

# We Will, We Will, Rock You: Kidney Stones

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#### • AUA Guidelines

- In 2014, AUA published 27 guideline statements on Medical Management of Kidney Stones (Reviewed and Validity Confirmed in 2019)- Evaluation, Dietary Therapies, Pharmacologic Therapies, and Follow Up
- In 2016, AUA published 56 guideline statements on Surgical Management of Kidney Stones- Imaging /Preop evaluation, Adults with Ureteral Stones, Adults with Renal Stones, Pediatric Patients, and Pregnant Patients



# Surgical Management of Stones Imaging/Pre-Op Testing

- Clinicians should obtain NCCT prior to PCNL.
- Clinicians may obtain NCCT to help select the best candidate for ESWL vs URS.
- Clinicians may obtain a functional imaging study if loss of renal function in the involved kidney is suspected.
- Clinicians are REQUIRED to obtain a UA prior to intervention.
- Clinicians should obtain a CBC with platelets on pts undergoing procedure where there is risk of significant hemorrhage (eg. PCNL).
- Clinicians may obtain additional contrast imaging in pts with complex stones or anatomy (IVP, retrograde pyelogram)



# Surgical Management: Adults with Ureteral Stones

- Uncomplicated stones <10mm should be offered observation, and those with distal stones of similar size should be offered MET with alpha blockers.
- Should offer reimaging prior to surgery if passage of stone is suspected.
- If observation is not successful after 4-6 weeks, then definitive treatment should be offered. Treatment can also be offered if patient/clinician decide to intervene sooner based on shared decision making approach.
- ESWL is the procedure with the least morbidity and complication rate, but URS has a greater stone free rate.
- Clinicians should offer URS for mid to distal ureteral stones if intervention required
- For cystine or uric acid stones, URS is recommended if intervention required.



# Surgical Management: Adults with Ureteral Stones

- Routine stenting should not be performed in pts undergoing ESWL.
- Stenting may be omitted after URS if there is no ureteral injury, no evidence of stricture, no renal function impairment, no plans for a secondary URS, and in those with a normal contralateral kidney.
- Stent placement prior to URS should not be performed routinely.
- Alpha blockers and antimuscarinics may be offered to reduce stent discomfort
- Pts who fail ESWL and/or URS may be offered PCNL, laparoscopic, open, or robotic assisted stone removal.
- If performing URS for proximal stones, a flexible scope should be available.
- Should not utilize EHL for intra-ureteral lithotripsy.
- Obstructing stones and suspected infection must be drained urgently with stent or nephrostomy tube and delay stone treatment.



# Surgical Management: Adults with Renal Stones

- Symptomatic pts with total non-lower pole renal stone burden <20mm, ESWL or URS may be offered.
- Total stone burden >20mm, PCNL should be offered as first line therapy.
- When residual fragments are present, pts should be offered endoscopic procedures to render pts stone free, especially for infection stones.
- Stone material should be sent for analysis.
- Total stone burden >20mm, ESWL should NOT be offered.
- Open, laparoscopic, and robotic surgery should not be offered as first line therapy in most pts.
- Nephrectomy may be performed if the involved kidney has negligible function
- Pts w/flank pain and non-obstructing stones may be offered stone treatment.



# Surgical Management: Adults with Renal Stones

- Pts with asymptomatic non-obstructing stones may be offered active surveillance.
- ESWL or URS should be offered for symptomatic lower pole stones <10mm.
- ESWL should not be offered as 1<sup>st</sup> line therapy for lower pole stones >10mm.
- Pts should be informed that PCNL has a higher stone free for lower pole stones >10mm but has a greater morbidity.
- Nephrostomy tube is optional after uncomplicated PCNL when pt is presumed stone free.
- Flexible nephroscopy should be a routine part of PCNL.
- Normal saline should be used during PCNL and URS.
- A safety wire should be used for most endoscopic procedures.
- Antimicrobial prophylaxis should be administered prior to stone intervention.



# Surgical Management: Adults with Renal Stones

- Endoscopic procedures should be **aborted** and appropriate drainage established if **purulent urine** is encountered.
- In pts not considered candidates for PCNL, URS may be offered.
- Alpha blockers may be offered after ESWL to facilitate passage of fragments.
- If ESWL fails, URS should be offered as the next treatment option.
- URS should be 1<sup>st</sup> line therapy for pts with uncorrected bleeding diatheses.
- ESWL should not be used if there is an anatomic or functional obstruction distal to the stone.
- Pts with symptomatic caliceal diverticular stones, endoscopic procedures should be offered (not ESWL).
- Staghorn stones should be removed if attendant comorbidities do not preclude treatment.





- First line treatment for mid and distal ureteral stones and pts with uncorrected bleeding diatheses.
- Recommended for radiolucent stones (Uric acid, Cystine)
- Also an option for proximal ureteral stones and renal stones <20mm (should have a flexible scope available; new digital scopes have improved optics which has led to increase in upper tract URS)
- Pre-stenting should not be performed routinely (but sometimes it is necessary)
- Holmium laser is most commonly used for endoscopic lithotripsy







- Good option for renal stones <20mm</li>
- Low morbidity and complication rate
- Stone free rate is not as good as URS or PCNL





# Percutaneous Nephrolithotomy

- Recommended for renal stones
  >20mm
- Should be offered for lower pole stones >10mm
- High stone free rates but more invasive
- Stone fragmentation via ultrasonic and lithoclast probe
- Flexible nephroscopy to "chase" fragments





#### • Surgical Management: Pediatric Patients

- Observation should be offered for ureteral stones <10mm with or w/o MET.
- URS or ESWL should be offered for ureteral stones that fail to pass, based on pt specific anatomy and body habitus.
- Low dose CT scan should be obtained prior to PCNL.
- Routine stenting should not be performed prior to URS.
- For renal stones <20mm, ESWL or URS may be offered.
- For renal stones >20mm, ESWL or PCNL may be offered. Stenting or nephrostomy should utilized if ESWL is chosen.
- Except for coexisting anatomic abnormalities, open/lap/robotic procedures should not routinely be performed.
- Non-obstructing asymptomatic renal stones can be observed with periodic US.



#### • Surgical Management: Pregnant Patients

- Pharmacological and surgical intervention should be coordinated with patient's OB.
- Ureteral stones with well controlled symptoms should be offered observation.
- URS may be offered for ureteral stones that fail observation. Ureteral stent and nephrostomy tube are alternative options with frequent stent or tube changes usually being necessary.



### Medical Management of Stones: Evaluation

- 1. Detailed medical and dietary history along with serum chemistries and UA should be obtained on pts with newly diagnosed stones.
- 2. iPTH should be obtained if primary hyperparathyroidism is suspected.
- 3. Stone analysis should be obtained at least once (if available).
- 4. Clinicians should obtain and review imaging to quantify stone burden.
- 5. Additional metabolic testing should be obtained in high risk and interested first time stone formers.
- 6. Metabolic testing should consist of one or two 24 hr urine collections on random diet. Volume, pH, calcium, oxalate, uric acid, citrate, sodium, potassium, and creatinine should be measured.
- 7. Fast and Calcium load testing should not routinely be performed.



#### Medical Management of Stones: Diet Therapies

- Recommend pts achieve a **urine volume** of at least **2.5L daily**.
- Pts with Ca stones and high urinary Ca should limit Na intake <2300mg/day and consume 1000-1200mg Ca daily.
- Pts with CaOx stones and high urinary Ox should limit intake of oxalate rich foods and maintain normal Ca consumption.
- Pts with Ca stones and low urinary citrate should increase intake of fruits and vegetables and limit non-dairy animal protein.
- Pts with Ca or UA stones and high urinary UA should limit intake of nondairy animal protein.
- Pts with cystine stones should limit Na and protein intake.



# Medical Management of Stones: Pharmacologic Therapies

- Pt's with recurrent Ca stones and high urinary Ca should be offered thiazide diuretics.
- Pt's with recurrent Ca stones and low urinary citrate should be offered potassiumcitrate.
- Pt's with recurrent Ca stones and high urinary UA and normal urinary Ca should be offered allopurinol.
- Pts with recurrent Ca stones in whom other metabolic abnormalities are absent or have been appropriately addressed should be offered thiazides and/or potassium citrate.
- Pt's with **UA or cystine stones** should be offered **potassium citrate**.
- Allopurinol should not be offered as first line therapy for UA stones.



Medical Management of Stones: Pharmacologic Therapies

- Pts with cystine stones who are unresponsive to dietary modifications and urinary alkalinization should be offered thiol drugs.
- Pts with residual or recurrent struvite stones may be offered acetohydroxamic acid after surgical options have been exhausted.



### Medical Management of Stones: Follow Up

- A single **24hr urine** should be obtained **within 6 months** of initiation of treatment to asses response to dietary or medical therapy.
- **24hr urine** should be obtained **annually** or with greater frequency, depending on stone activity, to assess patient adherence and metabolic response.
- **Periodic blood testing** should be obtained in pts on **pharmacologic therapy** to assess for adverse events.
- Repeat stone analysis should be obtained in pts not responding to treatment.
- Pts with struvite stones should be monitored for reinfection with urease producing organisms and utilize strategies to prevent such occurrences.
- Follow up imaging studies should be obtained periodically to assess for stone growth and new stone formation.



## Diet for Calcium Oxalate Stones

- Maintain fluid in take to achieve a volume of >2.5 liters of urine per day
- Increase intake of citrate (lemons, limes, oranges). This will alkalinize the urine.
- Restrict sodium intake to <2300mg per day. This will reduce urinary calcium.
- Limit intake of non-dairy animal protein to two 6oz portions per day. This will alkalinize the urine.
- Increase intake of fruits and vegetables (alkalinization).
- Maintain dietary calcium 1000-1200mg per day (about 3 servings of dairy per day). Calcium reduces the bioavailability of oxalate by binding to it in the GI tract.
- Restrict high oxalate foods (spinach, rhubarb, beets, tea, nuts, chocolate).





Stone Risk Factors / Cystine Screening: Negative (03/29/2017)										
DATE	SAMPLE	Vol 24	SS CaOx	Ca 24	0x 24	Cit 24	SS CaP	PH	SS UA	UA 24
06/26/17	825184007	7 3.80	2.63	286	20	292	0.11	5.322	0.83	0.530
03/27/17	82471436	1.55	9.29	357	31	360	1.78	5.916	0.95	0.643
03/26/17	82471436	2.15	8.00	571	33	408	1.14	5.660	1.19	0.717
REFERENCE RANGE		0.5 - 4L	6-10	male <250 female <200	20-40	male >450 female >550	0.5-2	5.8-6.2	0-1	male <0.800 female <0.750
Dietary Factors										
DATE	SAMPLEID	Na 24	K 24	Mg 24	P 24	Nh4 24	CI 24	Sul 24	UUN 24	РСК
06/26/17	525154007	77 <sup>°</sup>	27	120	0.722	40	95	27	9.40	0.7
03/27/17	524714381	272	31	87	0.987	41	266	33	9.66	0.7
03/26/17	52471436	327	33	140	1.149	55	338	43	12.43	0.8
REFEREN	CE RANGE	50 - 150	20-100	30-120	0.6-12	15-60	70-250	20-80	6-14	0.8-1.4

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# FmaGmm Kidney (îp) And unless you're Chuck Norris, not even Geico can help you now....



### **THANK YOU**

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