UNC SCHOOL OF MEDICINE

Challenging Cases in Kidney Stone Disease: The Multidisciplinary Approach

Floyd A. Fried Advances in Urology Symposium

Friday, June 19, 2015

Panelists

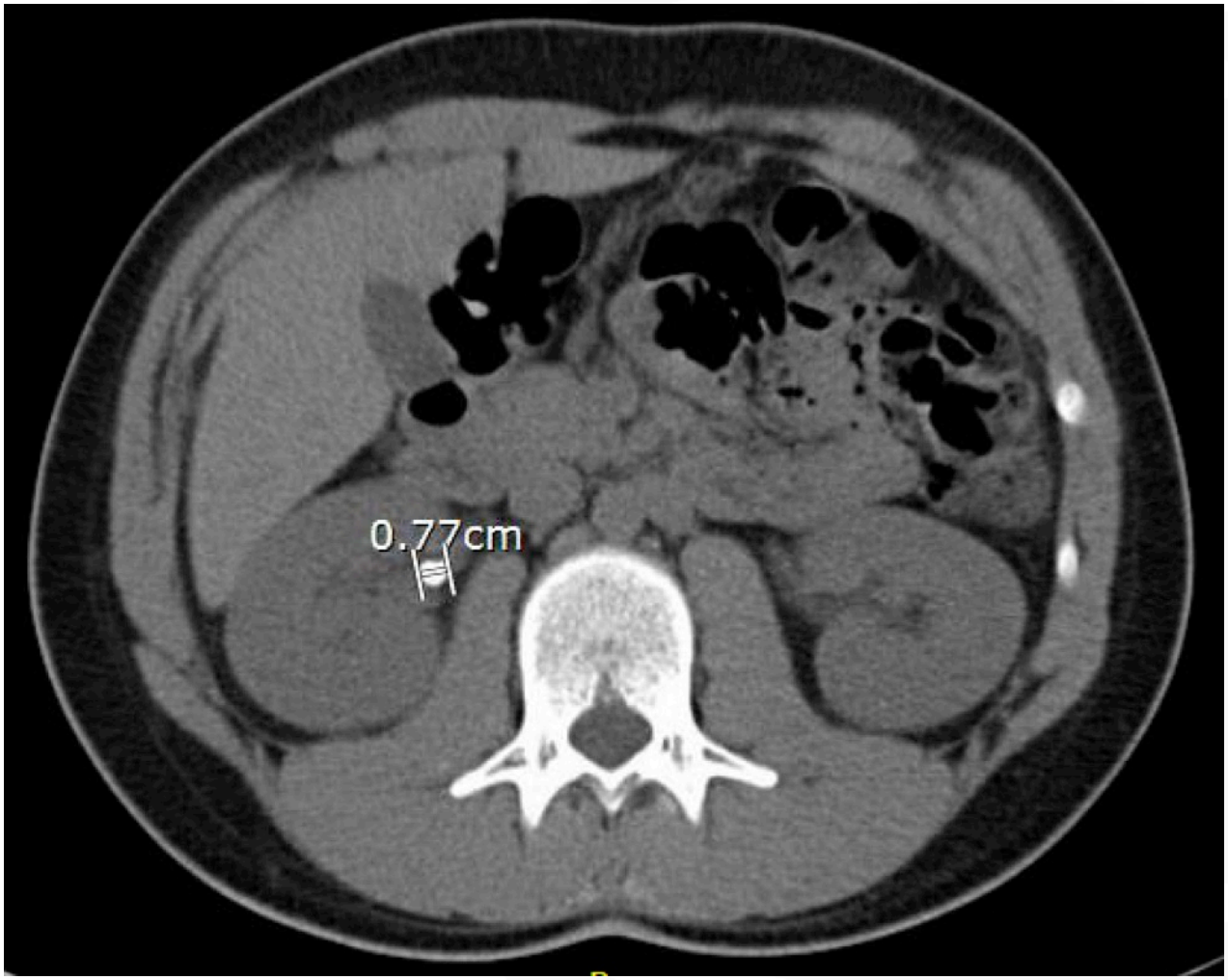
- **Brian Matlaga, MD, MPH**
  - Johns Hopkins, Department of Urology
- **Cindy Denu-Ciocca, MD**
  - UNC, Division of Nephrology
- **Susannah Southern, RDN, LDN**
  - UNC, Department of Family Medicine
- **Davis Viprakasit, MD, FACS (Moderator)**
  - UNC, Department of Urology

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

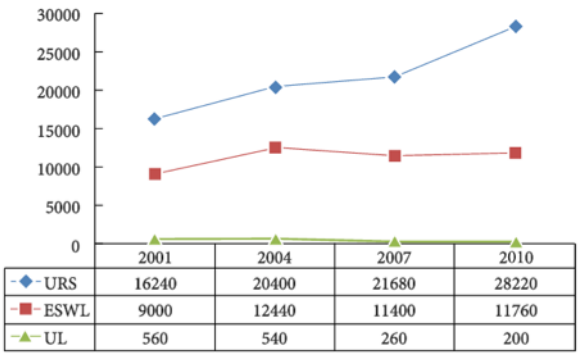
- Factors determining surgical approach?

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

Fig. 2 The use of URS, ESWL and UL from 2001 to 2010.



	2001	2004	2007	2010
URS	16240	20400	21680	28220
ESWL	9000	12440	11400	11760
UL	560	540	260	200

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

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

UROLOGY 81: 236–240, 2013.

Condition	Patients (n)	Distribution of Treatment Choice (%) OBS	ESWL	URS
No previous stone experience*	11	81.8	18.2	0
No previous stent or procedure	23	39.1	52.2	8.7
Only stent placement	13	7.6	46.2	46.2
ESWL but not URS	18	27.7	66.7	5.6
URS but not ESWL	23	26.1	26.1	47.8
URS and ESWL	24	8.3	50	41.7
Entire sample population	101	22.8	47.5	29.7

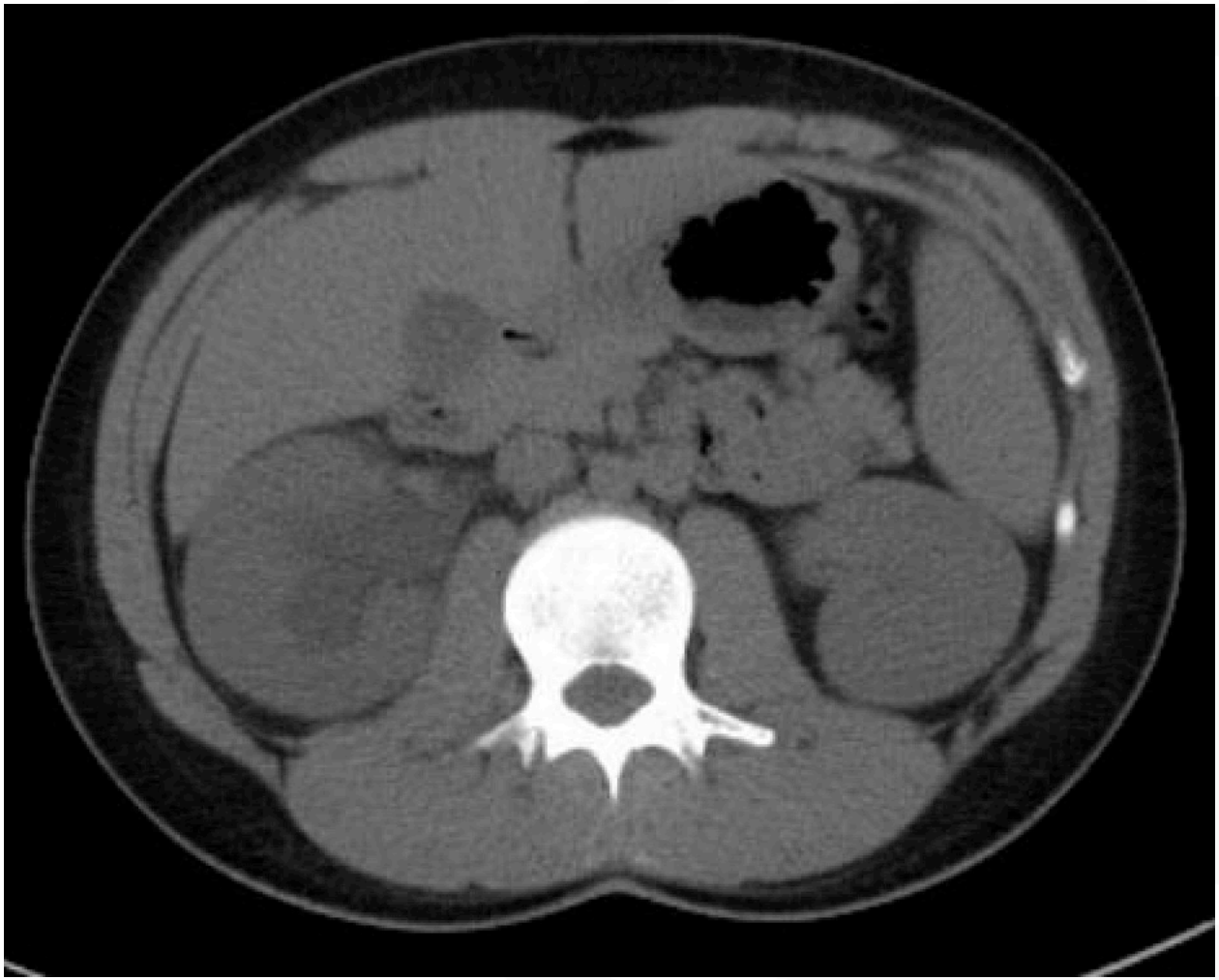
OBS, observation; other abbreviatons as in Table 1.
* Never passed a stone, had a stent placed, or underwent a stone procedure.

Case 1

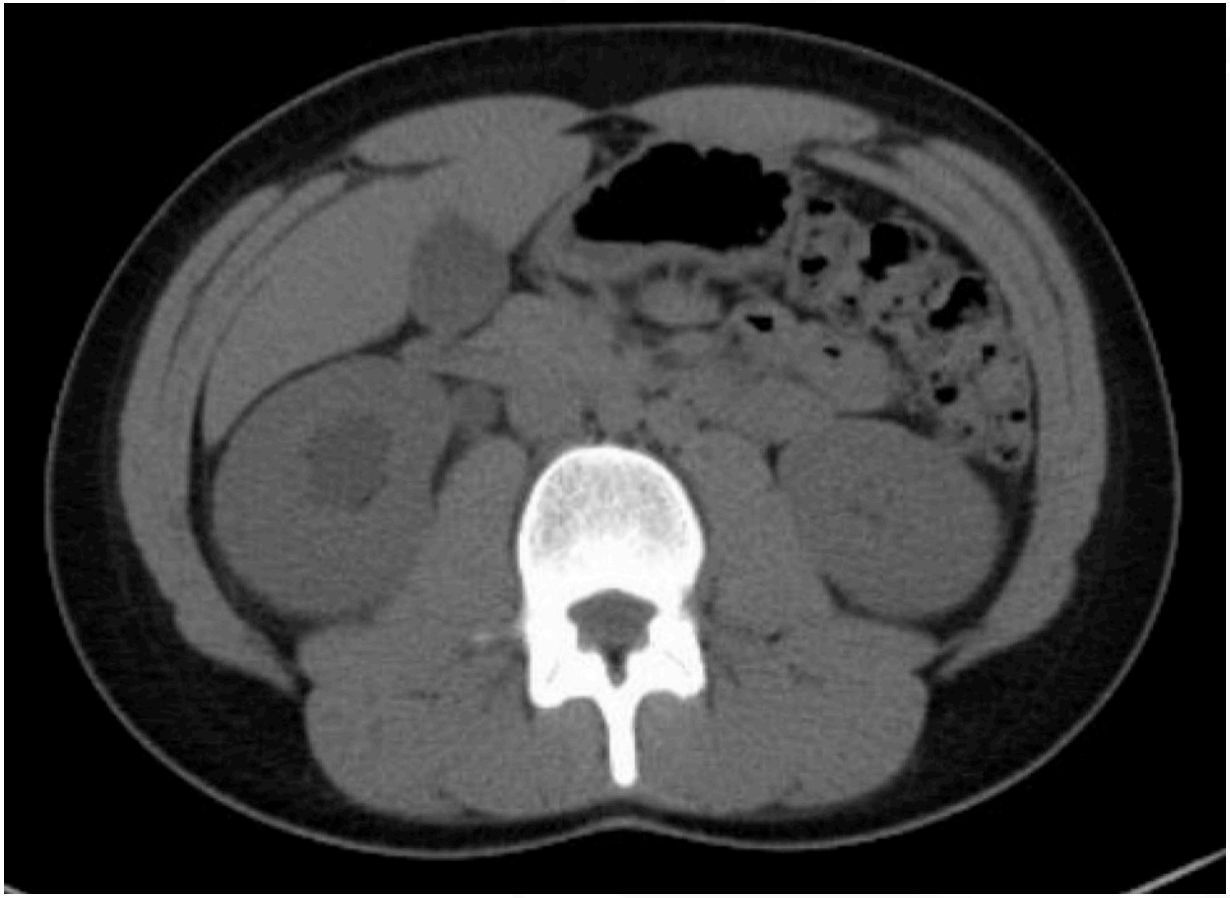
- Trial of stone passage with flomax
  - Repeat KUB at 3 weeks shows stone
  - Scheduled for SWL
  - Cancelled due to family emergency

- 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

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,[*†] *Amy E. Krambeck,*[‡] *and John C. Lieske*[*§]

Clin J Am Soc Nephrol 6: 2069–2075, 2011

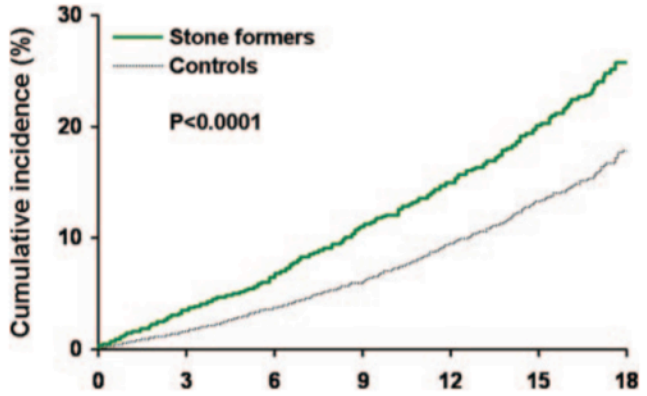
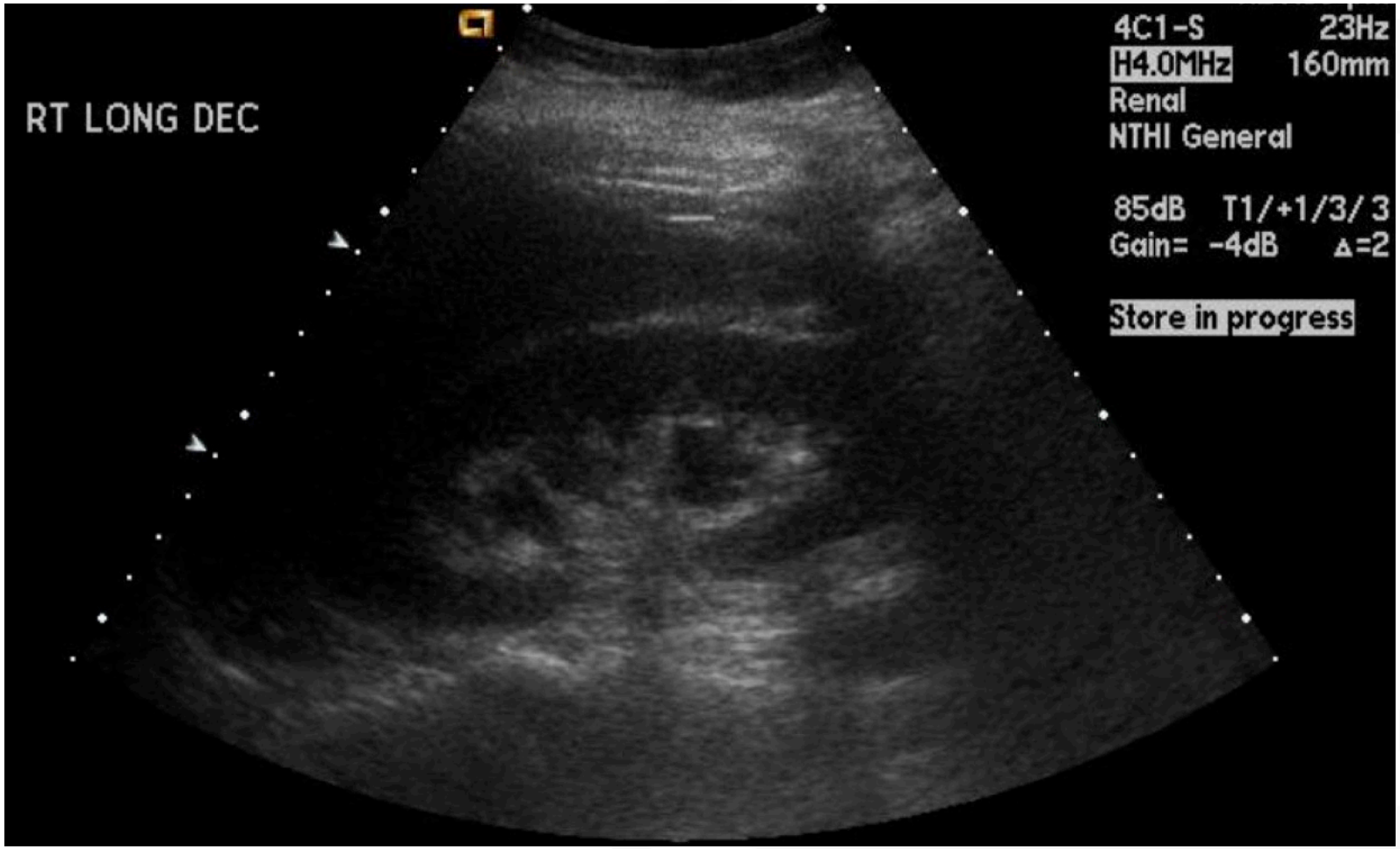


Figure 1. | Risk for a clinical diagnosis of CKD between stone formers and control subjects in Olmsted County. X-axis is years. Reprinted from reference 2, with permission.

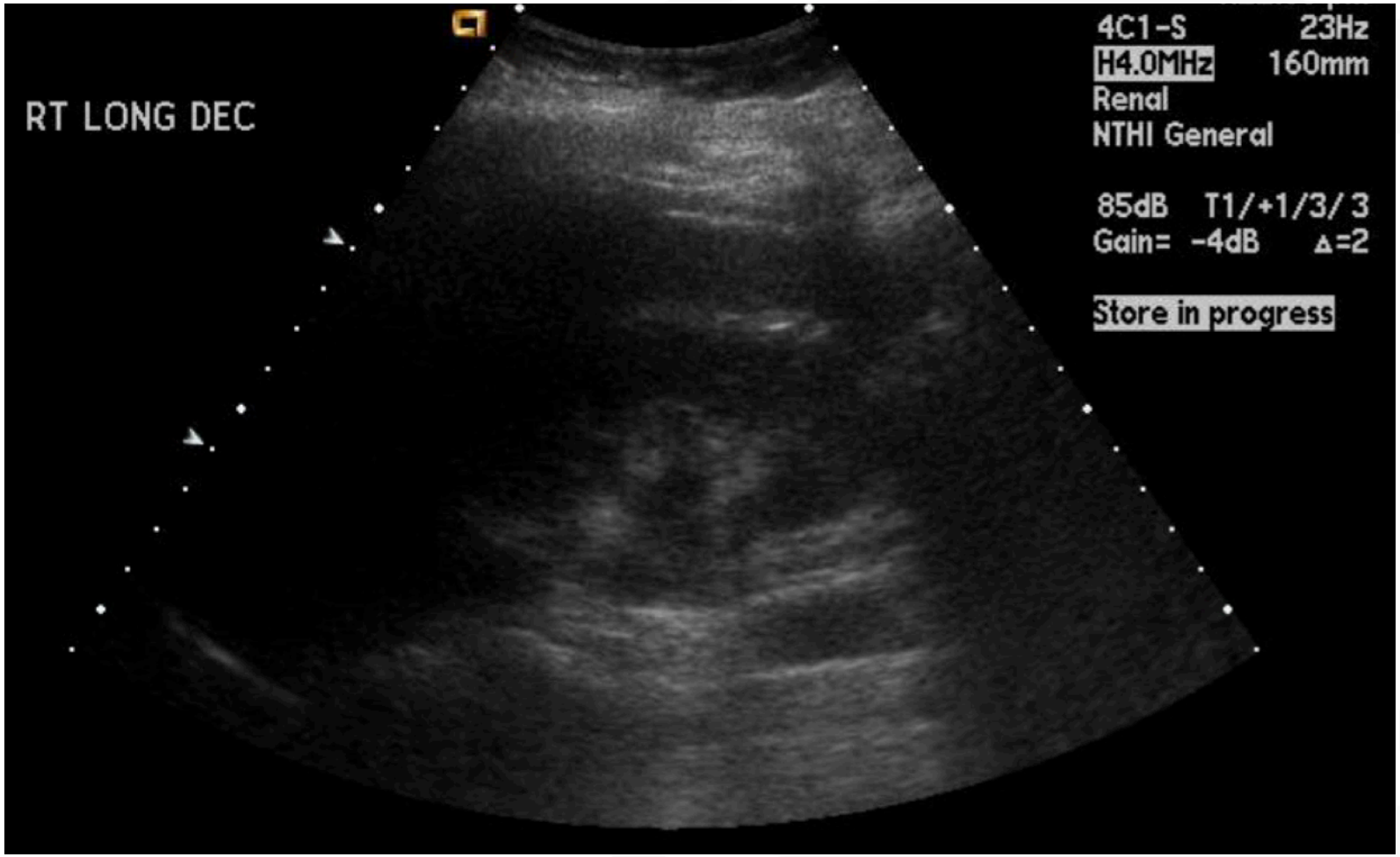
Case 2

- 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


RT LONG DEC
4C1-S
23Hz
H4.0MHz
160mm
Renal
NTHI General
85dB
T1/+1/3/3
Gain= -4dB
Δ=2
Store in progress

Case 2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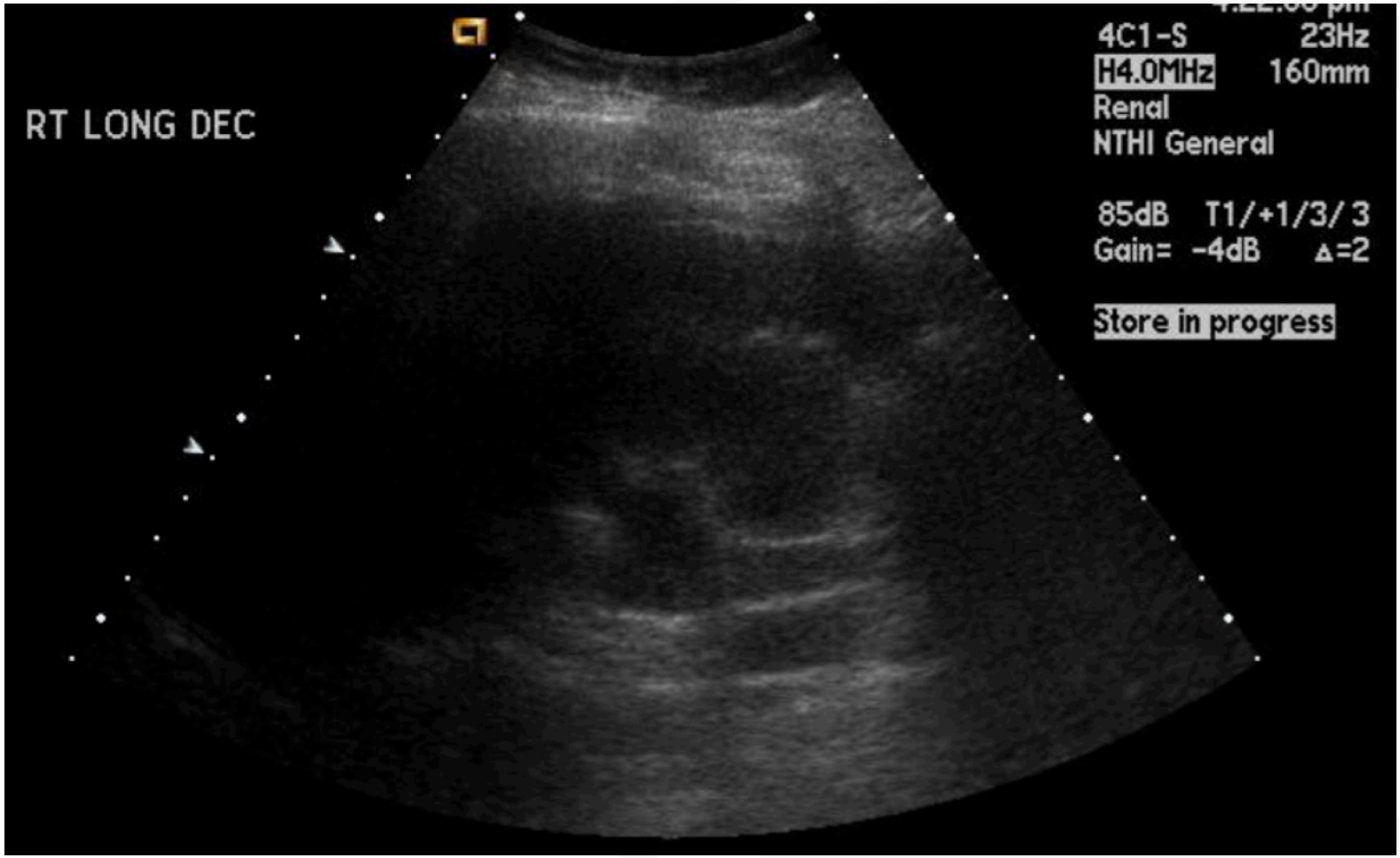
RT LONG DEC
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Renal
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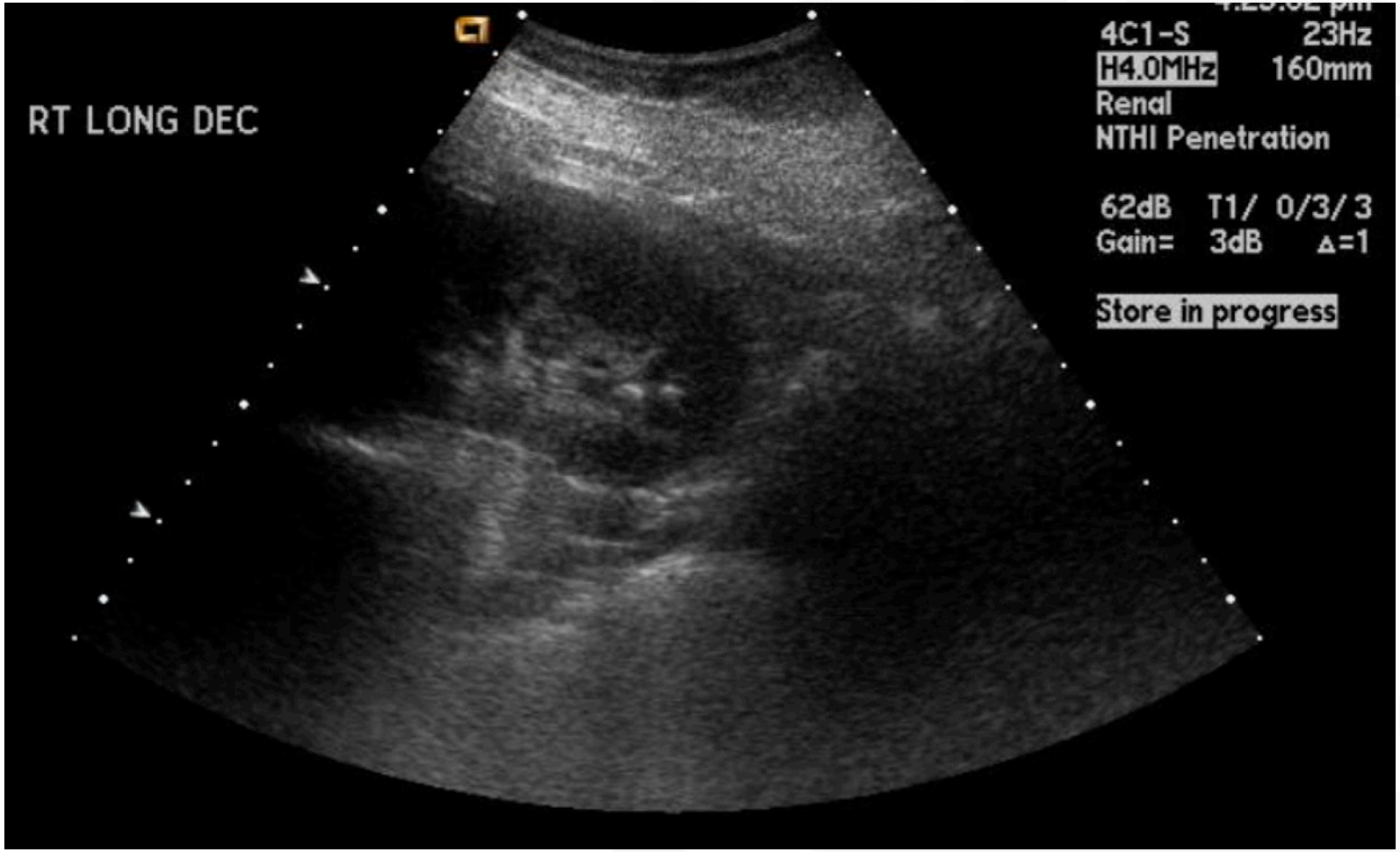
Case 2



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)

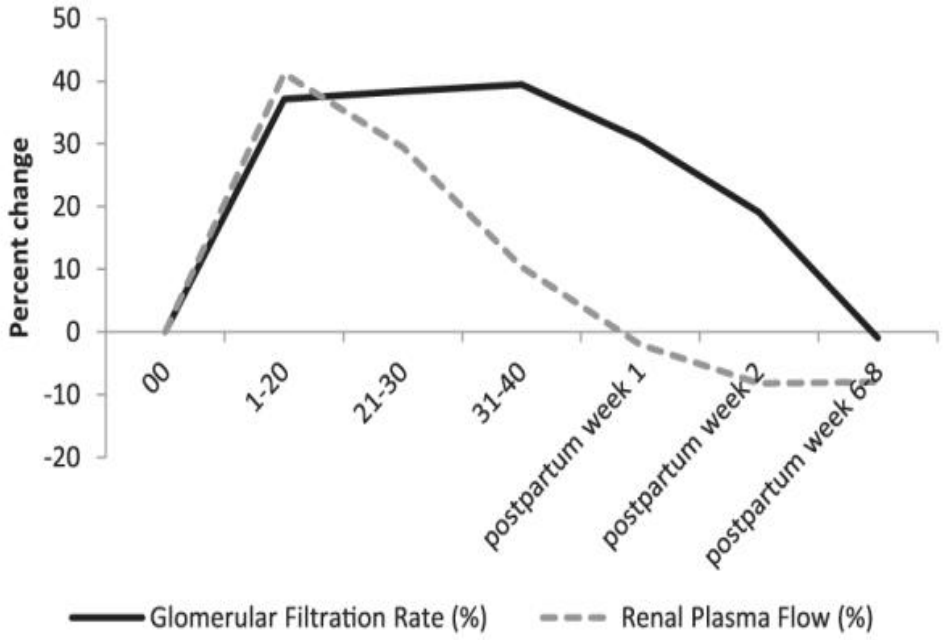
Volume 24	SS CaOx	Calcium 24	Oxalate 24	Citrate 24	SS CaP	pH	SS UA	Uric acid 24	Sodium 24	Creatinine/Kg
0.84	**6.88**	**103**	**24**	**530**	**2.46**	**6.32**	**0.71**	**0.575**	**151**	**17.9**
0.5-4 L	6-10	<250 male <200 female	20-40	>450 male >550 female	0.5-2	5.8 – 6.2	0-1	<0.8 male <0.75 female	50-150	18-24 male 15-20 female

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



Normal Lab Values in Pregnancy

Variable	Average values in pregnancy
Plasma osmolality	270 mOsm
Sodium	135
Potassium	3.8
Bicarbonate	18-20
Blood Urea Nitrogen	9
Creatinine	0.5
Uric acid	2-3

Cheung, Katharine and Lafayette, Richard. “Renal physiology of pregnancy.” Advances in CKD. 2013-05-01Z, Volume 20, Issue 3, pages 209-214.

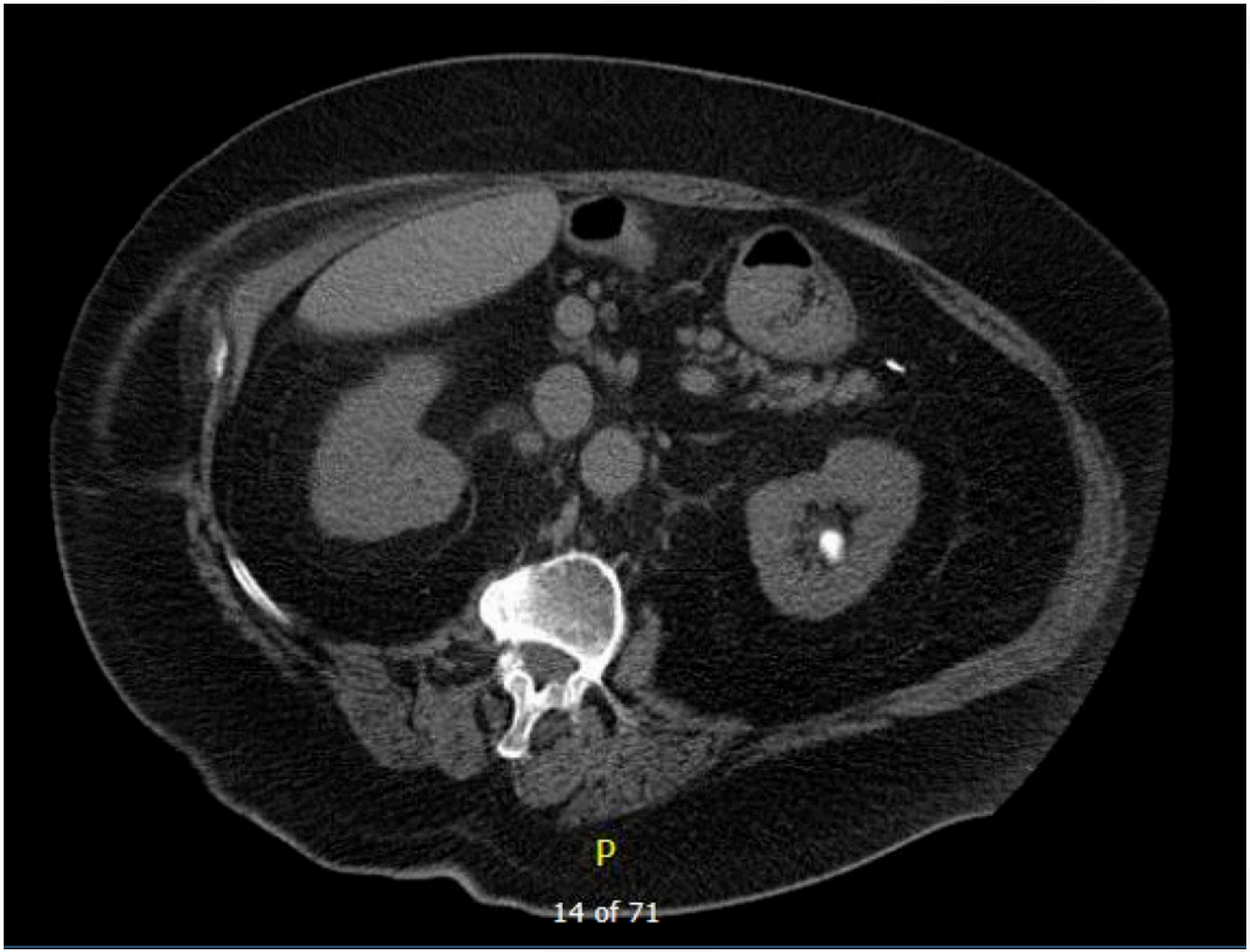
Panel Discussion

- Nutritional recommendations in at risk patients during pregnancy?

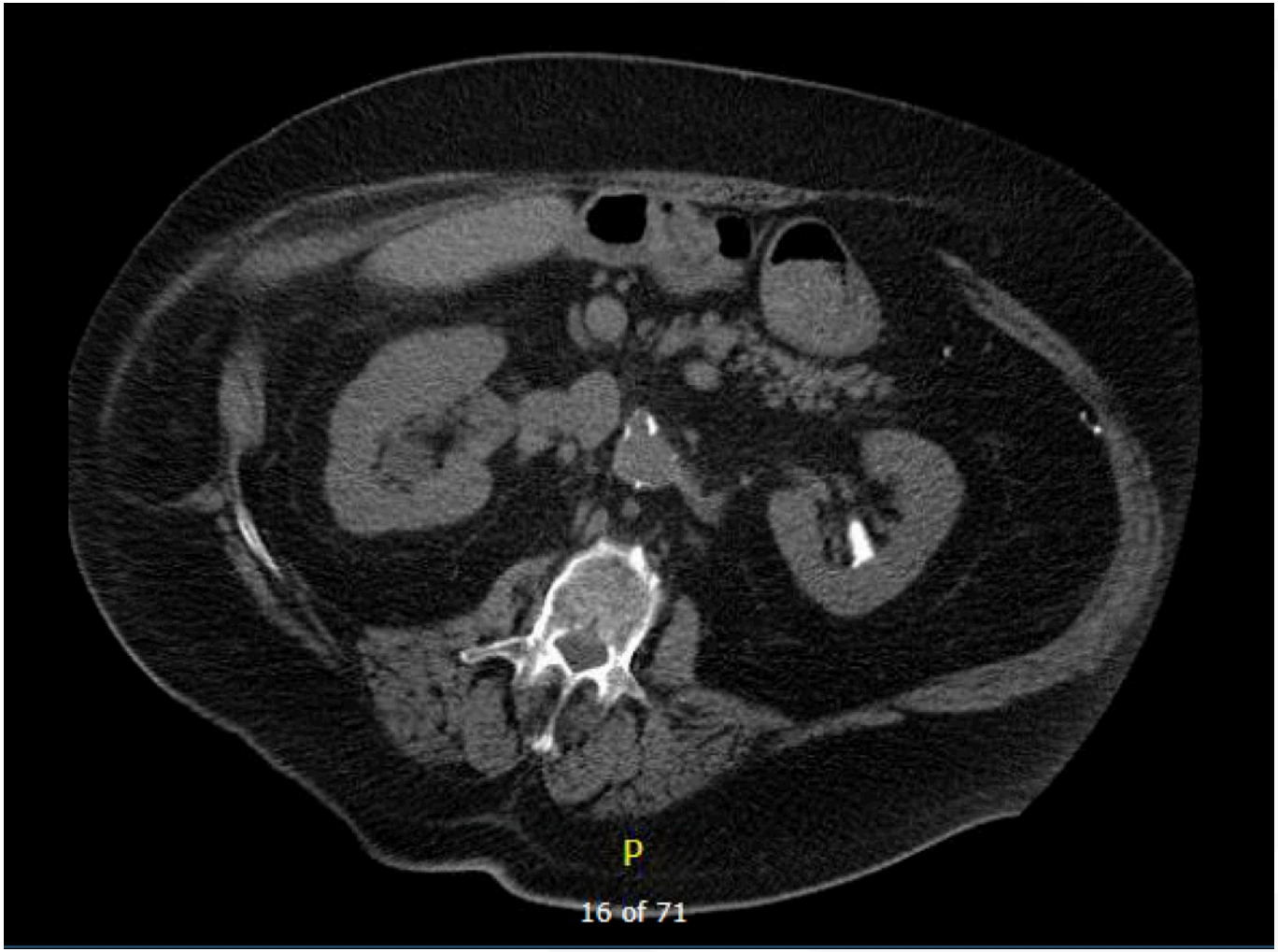
Case 3

- 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



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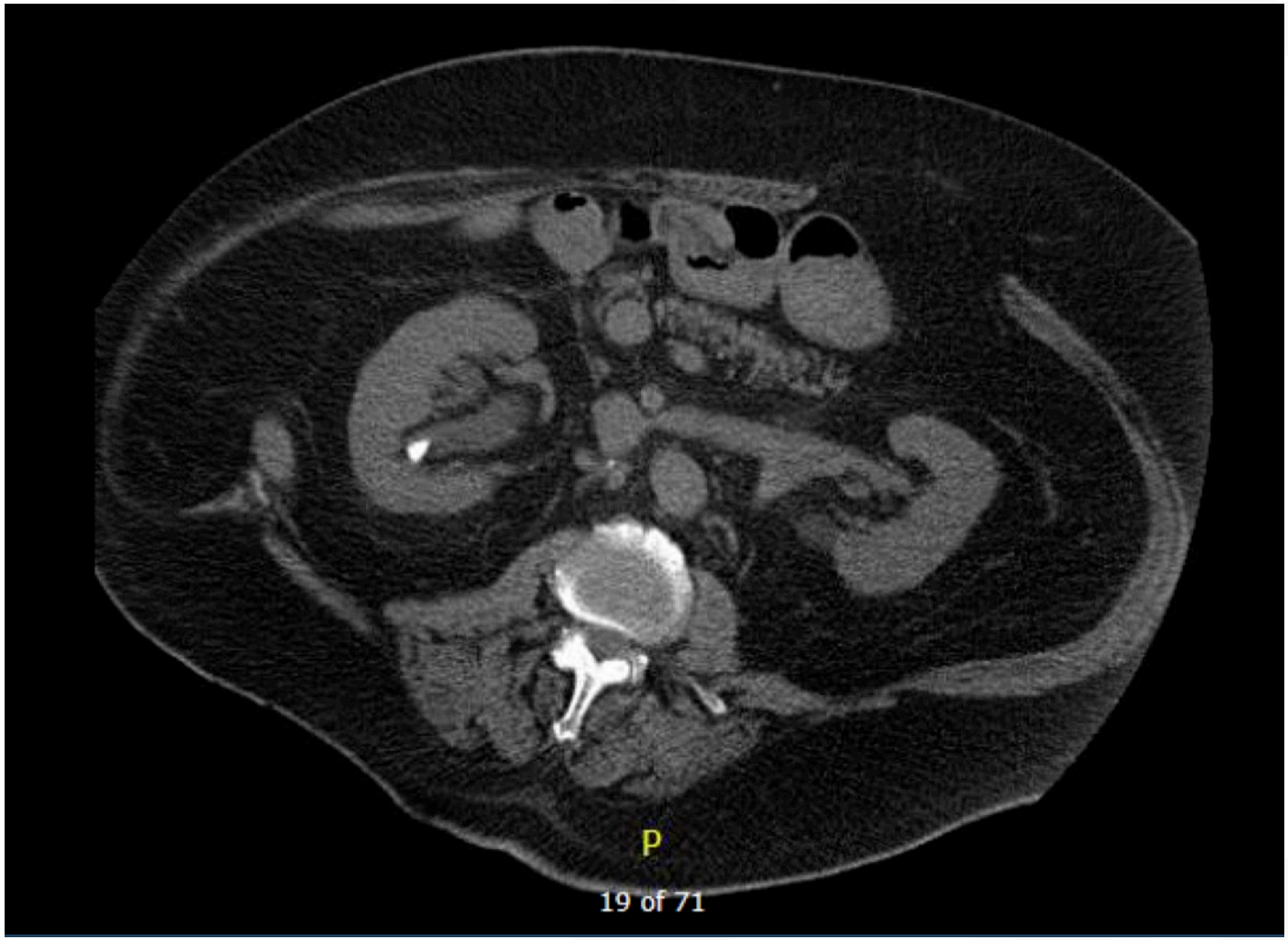

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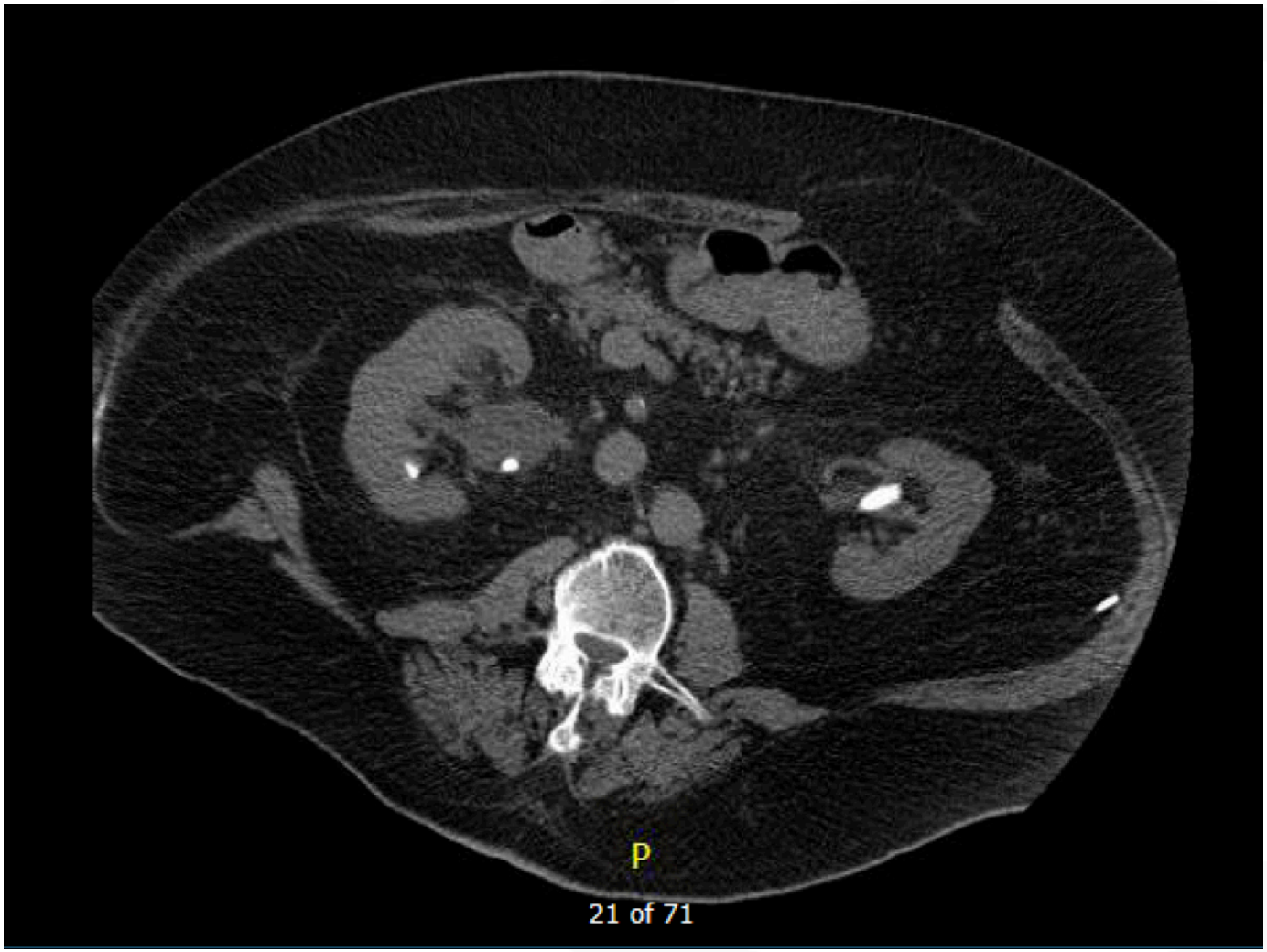

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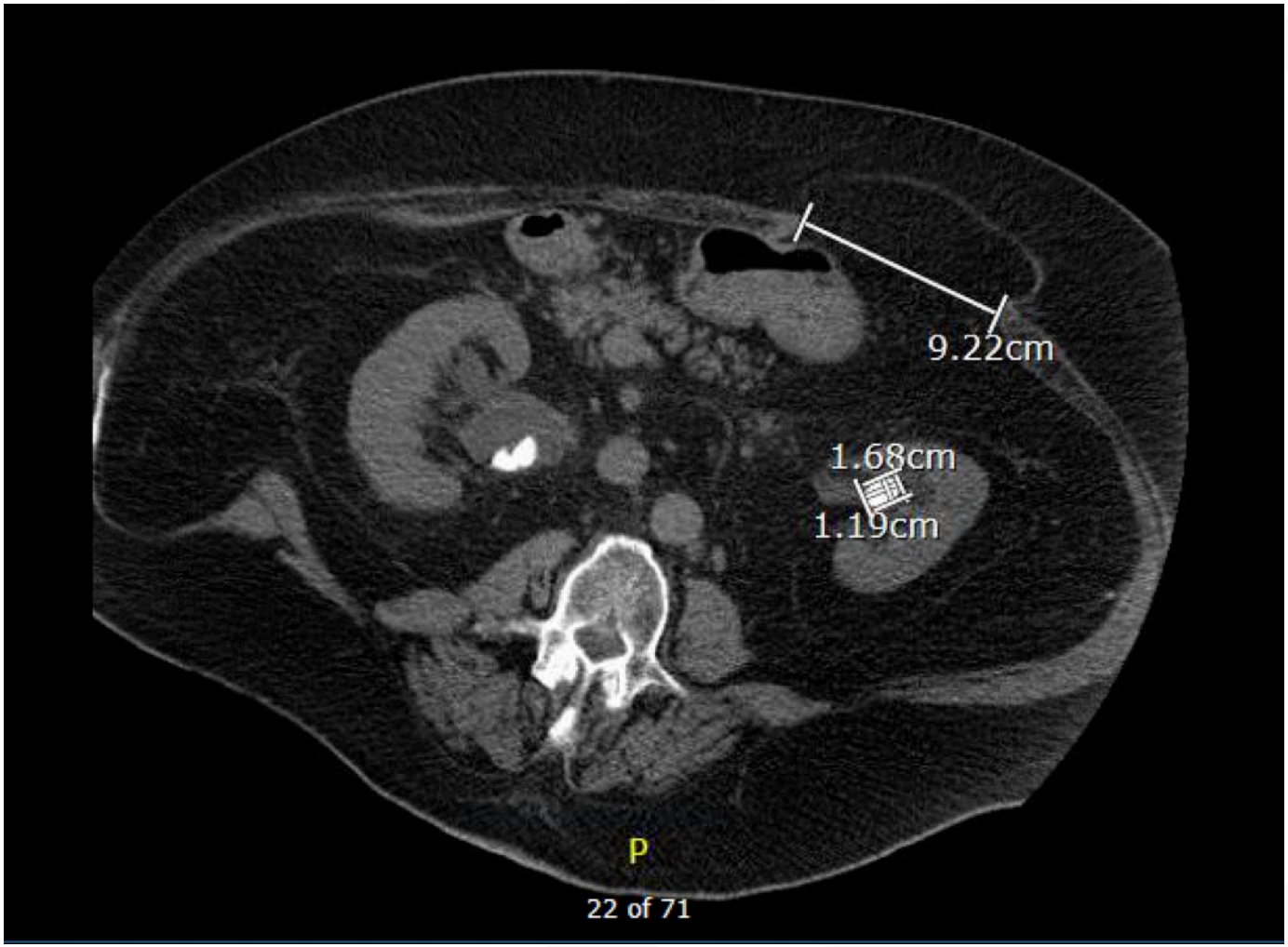

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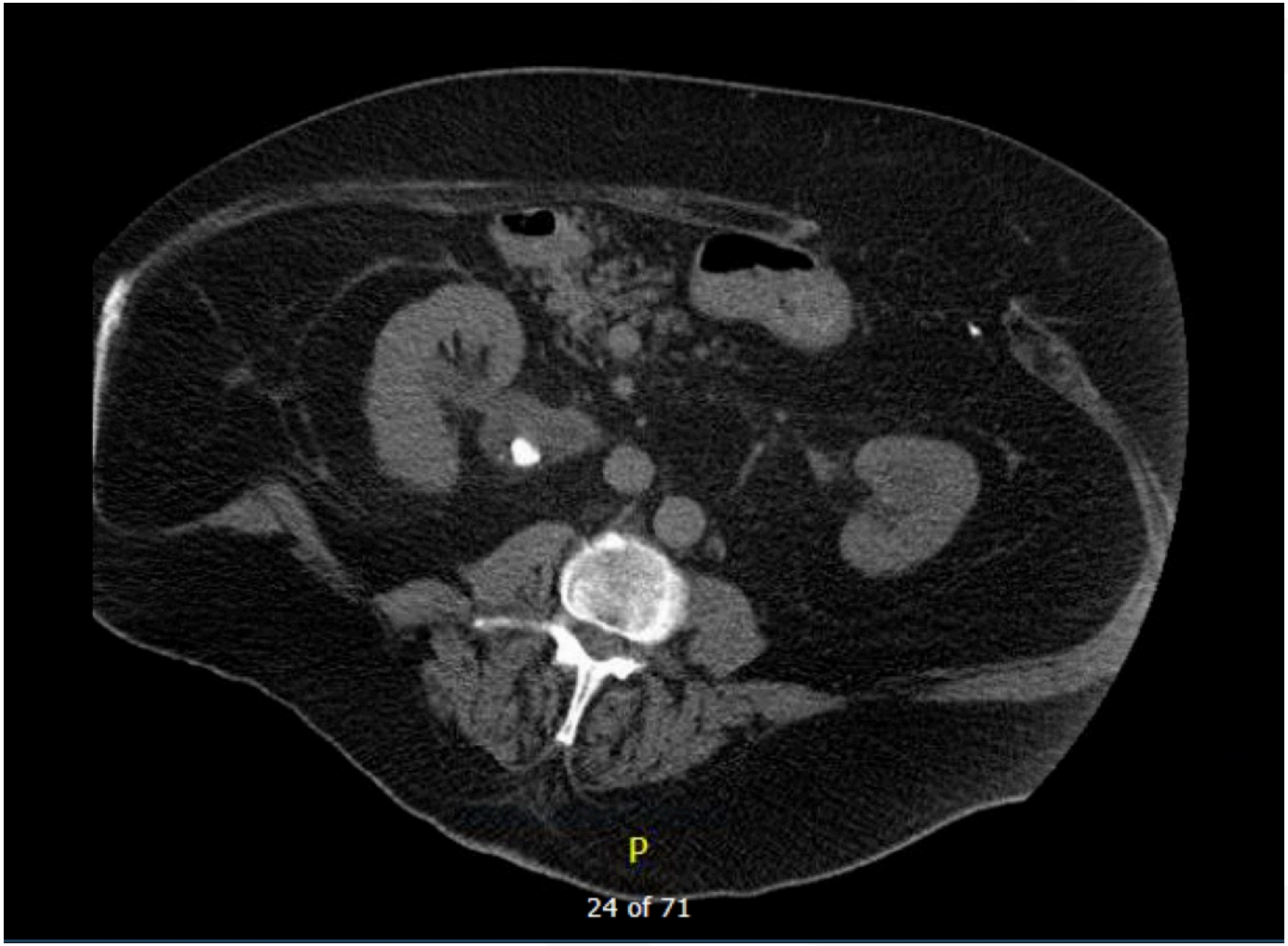

Case 3

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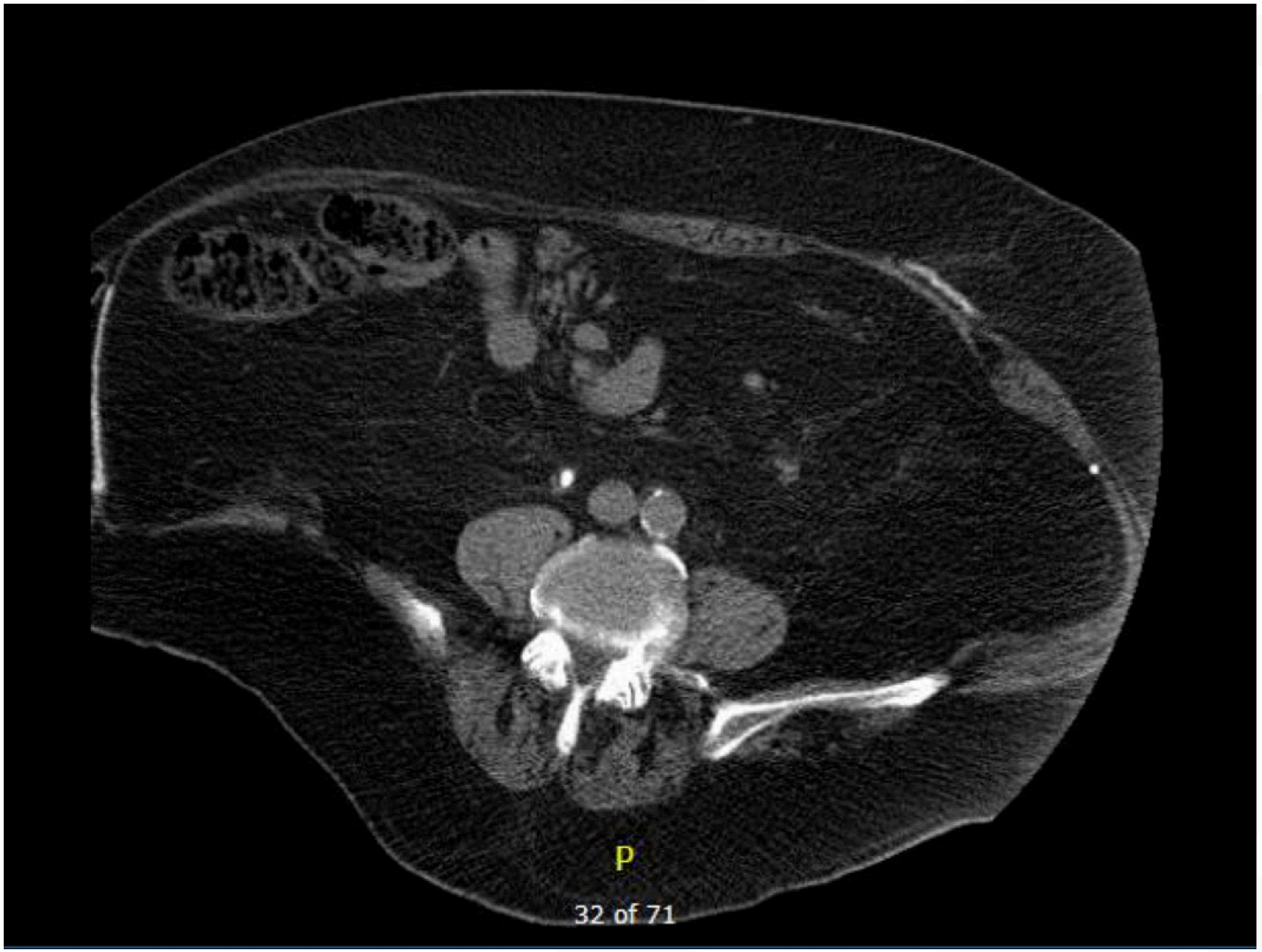
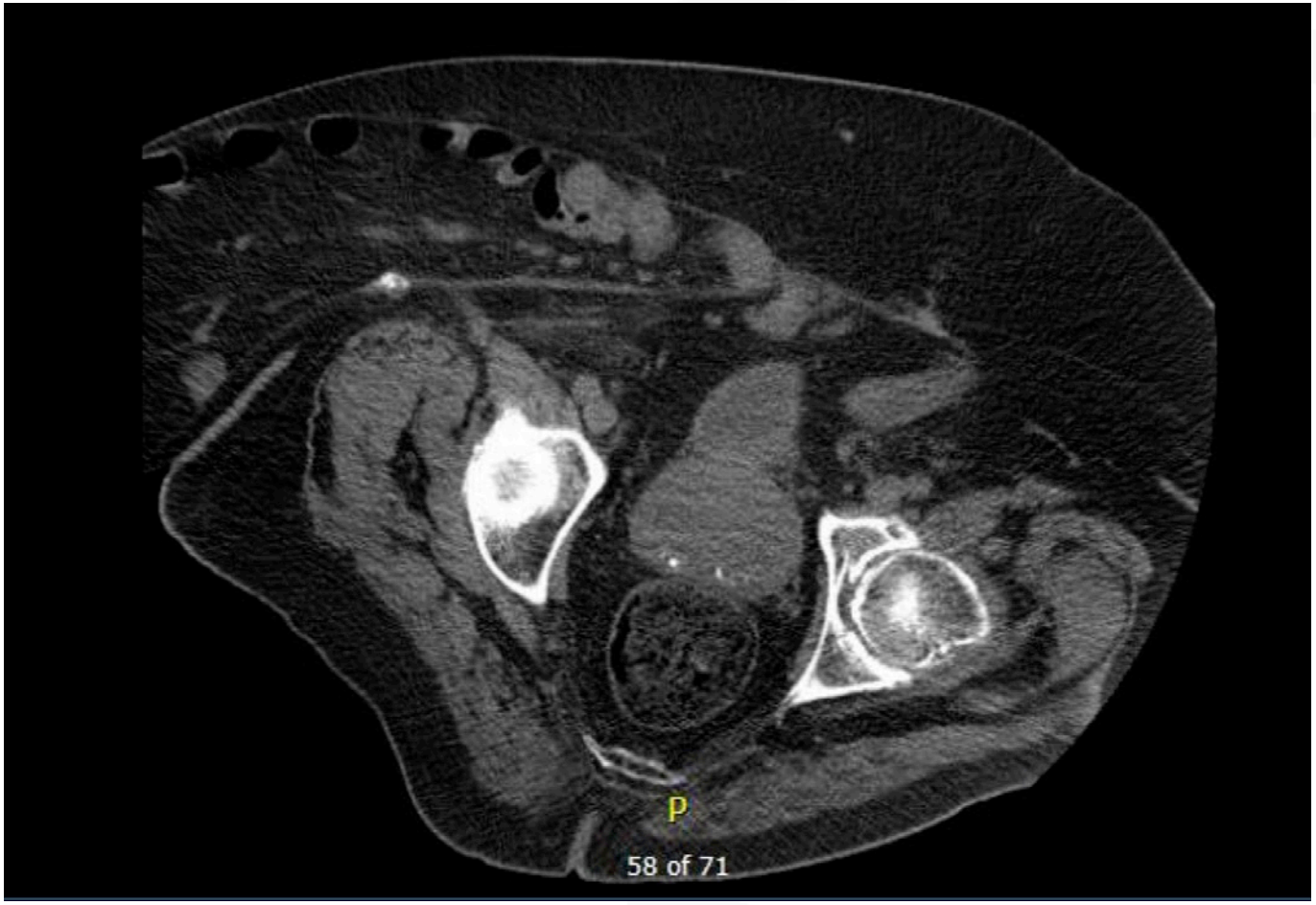


Case 3



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:

Date	Volume 24	SS CaOx	Calcium 24	Oxalate 24	Citrate 24	SS CaP	pH	SS UA	Uric acid 24	Sodium 24
Day 1	2.6	8.0	424	51	949	3.5	6.5	0.3	1.0	317
Day 2	3.5	5.8	503	51	909	3.1	6.8	0.1	1.0	364
	0.5-4 L	6-10	<250 male <200 female	20-40	>450 male >550 female	0.5-2	5.8 – 6.2	0-1	<0.8 male <0.75 female	50-150
Date	K 24	Mg 24	PO4	NH4	Cl	Sul	UUN	PCR	Cr	Creatinine /Kg
Day 1	78	169	1.8	41	239	32	11	0.7	1920	14.3
Day 2	80	187	1.7	42	323	29	13	0.8	1656	12.3
	20-100	30-120	0.6-1.2	15-60	70-250	20-80	6-14	0.8-1.4		18-24 male 15-20 female

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

J Endourol. 2014 Feb;28(2):248-51.

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

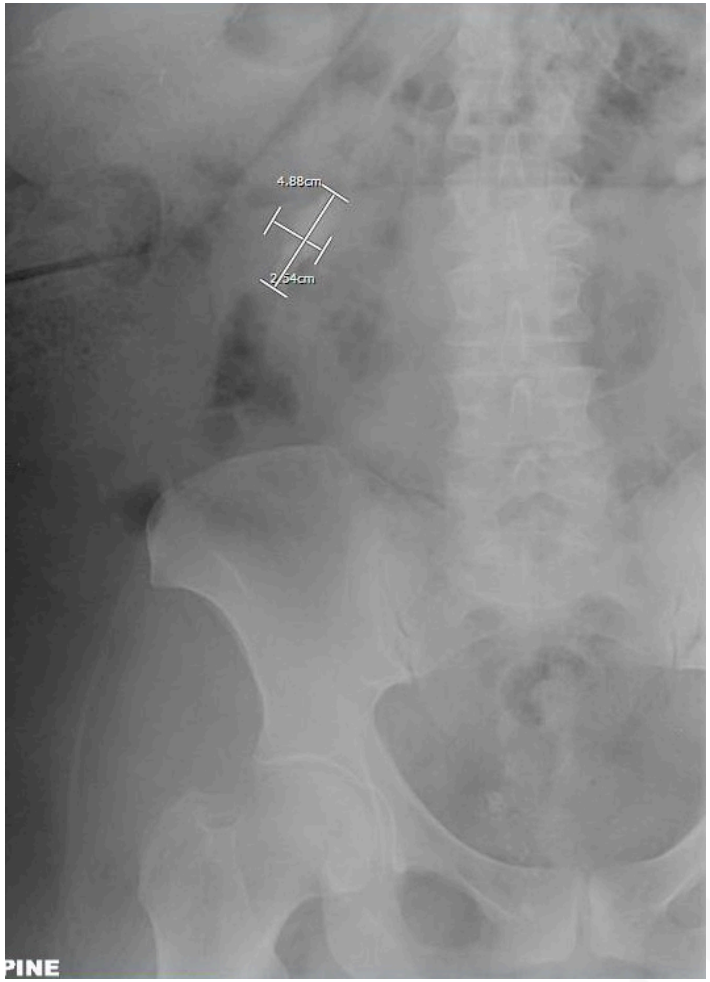
- Follow-up 24-hour urine study:

Volume 24	SS CaOx	Calcium 24	Oxalate 24	Citrate 24	SS CaP	pH	SS UA	Uric acid 24	Sodium 24
2.7	5.6	240	44	430	0.5	5.9	0.5	0.6	140
0.5-4 L	6-10	<250 male <200 female	20-40	>450 male >550 female	0.5-2	5.8 – 6.2	0-1	<0.8 male <0.75 female	50-150
K 24	Mg 24	PO4	NH4	Cl	Sul	UUN	PCR	Cr	Creatinine /Kg
60	170	0.7	36	175	24	7.2	0.5	1598	13
20-100	30-120	0.6-1.2	15-60	70-250	20-80	6-14	0.8-1.4		18-24 male 15-20 female

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

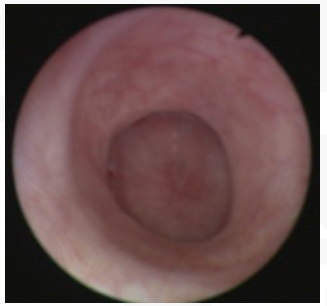
Case 4

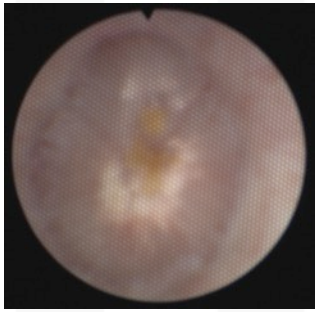


Panel Discussion

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

Case 4



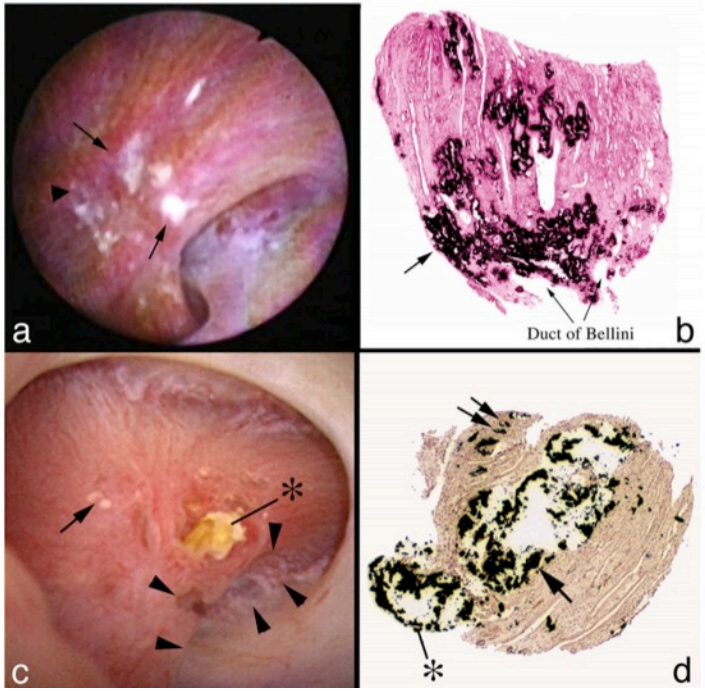


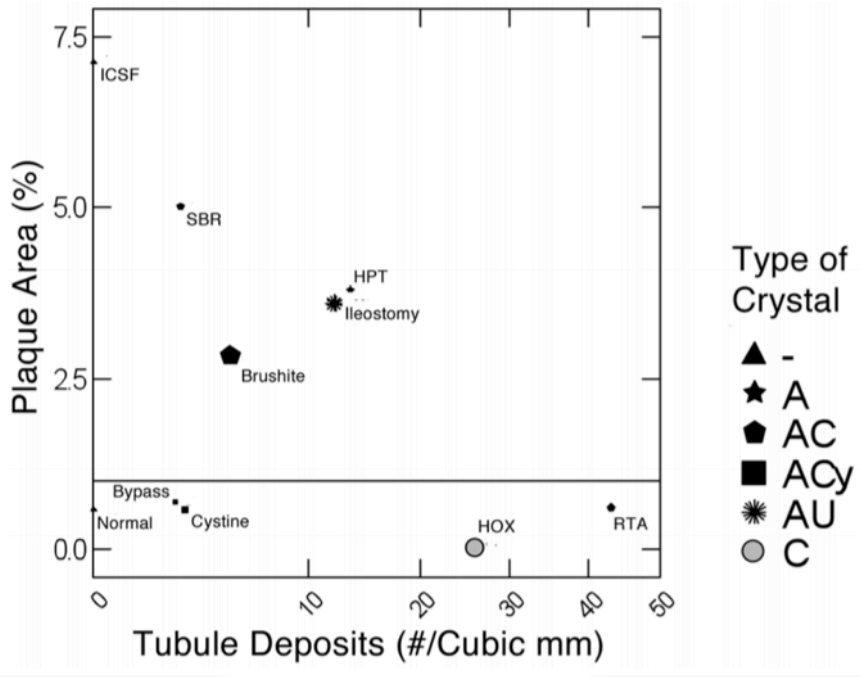
- Taken to OR for staged procedures
  - » Right percutaneous nephrolithotomy
  - » Left percutaneous nephrolithotomy
- Hospital course uneventful

- 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?





Plaque and Deposits in Nine Human Stone Diseases

Fredric L Coe[1], **Andrew P Evan**[2], **James E Lingeman**[3], and **Elaine M Worcester**[1]

Urol Res. 2010 August ; 38(4): 239–247.

Case 4

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

Volume 24	SS CaOx	Calcium 24	Oxalate 24	Citrate 24	SS CaP	pH	SS UA	Uric acid 24	Sodium 24	Creatinine/Kg
3.6	**1.3**	**67**	**62**	**829**	**0.5**	**6.9**	**0.06**	**0.8**	**343**	**6.4**
0.5-4 L	6-10	<250 male <200 female	20-40	>450 male >550 female	0.5-2	5.8 – 6.2	0-1	<0.8 male <0.75 female	50-150	18-24 male 15-20 female

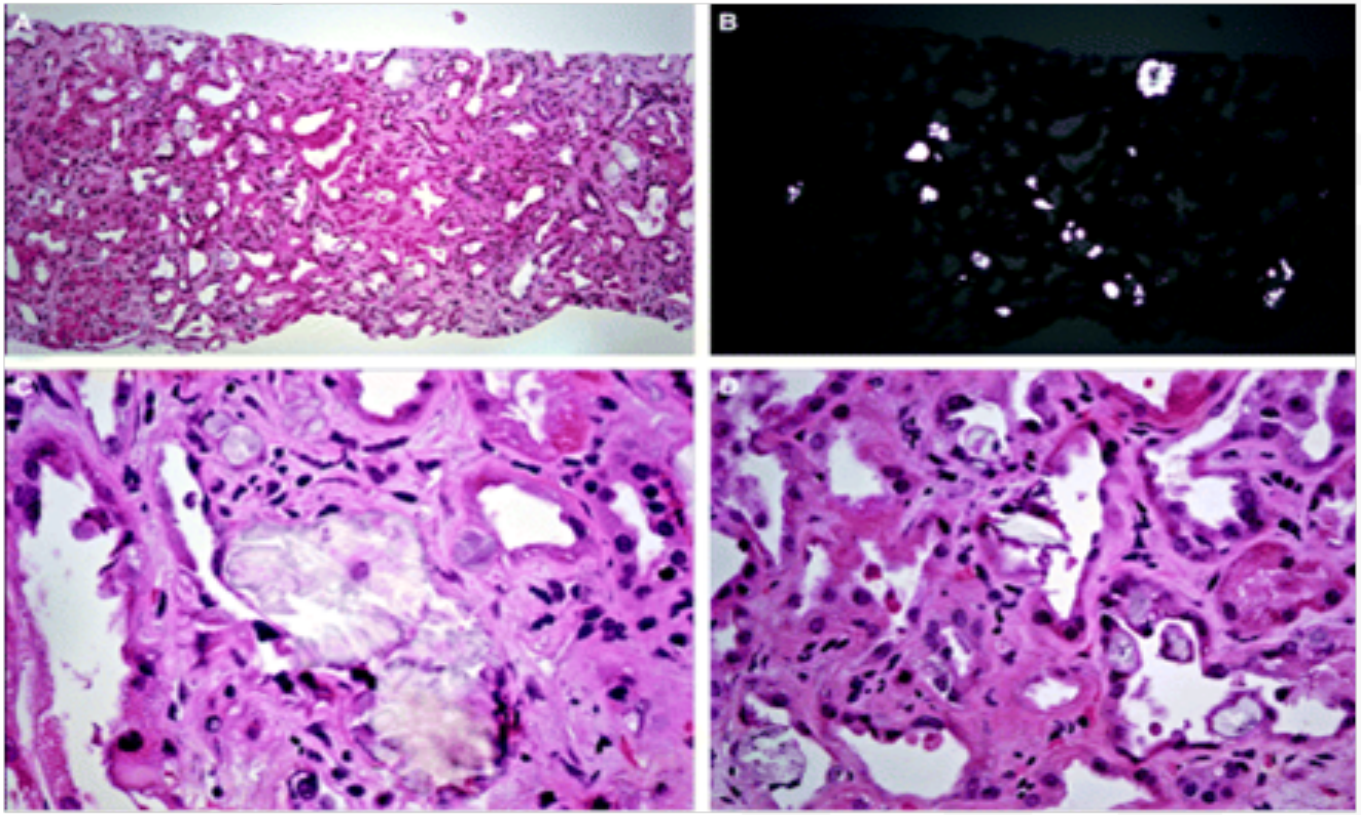
- Recommended calcium citrate with meals, low oxalate diet, low salt / animal protein

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

Nasr SH, D'Agati VD, et al. Clin J Am Soc Nephol 3:1676-83,2008

Case 5

- 73 year old male
  - 1st 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:

Volume 24	SS CaOx	Calcium 24	Oxalate 24	Citrate 24	SS CaP	pH	SS UA	Uric acid 24	Sodium 24	Creatinine/Kg
2.1	**4.26**	**262**	**25**	**686**	**2.3**	**6.8**	**0.1**	**0.7**	**233**	**25**
0.5-4 L	6-10	<250 male <200 female	20-40	>450 male >550 female	0.5-2	5.8 – 6.2	0-1	<0.8 male <0.75 female	50-150	18-24 male 15-20 female

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

Case 5

- Follow-up 24-hour urine study:

Volume 24	SS CaOx	Calcium 24	Oxalate 24	Citrate 24	SS CaP	pH	SS UA	Uric acid 24	Sodium 24	Creatinine/Kg
2.7	**3.2**	**145**	**39**	**362**	**0.9**	**6.4**	**0.3**	**0.8**	**207**	**24**
0.5-4 L	6-10	<250 male <200 female	20-40	>450 male >550 female	0.5-2	5.8 – 6.2	0-1	<0.8 male <0.75 female	50-150	18-24 male 15-20 female

Questions?

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