
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<tr>
<td>Day 2</td>
<td>80</td>
<td>187</td>
<td>1.7</td>
<td>42</td>
<td>323</td>
<td>29</td>
<td>13</td>
<td>0.8</td>
<td>1656</td>
<td>12.3</td>
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<tr>
<td>20-100</td>
<td>30-120</td>
<td>0.6-1.2</td>
<td>15-60</td>
<td>70-250</td>
<td>20-80</td>
<td>6-14</td>
<td>0.8-1.4</td>
<td>18-24 male</td>
<td>15-20 female</td>
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*Note: Values are typical ranges for 24-hour urine studies.*
Panel Discussion

- Routine use of 1 or 2-day studies?
Poll

• Are your patients able to follow dietary recommendations long term?
  1. Yes
  2. No
Panel Discussion

• Dietary approach in obese patient?

Can Obese Stone Formers Follow Dietary Recommendations?

Fabio Cesar Miranda Torricelli, MD, Shubha De, MD, Ina Li, RN, Carl Sarkissian, BS, and Manoj Monga, MD

Poll

- What is hardest dietary recommendation for your patients to maintain compliance?
  1. Fluid intake
  2. Low salt diet
  3. Low oxalate diet
  4. Low animal protein diet
Panel Discussion

• Any Hints to improve dietary compliance?
Panel Discussion

• How to balance stone prevention recommendations with other patient medical comorbidities?
  » Heart failure
  » Lasix use
  » HTN
  » Renal insufficiency
Case 3

- Follow-up 24-hour urine study:

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<th>Uric acid 24</th>
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</thead>
<tbody>
<tr>
<td>2.7</td>
<td>5.6</td>
<td>240</td>
<td>44</td>
<td>430</td>
<td>0.5</td>
<td>5.9</td>
<td>0.5</td>
<td>0.6</td>
<td>140</td>
</tr>
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<td>0.5-4 L</td>
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<tbody>
<tr>
<td>60</td>
<td>170</td>
<td>0.7</td>
<td>36</td>
<td>175</td>
<td>24</td>
<td>7.2</td>
<td>0.5</td>
<td>1598</td>
<td>13</td>
</tr>
<tr>
<td>20-100</td>
<td>30-120</td>
<td>0.6-1.2</td>
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<td>0.8-1.4</td>
<td>18-24 male</td>
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</table>
Case 4

- 54 year old female
- History of morbid obesity s/p gastric bypass 13 yr ago
- 15 year hx stones, with current monthly stone passage
- PMH: HTN, obesity
- Meds: Amlodipine, Olmesartan
- PE: 180kg, BMI 56, 192/94
- Mild R CVAT
- Labs: Creatinine 0.68, calcium 9.0, uric acid 5.7, UA >182 rbc, UCx mixed flora
Case 4
Panel Discussion

- Any special considerations with operative planning in morbid obese patients / abnormal anatomy?
Case 4

- Taken to OR for staged procedures
  » Right percutaneous nephrolithotomy
  » Left percutaneous nephrolithotomy
- Hospital course uneventful
- After 2nd Rx, noted with L lower back to buttock to thigh parasthesia pain
- Evaluated by Neuro/Spine clinic and Dx with lumbar radiculopathy since Rx with pain med / PT
Panel Discussion

• Clinical role of assessing intraoperative renal papilla anatomy?
Case 4

- Renal ultrasound without stones / hydronephrosis
- Stone analysis 100% calcium oxalate
- 24-hour urine study:

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<th>Uric acid 24</th>
<th>Sodium 24</th>
<th>Creatinine/Kg</th>
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</thead>
<tbody>
<tr>
<td>3.6</td>
<td>1.3</td>
<td>67</td>
<td>62</td>
<td>829</td>
<td>0.5</td>
<td>6.9</td>
<td>0.06</td>
<td>0.8</td>
<td>343</td>
<td>6.4</td>
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<td></td>
<td></td>
<td>0-1</td>
<td>&lt;0.75 female</td>
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</table>

- Recommended calcium citrate with meals, low oxalate diet, low salt / animal protein
Panel Discussion

- How to manage nutritional recommendations following gastric bypass surgery with stone preventive measures?
Panel Discussion

- Do you need to worry about oxalate nephropathy after gastric bypass surgery?
• 11 cases of oxalate nephropathy after RYGB
• Acute & chronic renal failure due to oxalate nephropathy (intratubular & interstitial calcium oxalate precipitation)
• 8 patients developed ESRD

Case 5

- 73 year old male
  - 1\textsuperscript{st} stone at age 24
  - Prior R open pyelotomy, L PCNL, SWL x 12
  - Previous stone CaOx, now CaP
  - Told previous needed to increase fluid hydration
  - Labs: Creatinine 1.09, calcium 8.2
  - CT imaging: L hydronephrosis with 10, 17, 7 mm renal and 6mm ureteral stone, R 6, 9, 1 mm nonobstructing stones
Case 5

• Patient treated with left percutaneous nephrolithotomy surgery
• Patient doing well in follow-up
• Repeat imaging notes mild stable L pelvic dilation, continued R stones

• Stone analysis: 90% brushite (calcium monohydrogen phosphate), 10% calcium phosphate hydroxyapatite
Panel Discussion

• Implications of brushite stone composition?
  » Change in surveillance practice
  » Surgical intervention sooner
  » Concern for renal function
Case 5

- 24-hour urine study:

<table>
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<th>Sodium 24</th>
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<tbody>
<tr>
<td>2.1</td>
<td>4.26</td>
<td>262</td>
<td>25</td>
<td>686</td>
<td>2.3</td>
<td>6.8</td>
<td>0.1</td>
<td>0.7</td>
<td>233</td>
<td>25</td>
</tr>
<tr>
<td>0.5-4 L</td>
<td>6-10</td>
<td>&lt;250 &lt;200</td>
<td>20-40</td>
<td>&gt;450 &gt;550</td>
<td>0.5-2</td>
<td>5.8-6.2</td>
<td>0.1 &lt;0.8</td>
<td>25</td>
<td>50-150</td>
<td>18-24 male 15-20 female</td>
</tr>
</tbody>
</table>

- Recommended indapamide 2.5 mg daily, low salt diet, continued good fluid intake
Case 5

- Follow-up 24-hour urine study:

<table>
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<tr>
<th>Volume 24</th>
<th>SS CaOx</th>
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<th>Citrate 24</th>
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<th>Sodium 24</th>
<th>Creatinine/Kg</th>
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</thead>
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<td>2.7</td>
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<td>39</td>
<td>362</td>
<td>0.9</td>
<td>6.4</td>
<td>0.3</td>
<td>0.8</td>
<td>207</td>
<td>24</td>
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<tr>
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</tr>
<tr>
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<td>male</td>
<td>female</td>
<td></td>
<td></td>
<td>male</td>
<td>female</td>
<td></td>
</tr>
</tbody>
</table>

- 18-24 male
- 15-20 female
Questions?

http://dailydot.tumblr.com/post/39936275978/calvin-is-grumpy