

Chronic Flank Pain: Strategies for the Successful Workup and Management of a Frustrating Clinical Conundrum

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Innovations in Urologic Practice

September 16th, 2018

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Disclosures

- Astellas – PI for an investigator-initiated clinical trial

Objectives

- Review common and uncommon causes of flank pain
- Recognize conditions that might be amenable to particular treatments
- Discuss Loin Pain Hematuria Syndrome
- Highlight interdisciplinary strategies
- Create a framework for examining, working-up, and treating chronic flank pain patients

Flank Pain

- Sensation of discomfort, distress, or agony in the part of the body below the rib and above the ilium
 - Generally posterior or in mid-axillary line
- Nearly 2% of all emergency room visits and nearly 12% of those with abdominal pain
- Associated symptoms are common
- Can either be acute or chronic
 - implications for etiology



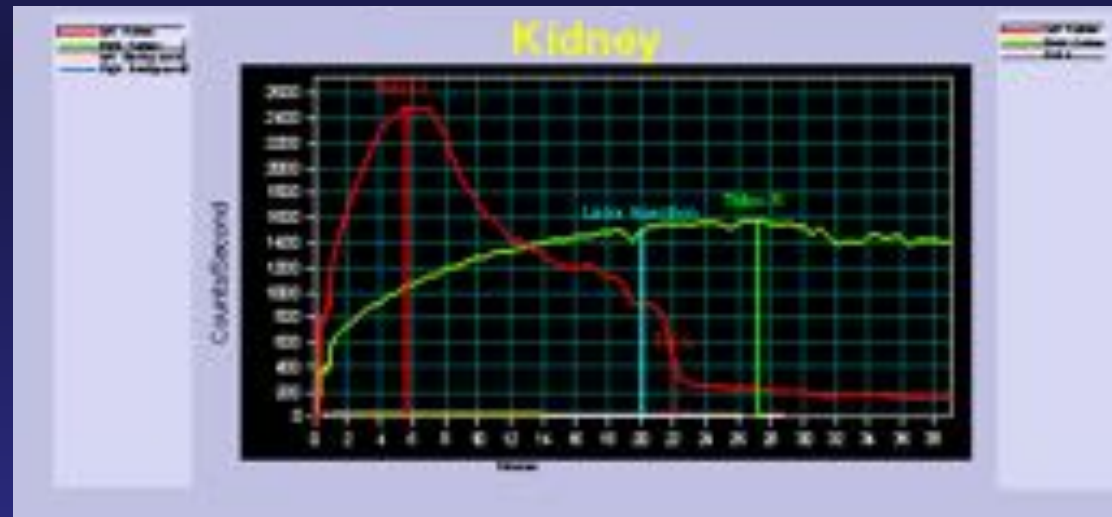
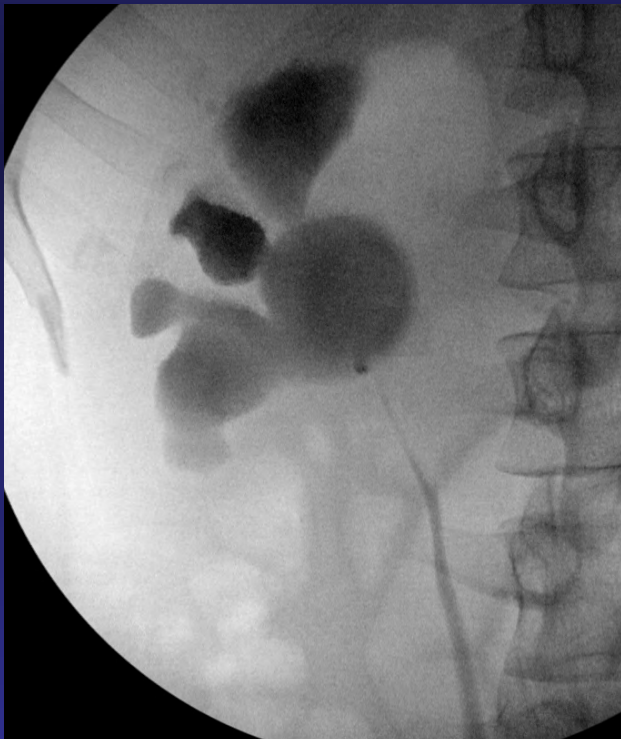
Causes of Flank Pain

- Ureteral Obstruction
 - Stone, clot, papillary necrosis, congenital (UPJO, VUR), previous surgery, RPF, cancer, XRT
- Renal Inflammation
 - Pyelonephritis and abscess
- Tumor
 - RCC, TCC, PCKD
- Trauma
- Infarction/ hemorrhage
- Extra-urinary causes
 - Nutcracker syndrome, shingles, cholecystitis, GI causes



Patient Presentation

- MF is a 23 year old young man referred for right flank pain
- Presented to the ER with severe flank pain after a night of drinking alcohol
- CT demonstrates a large dilated right renal pelvis with no stone



Patient Presentation

- 24 year old patient with a mid-thoracic spina bifida and a vesicostomy
 - Incontinent per vesicostomy and per urethra
- Recurrent urinary tract infections managed by an outside urologist
 - Bladder stone found early 2018 removed in the office but no improvement
- Admitted listless with high fever and right hydronephrosis on RUS
- PCN placed and improved but also chronic left flank pain





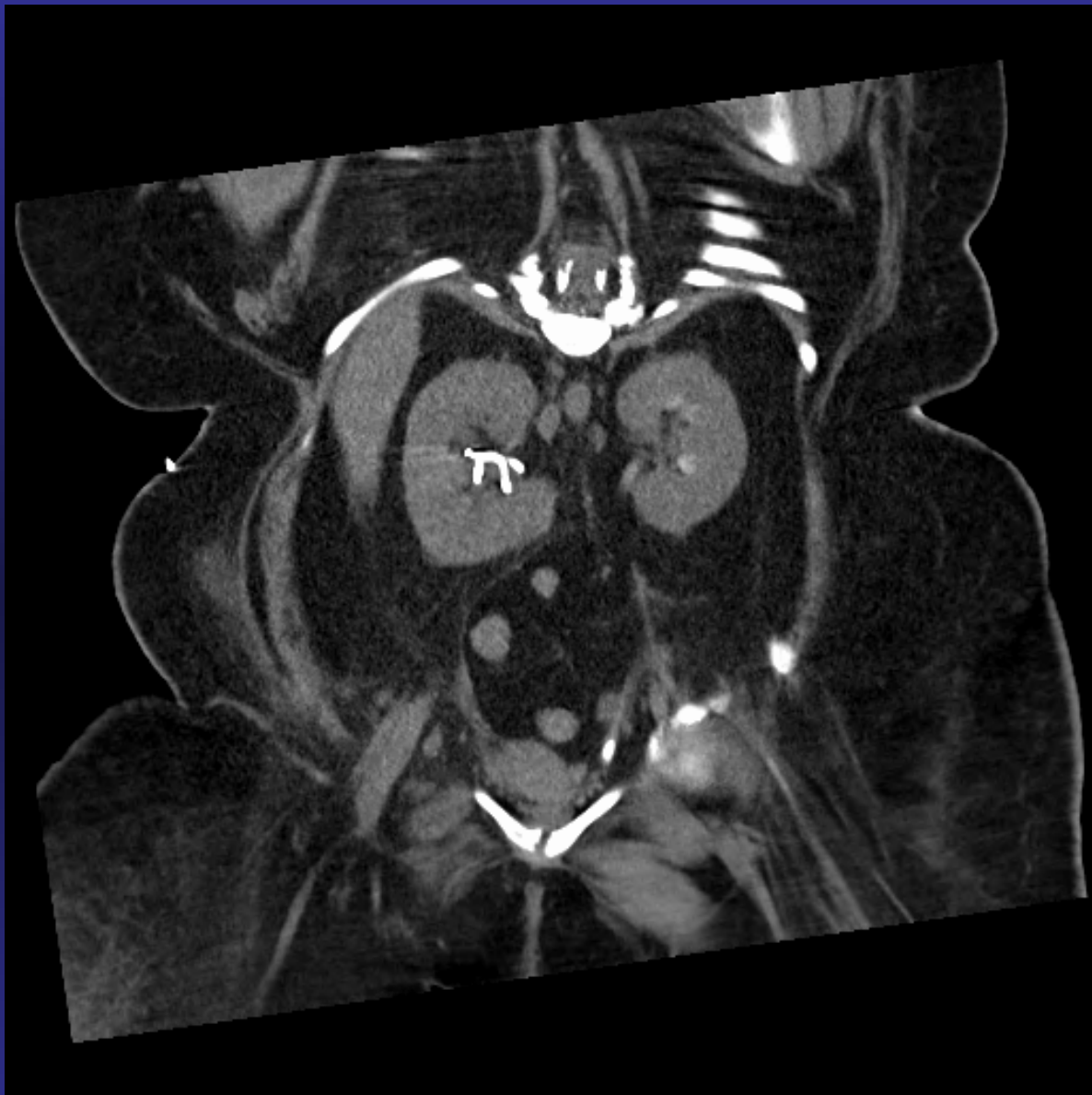


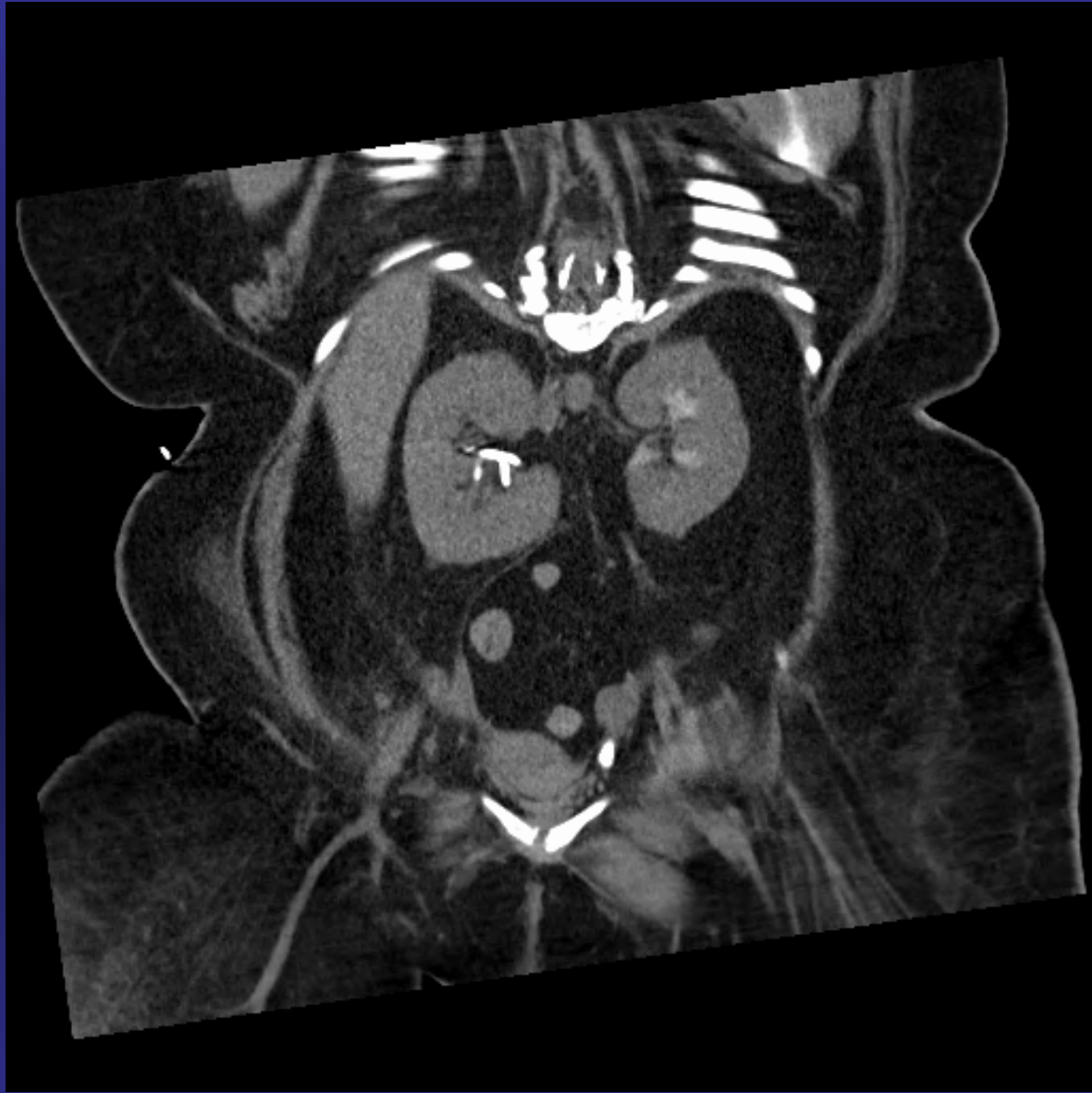


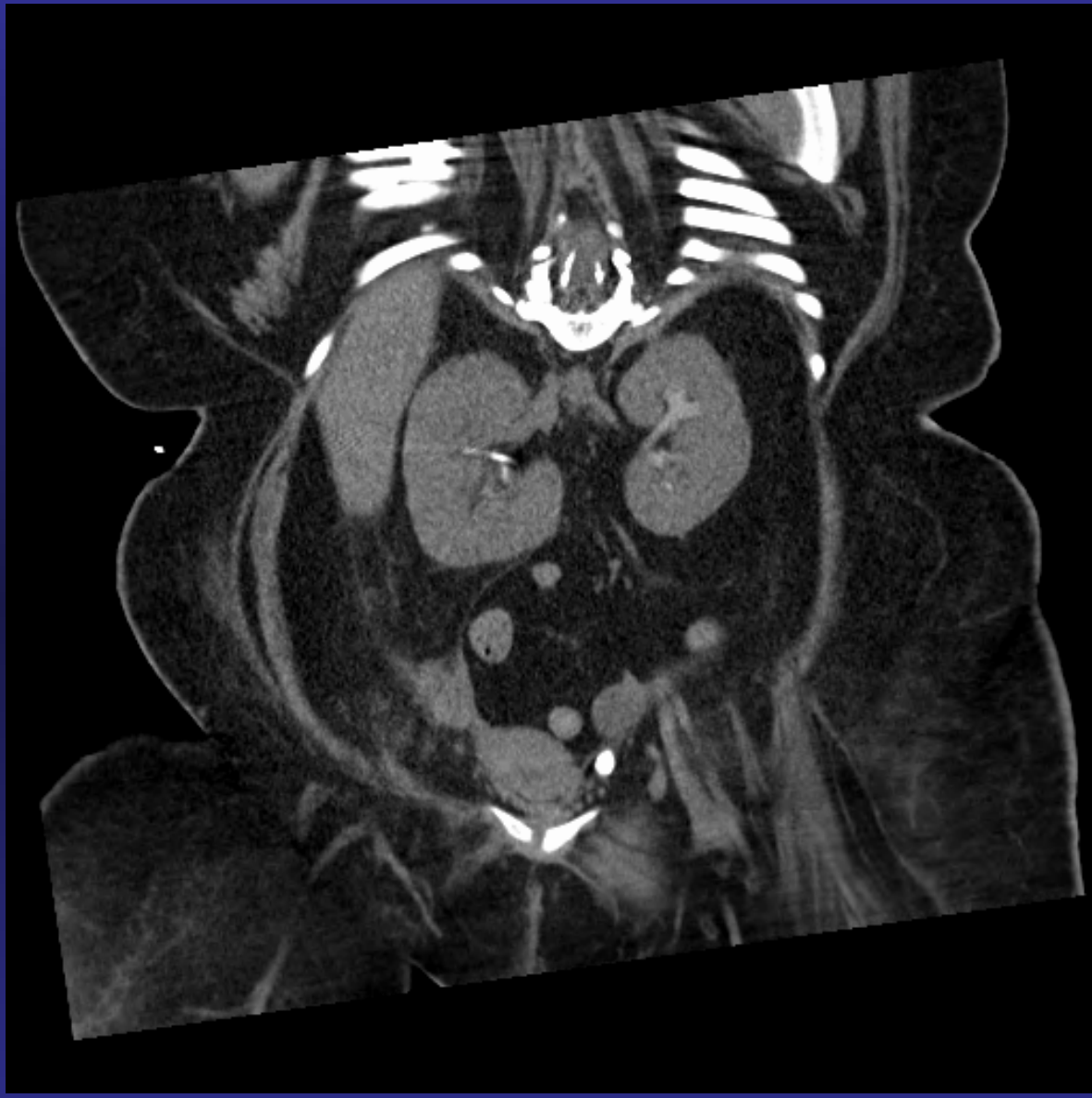


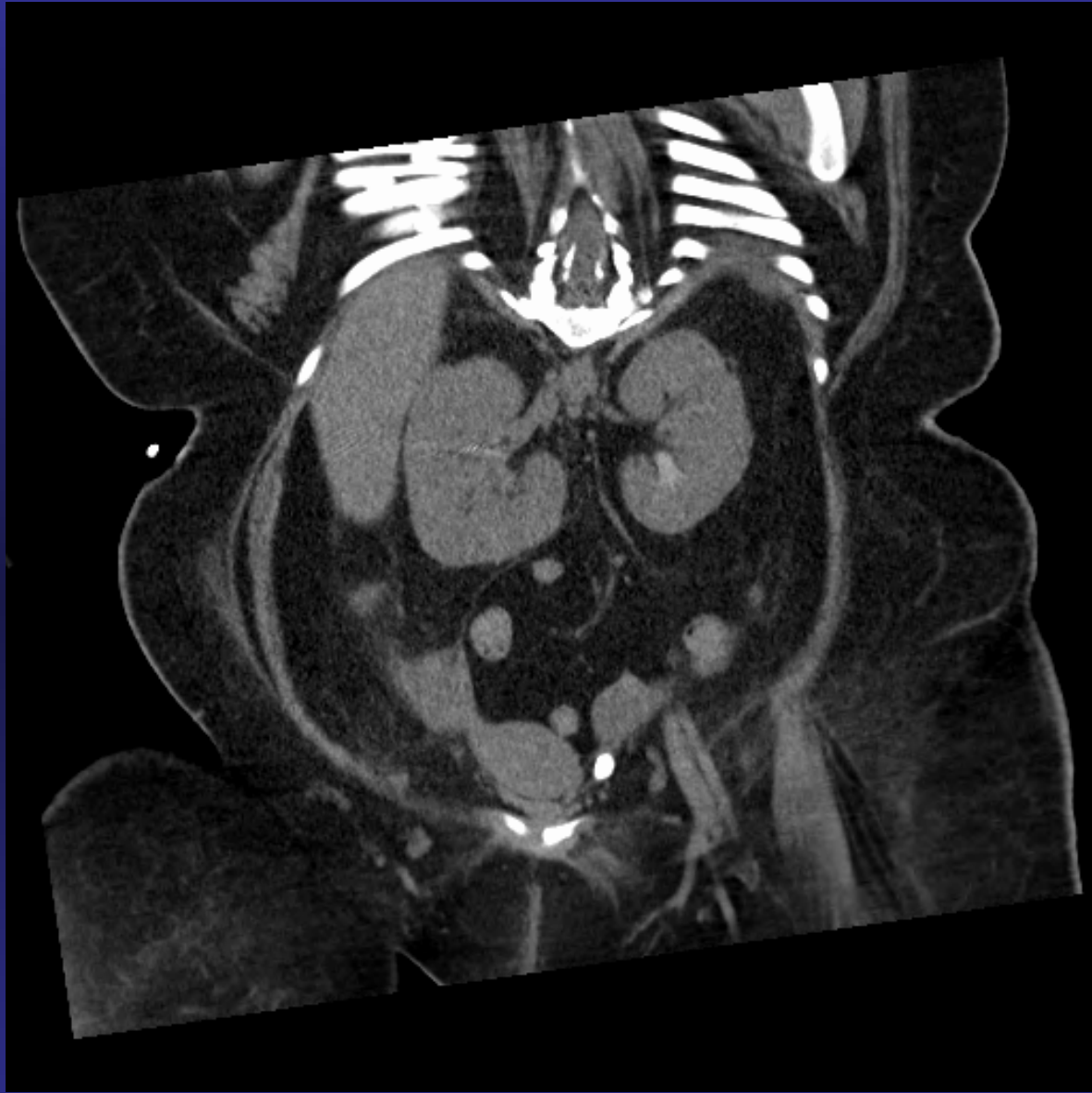


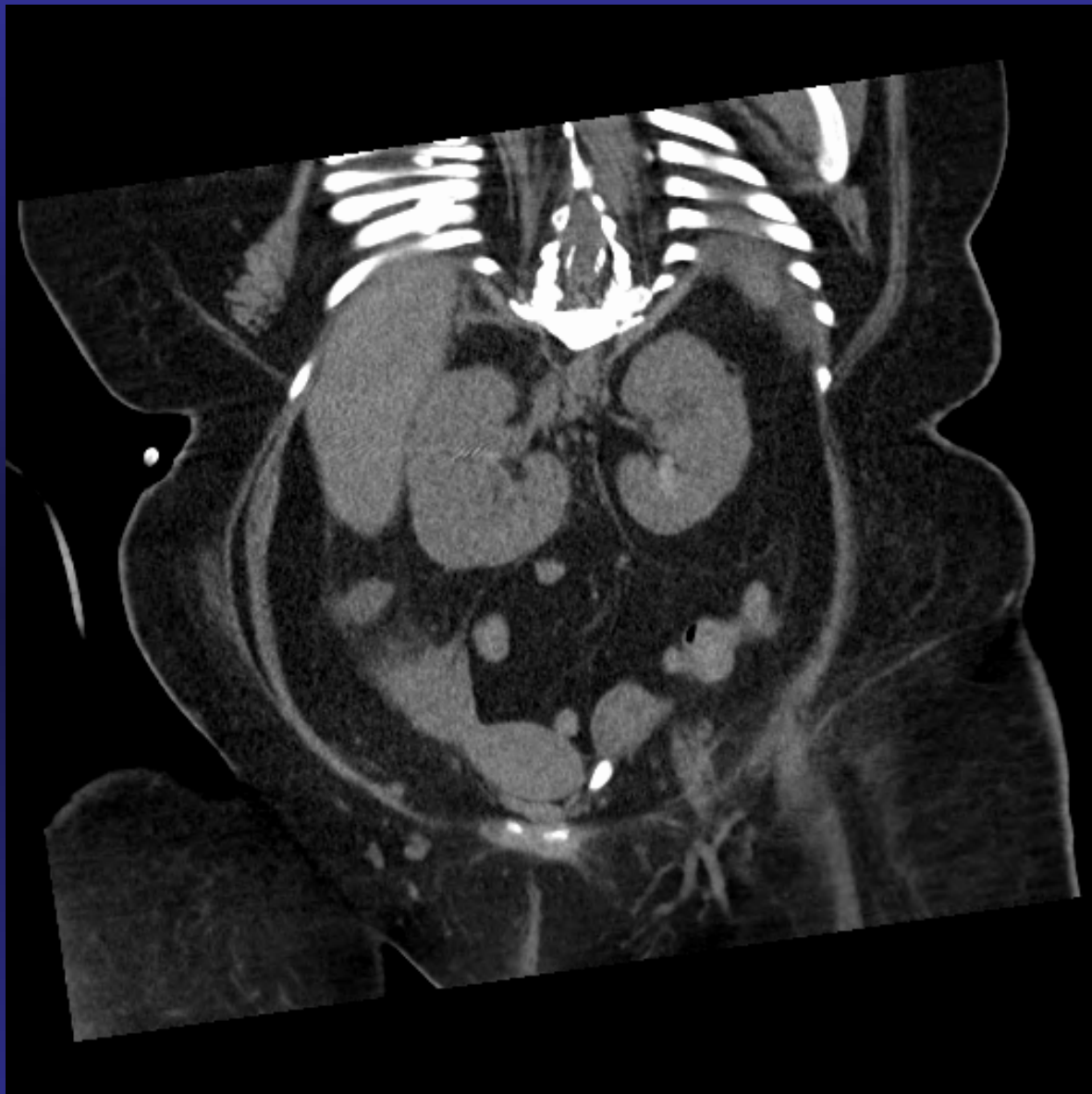


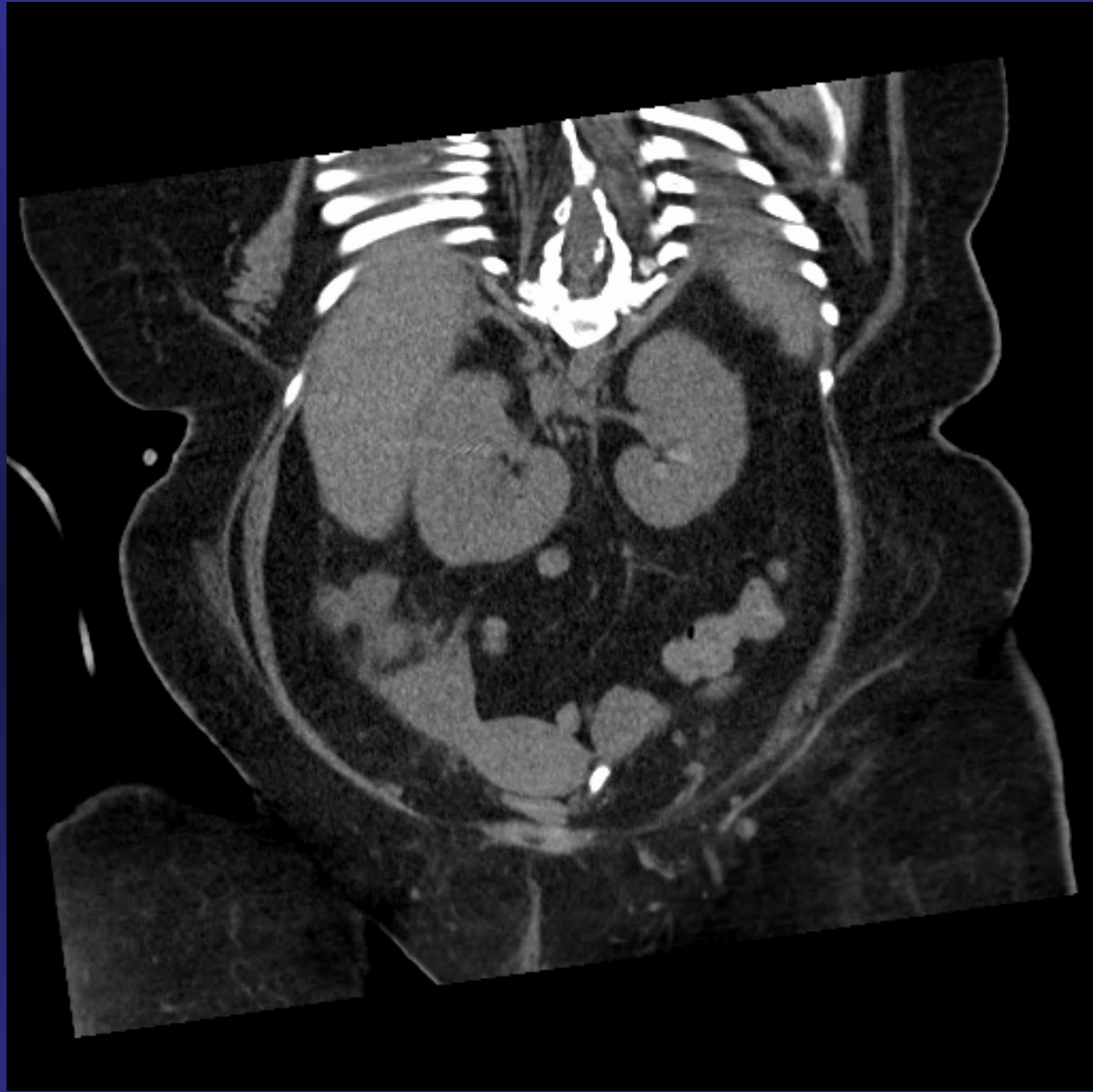














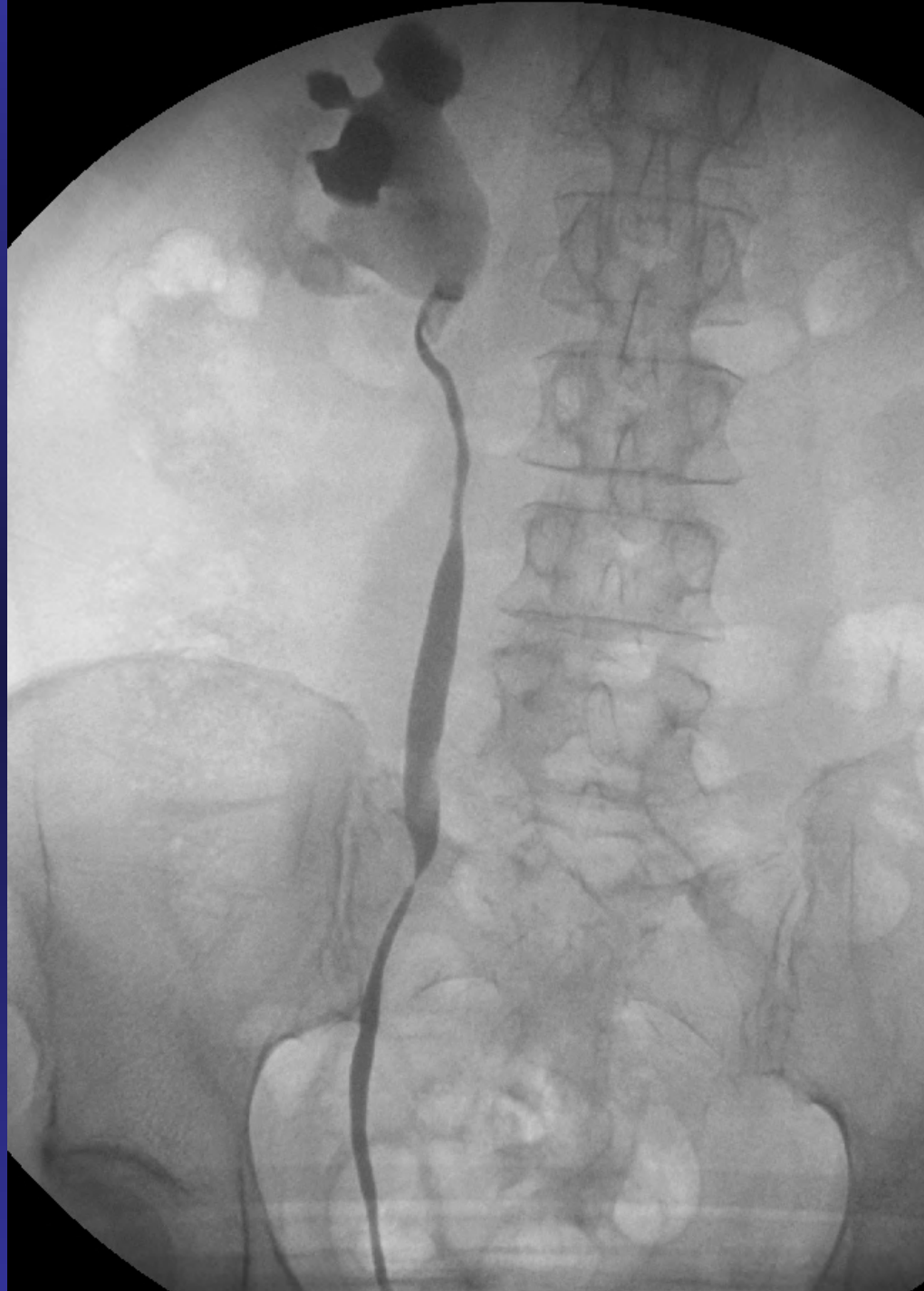






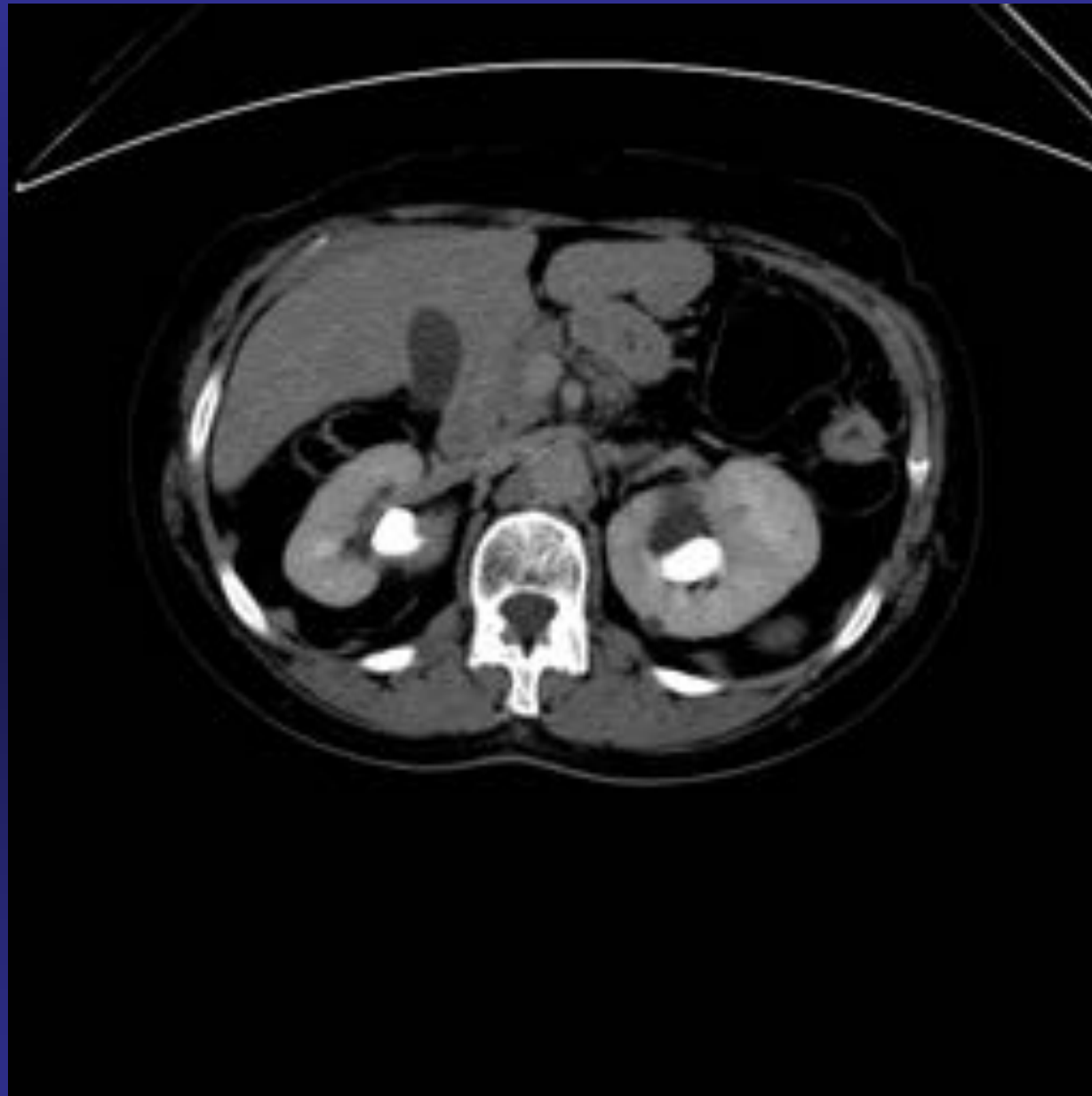
Patient Presentation

- 60 year old female referred for chronic right flank pain
- Long history of calcium oxalate stones
- Status post ureteroscopy a few years earlier for right mid-ureteral impacted stone
- Subsequent ureteral stricture found and laser-incised by an OS urologist but pain has recurred

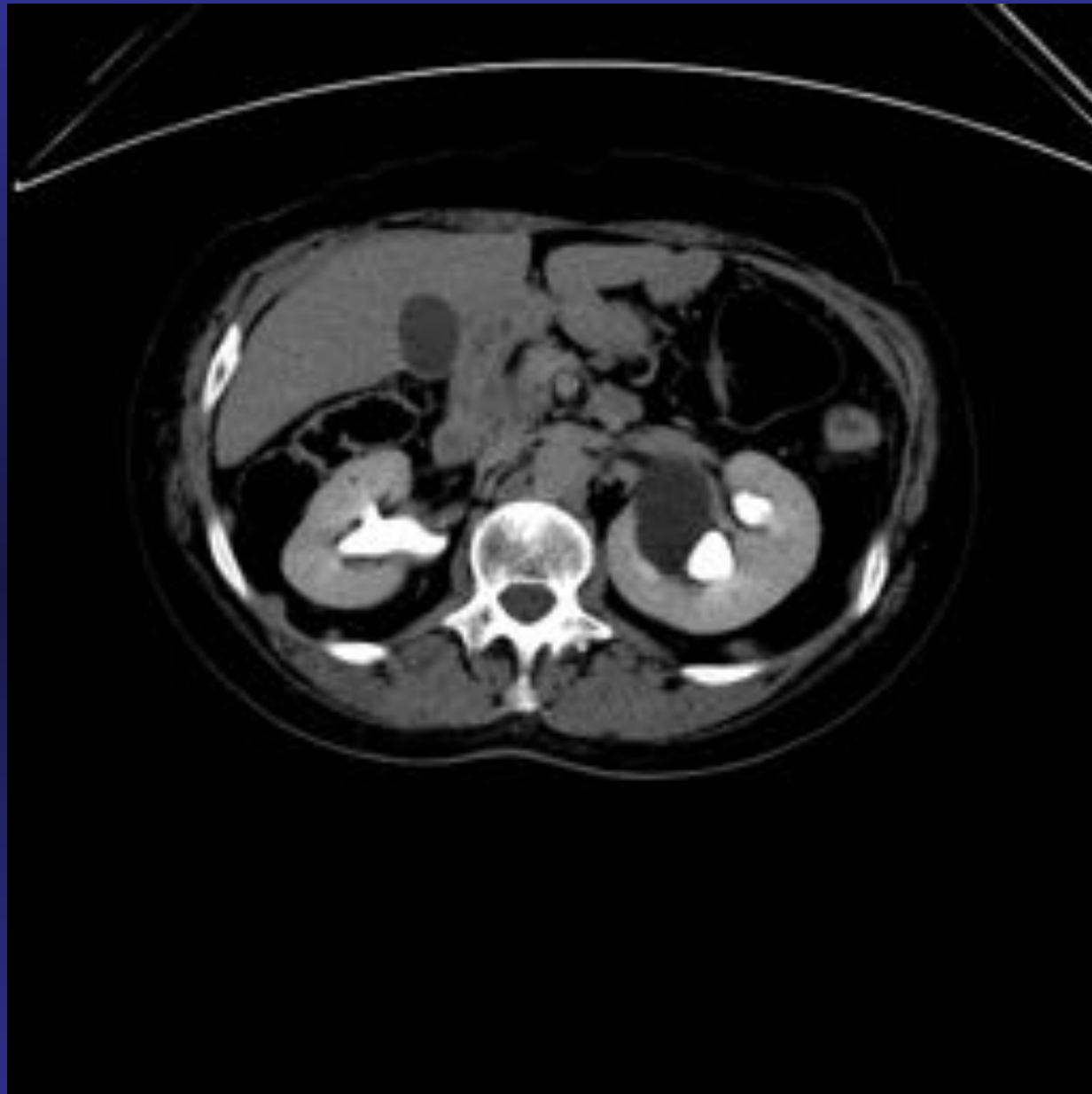


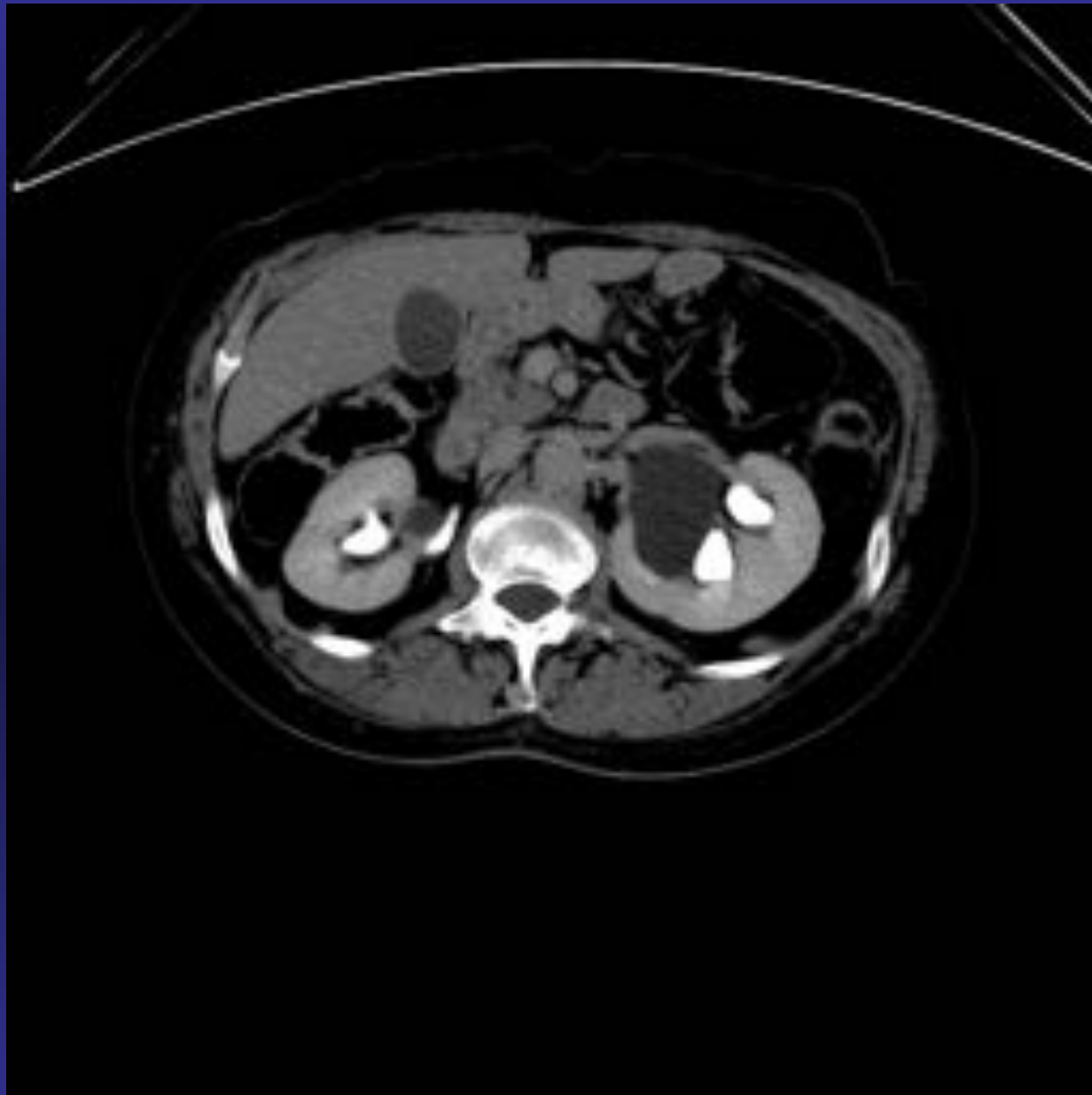
Patient Presentation

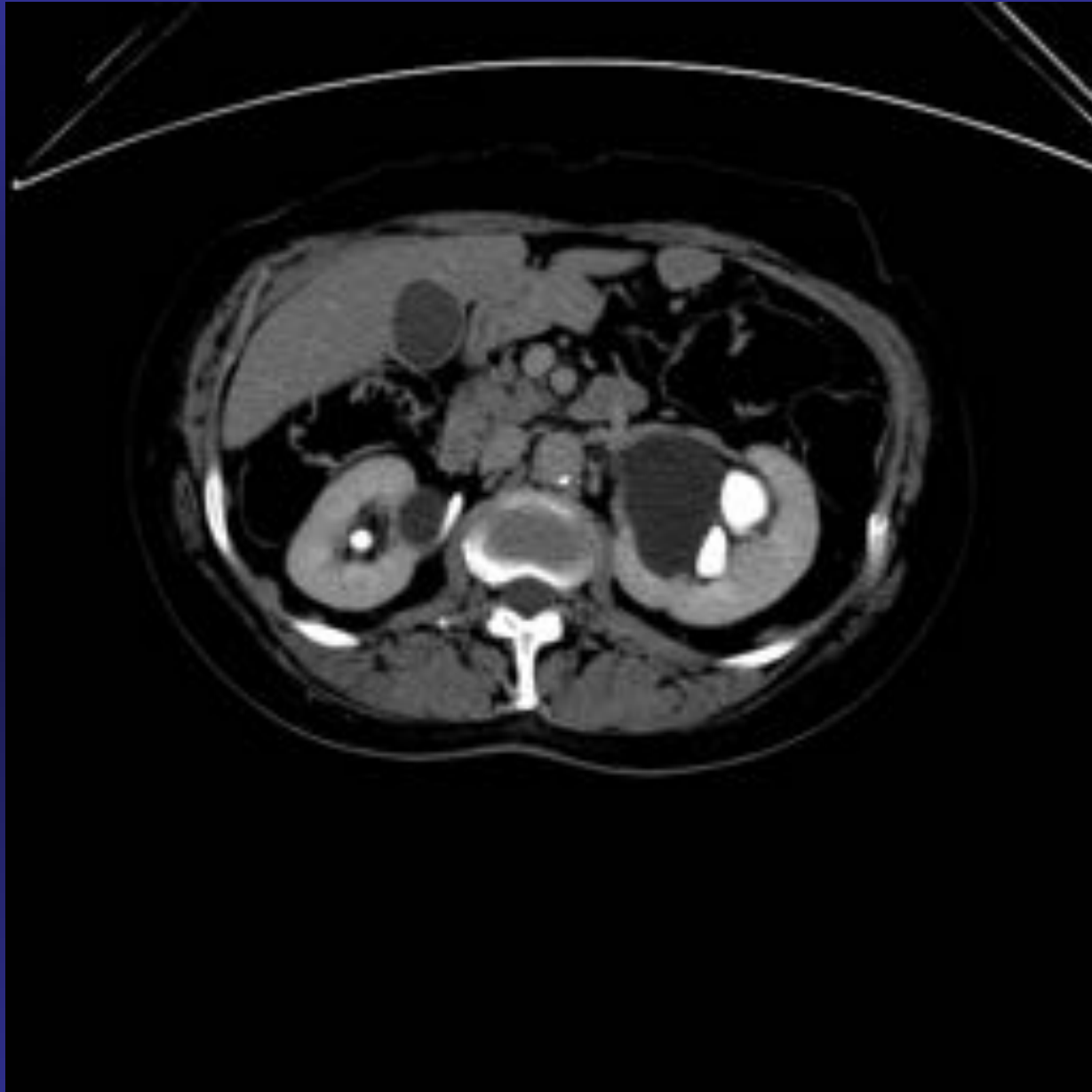
- 68 year old woman with recurrent UTIs and chronic left flank pain with intermittent nausea

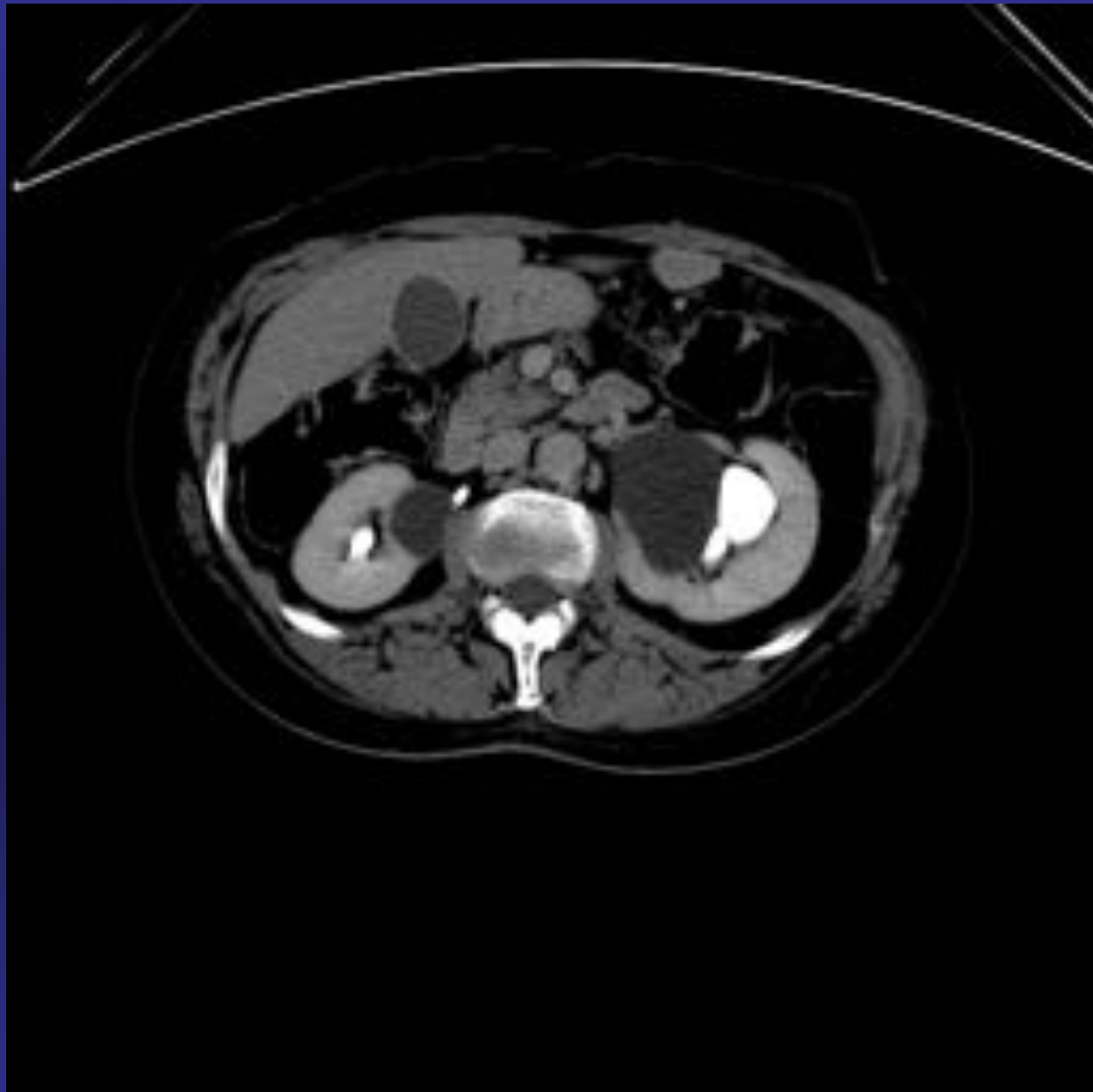


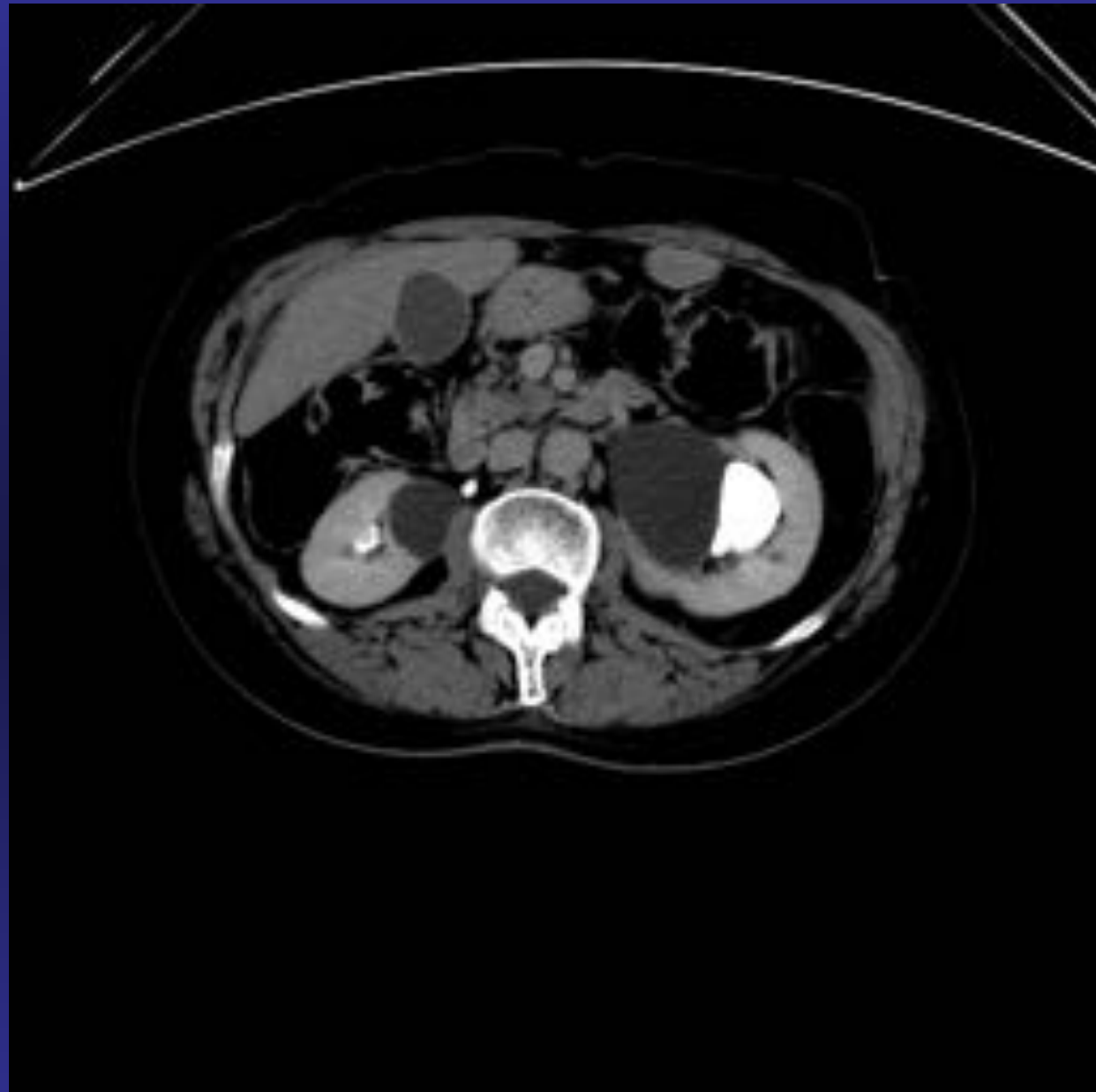


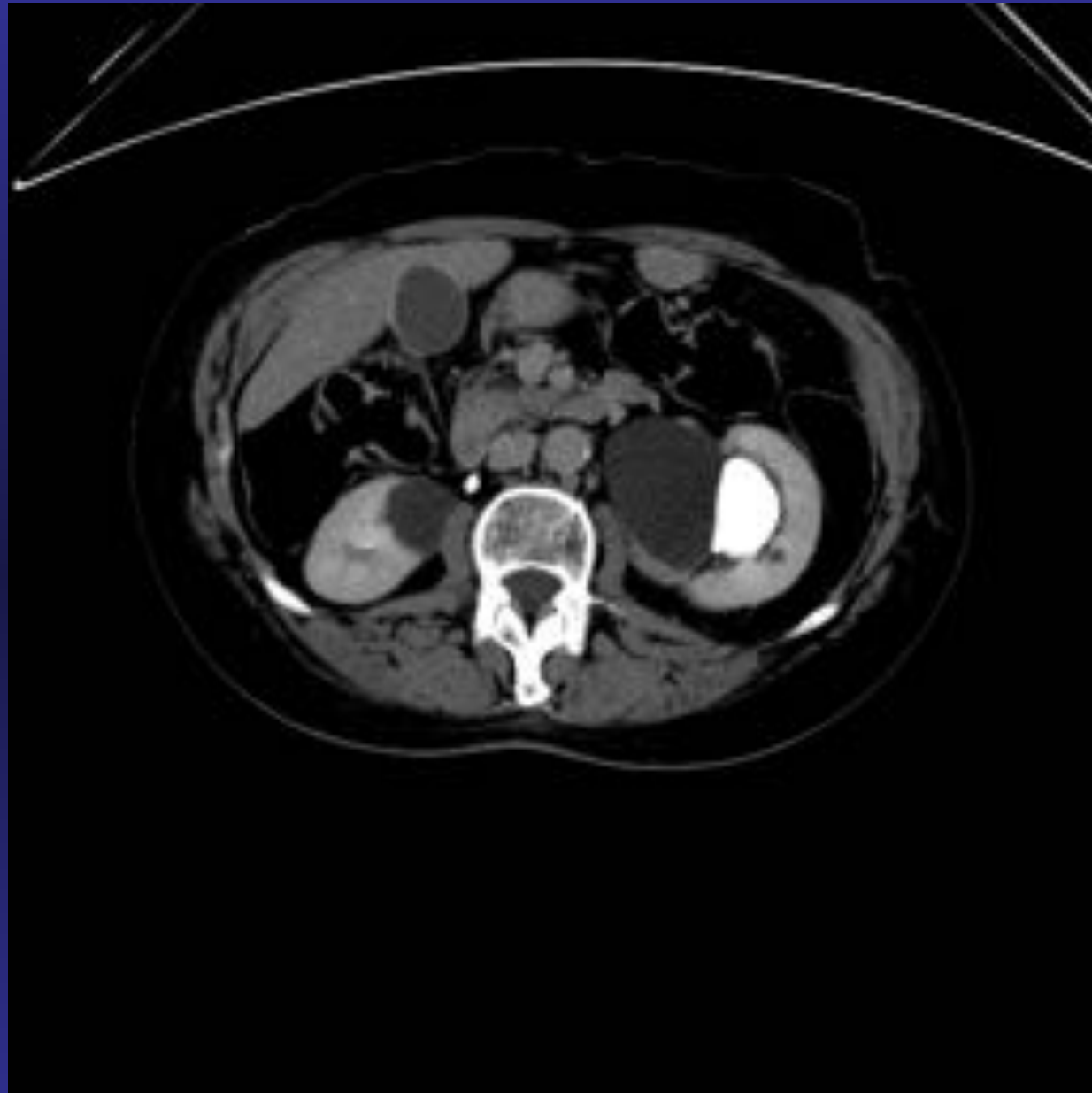


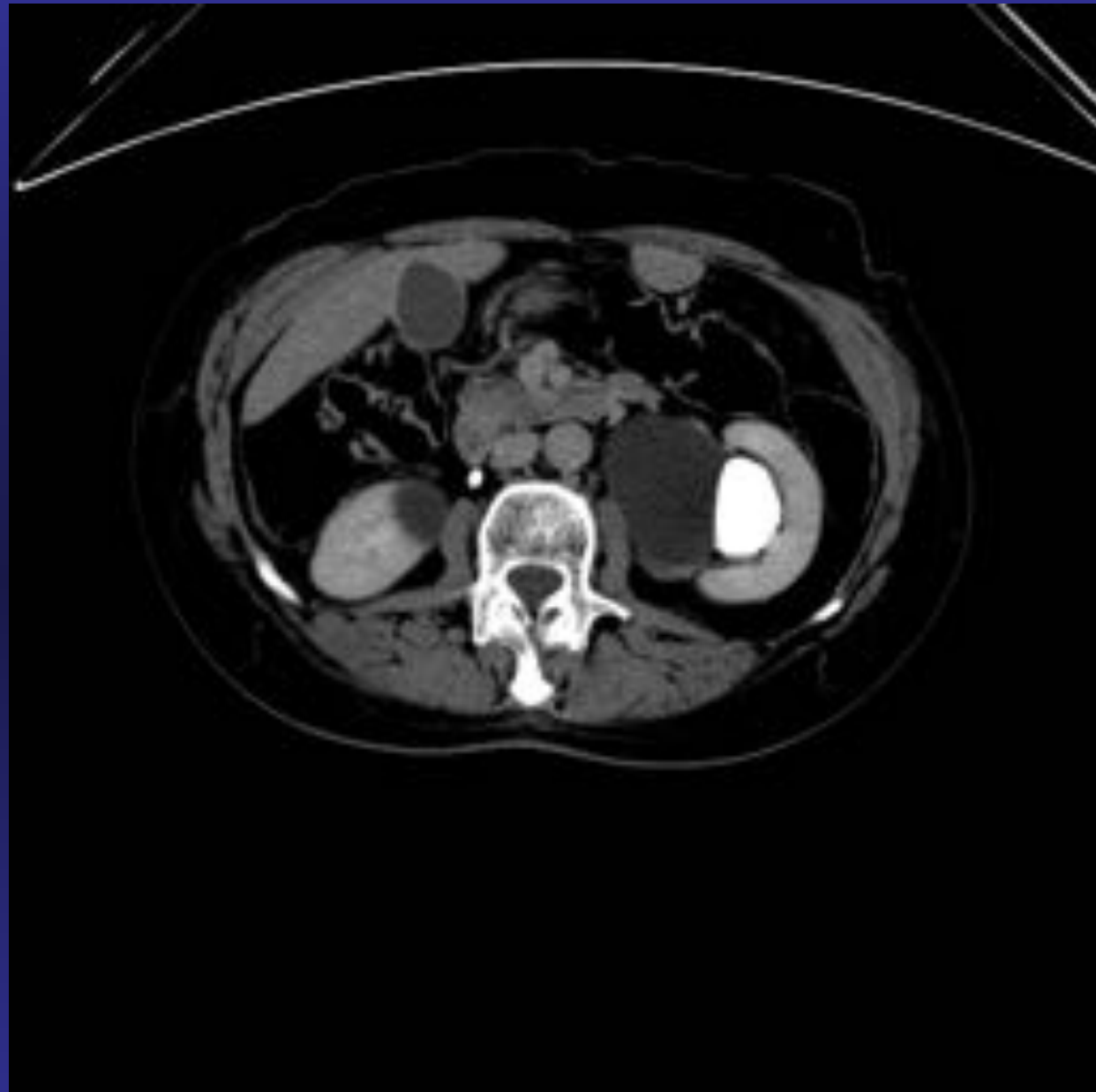


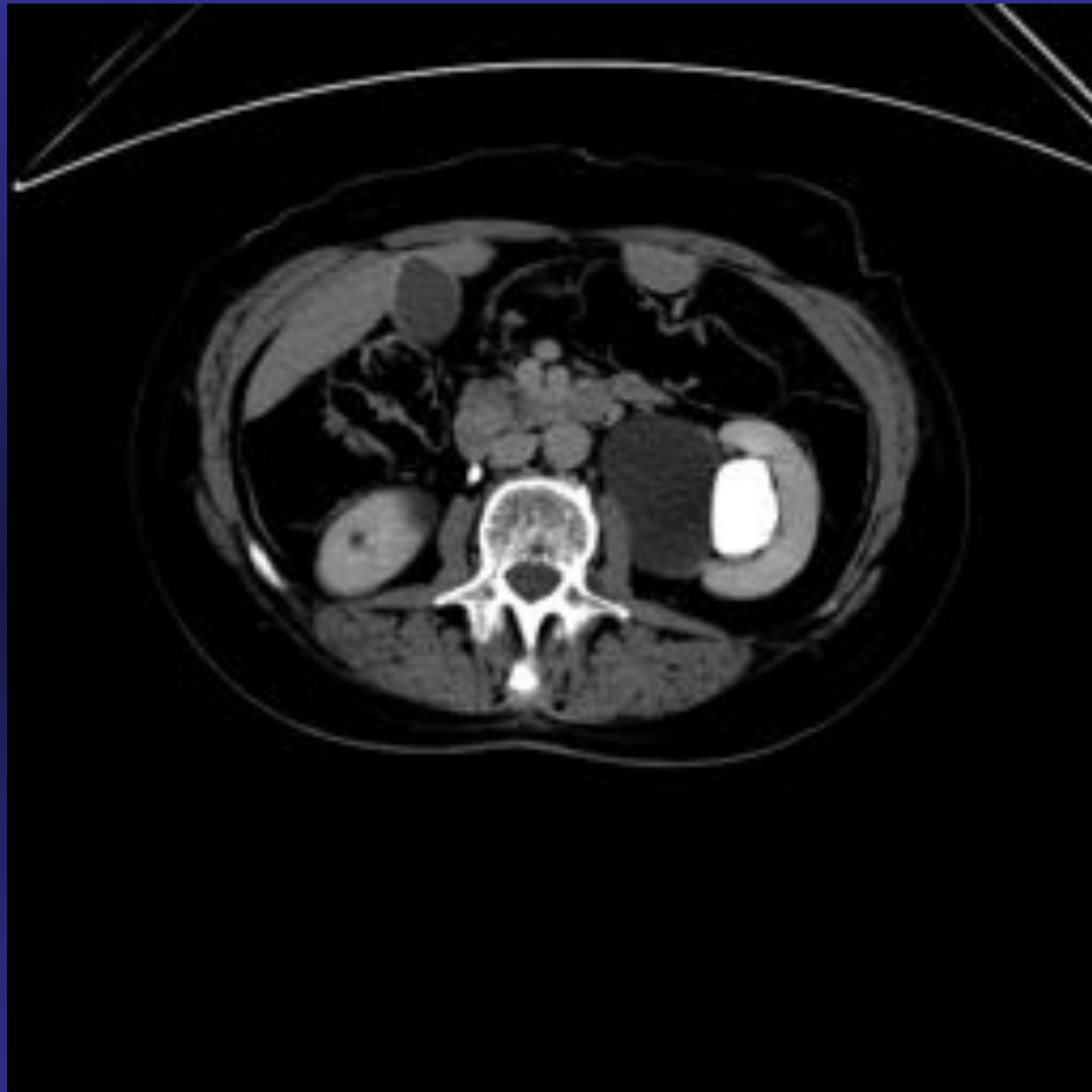


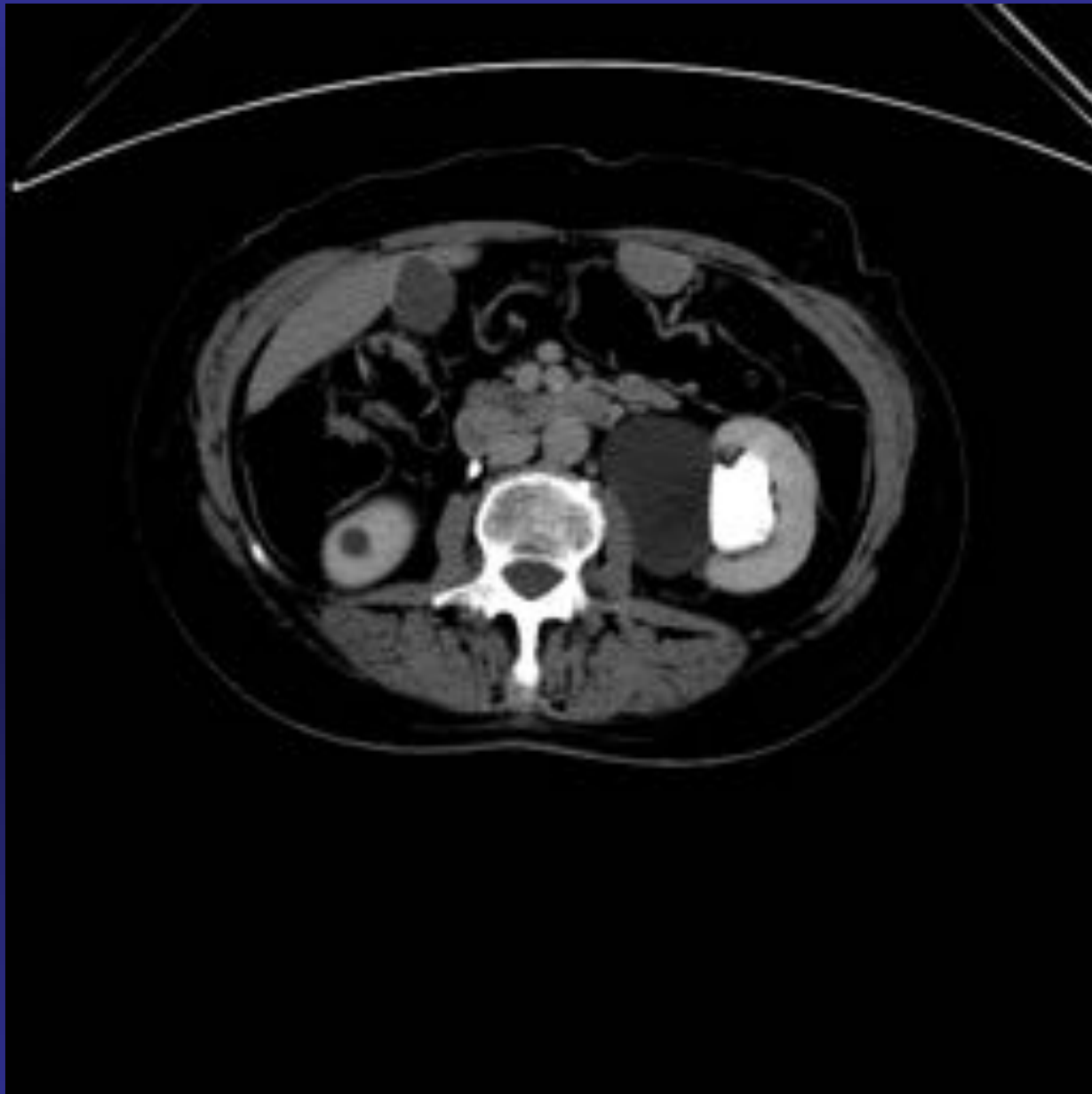


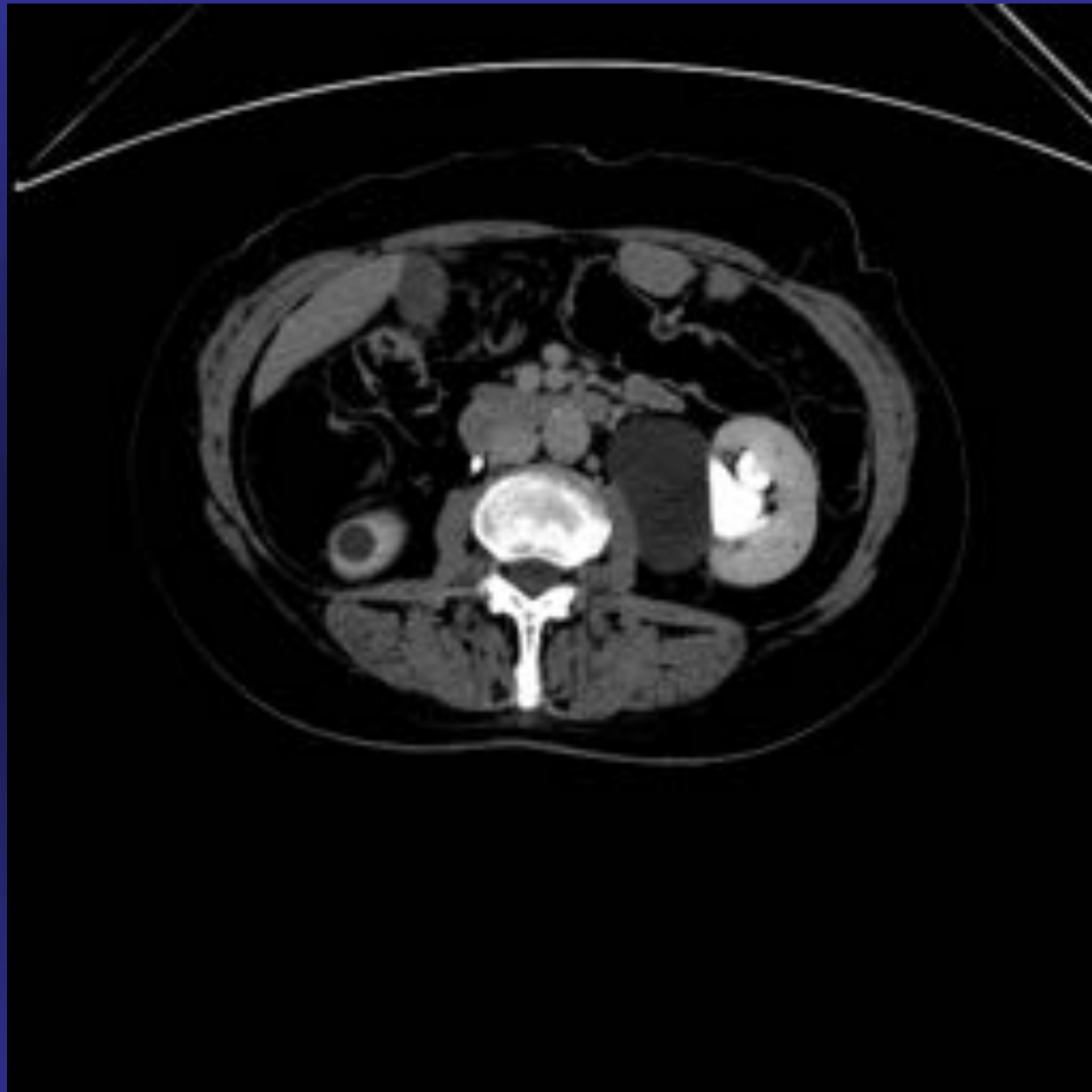


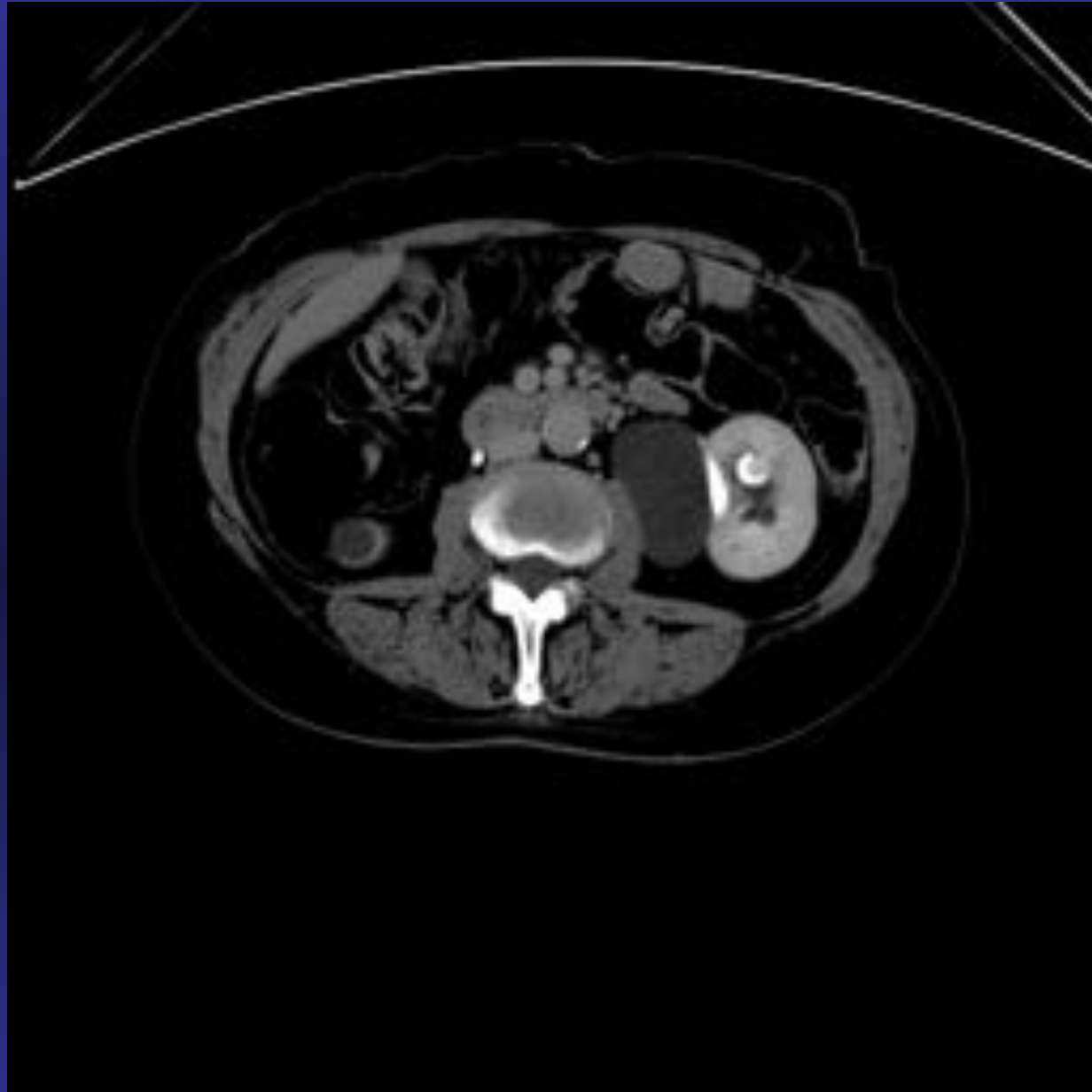


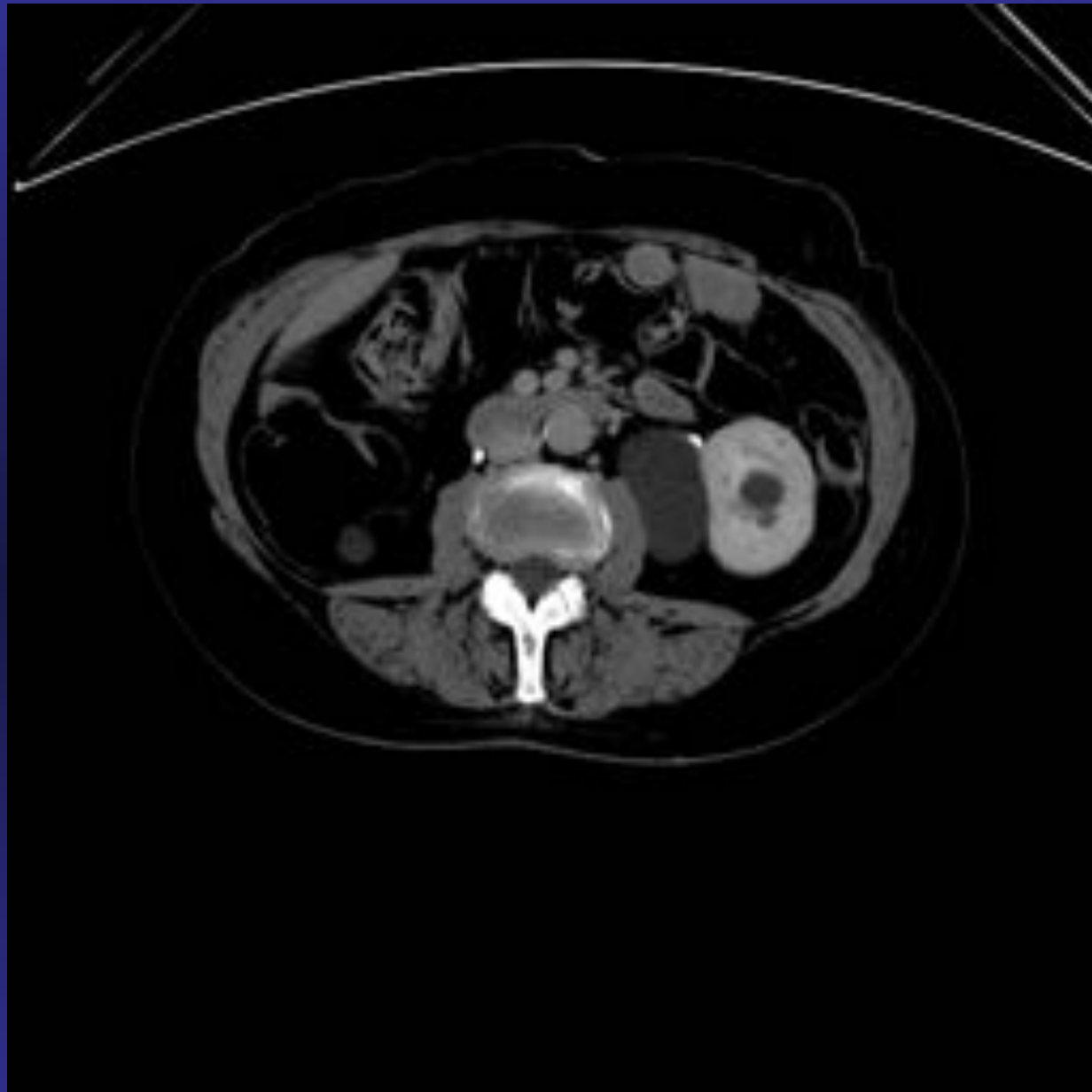


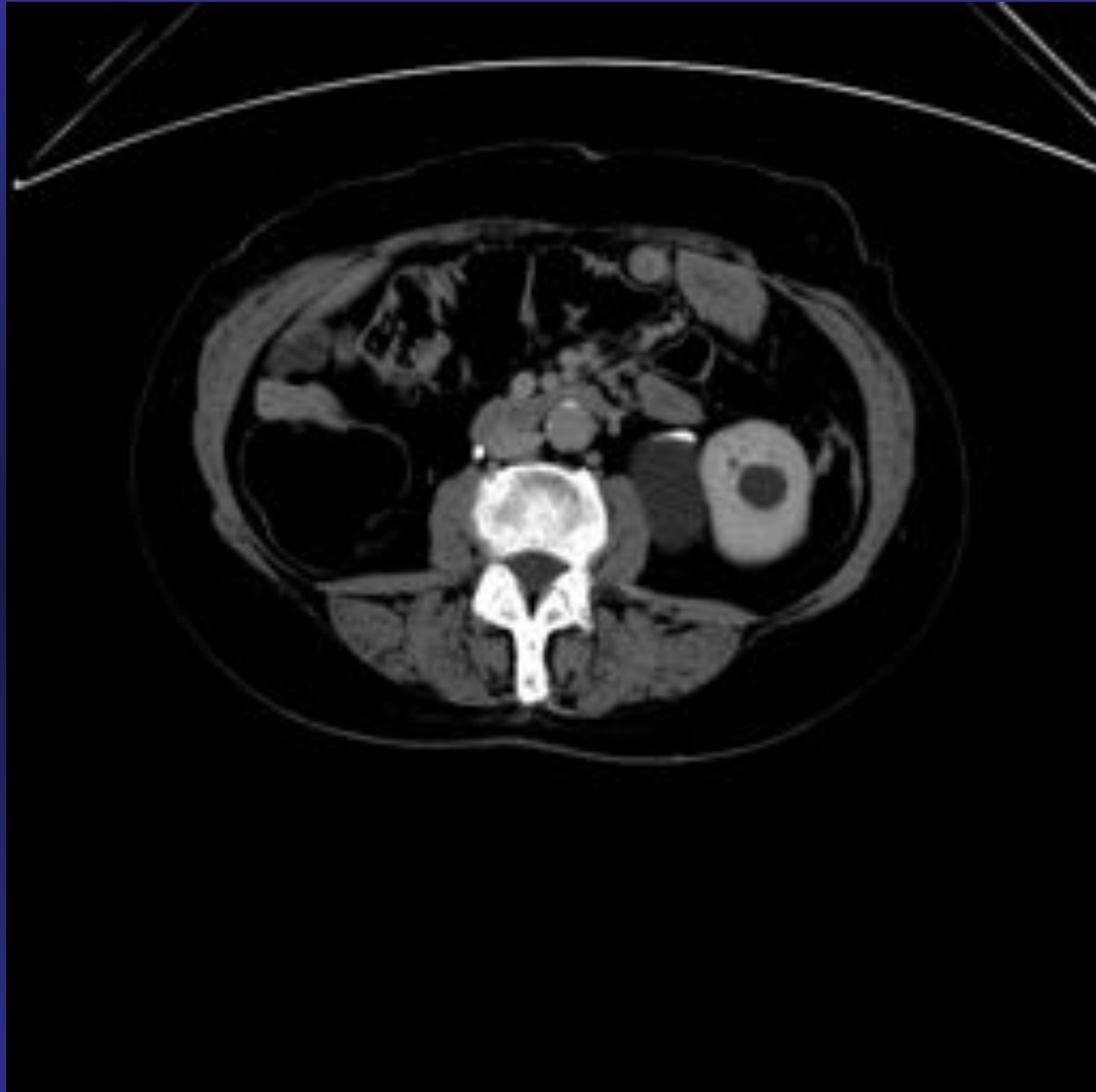


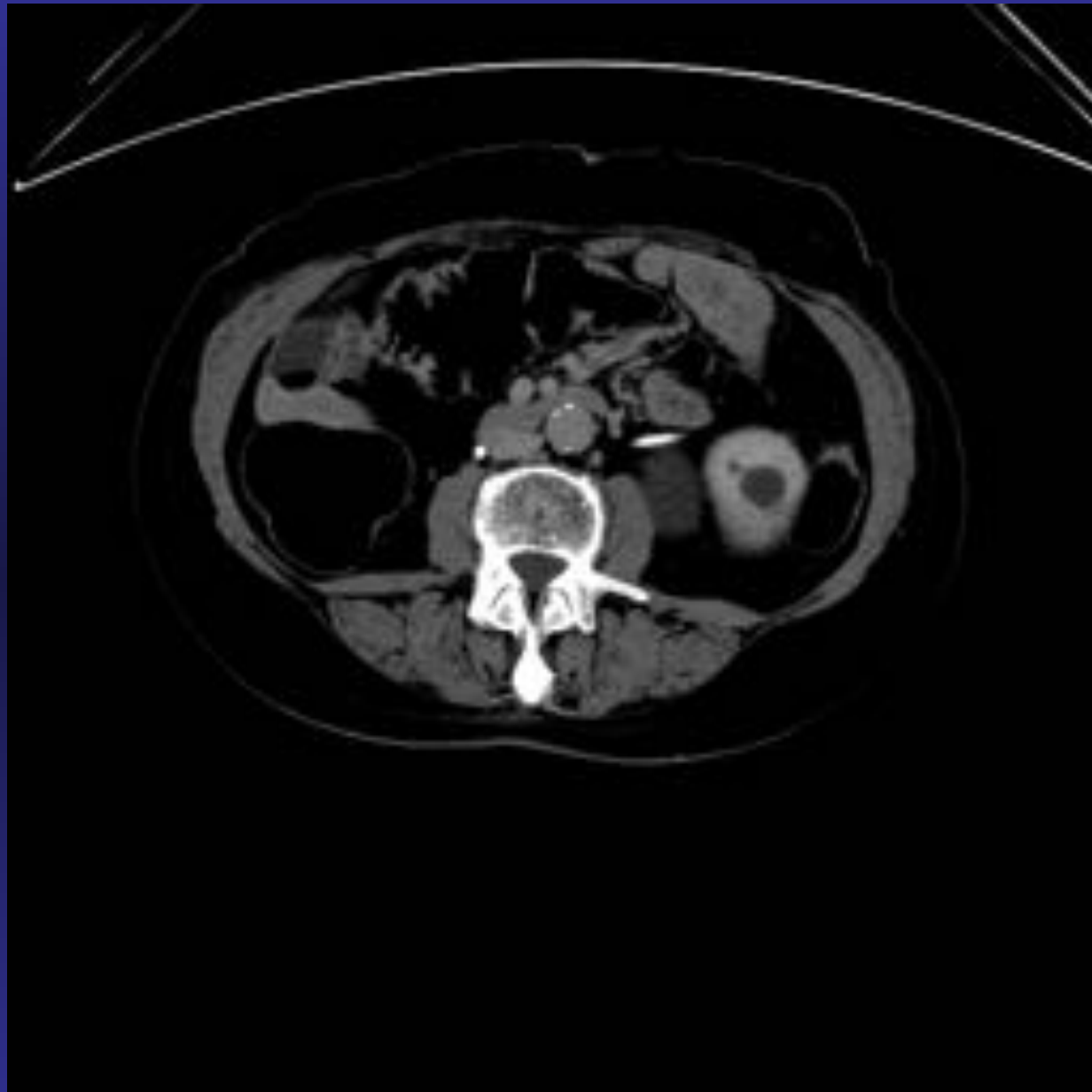


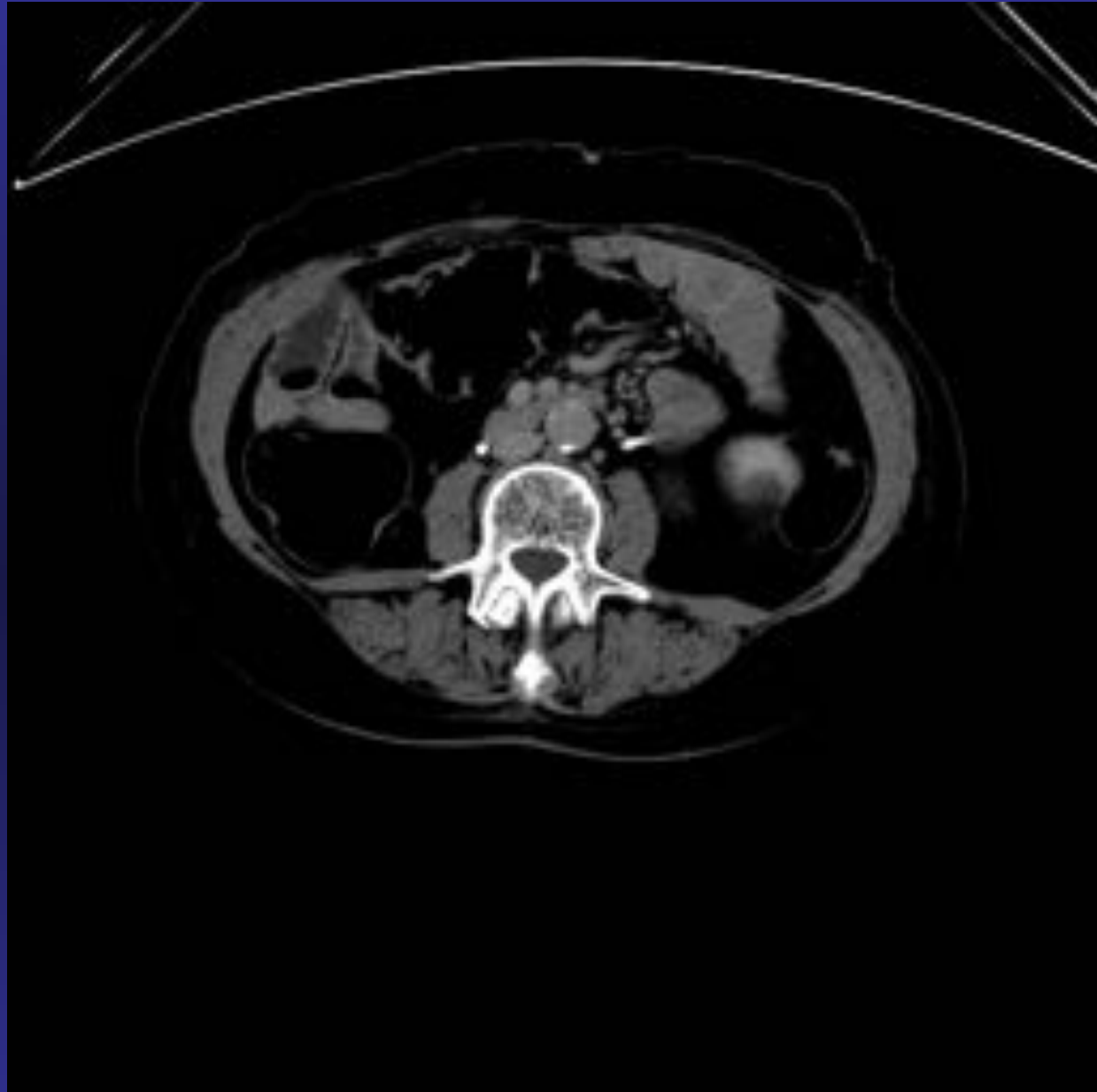


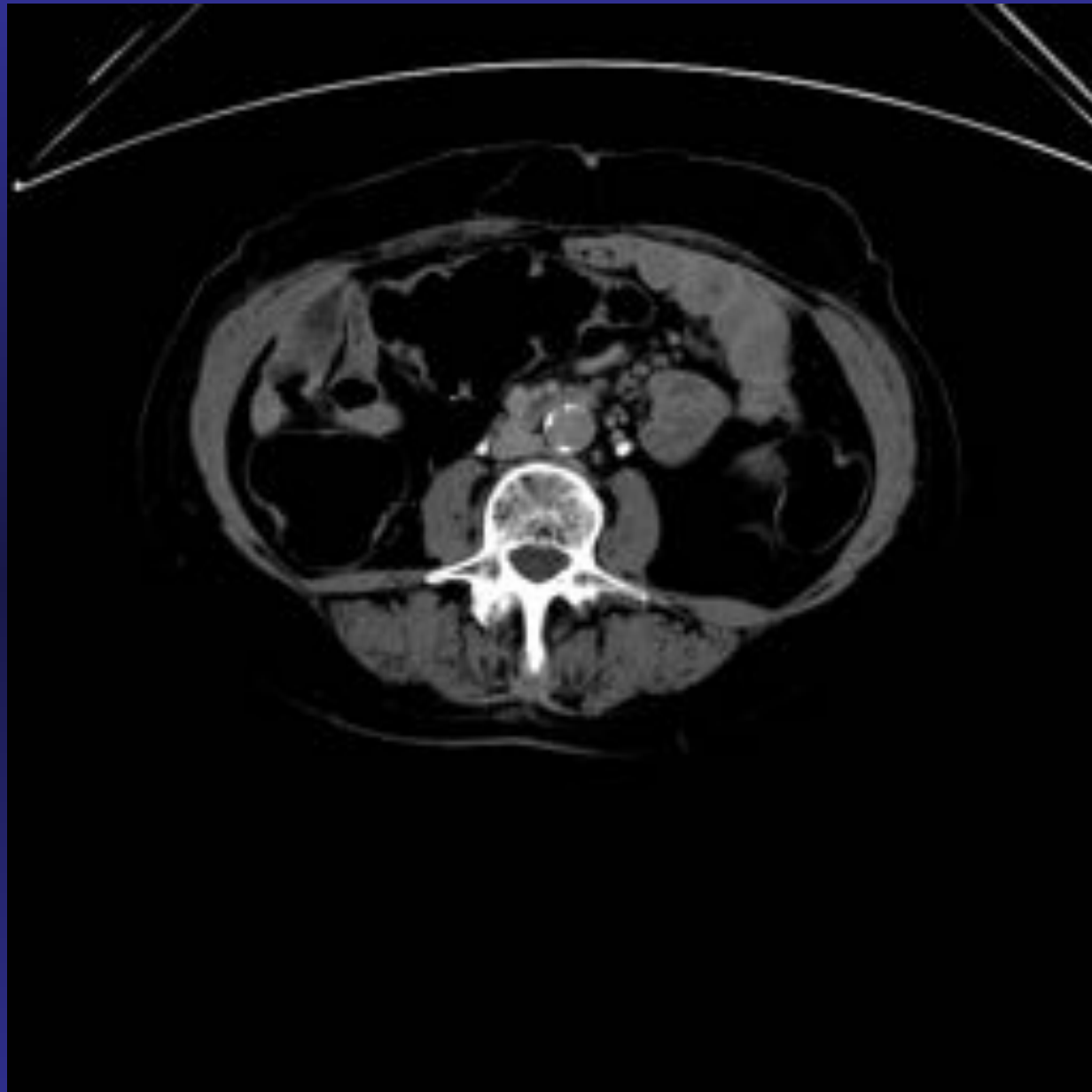






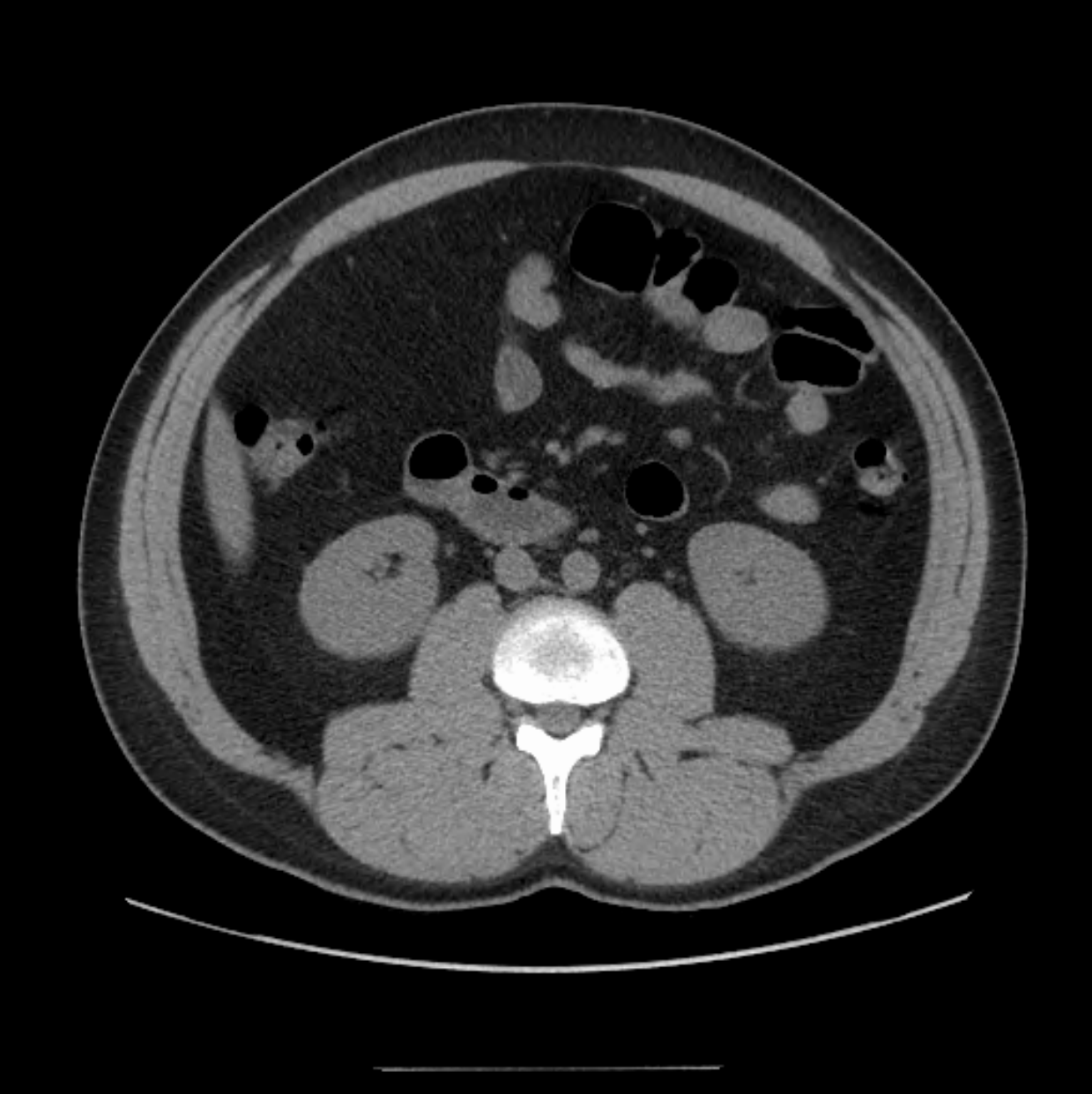


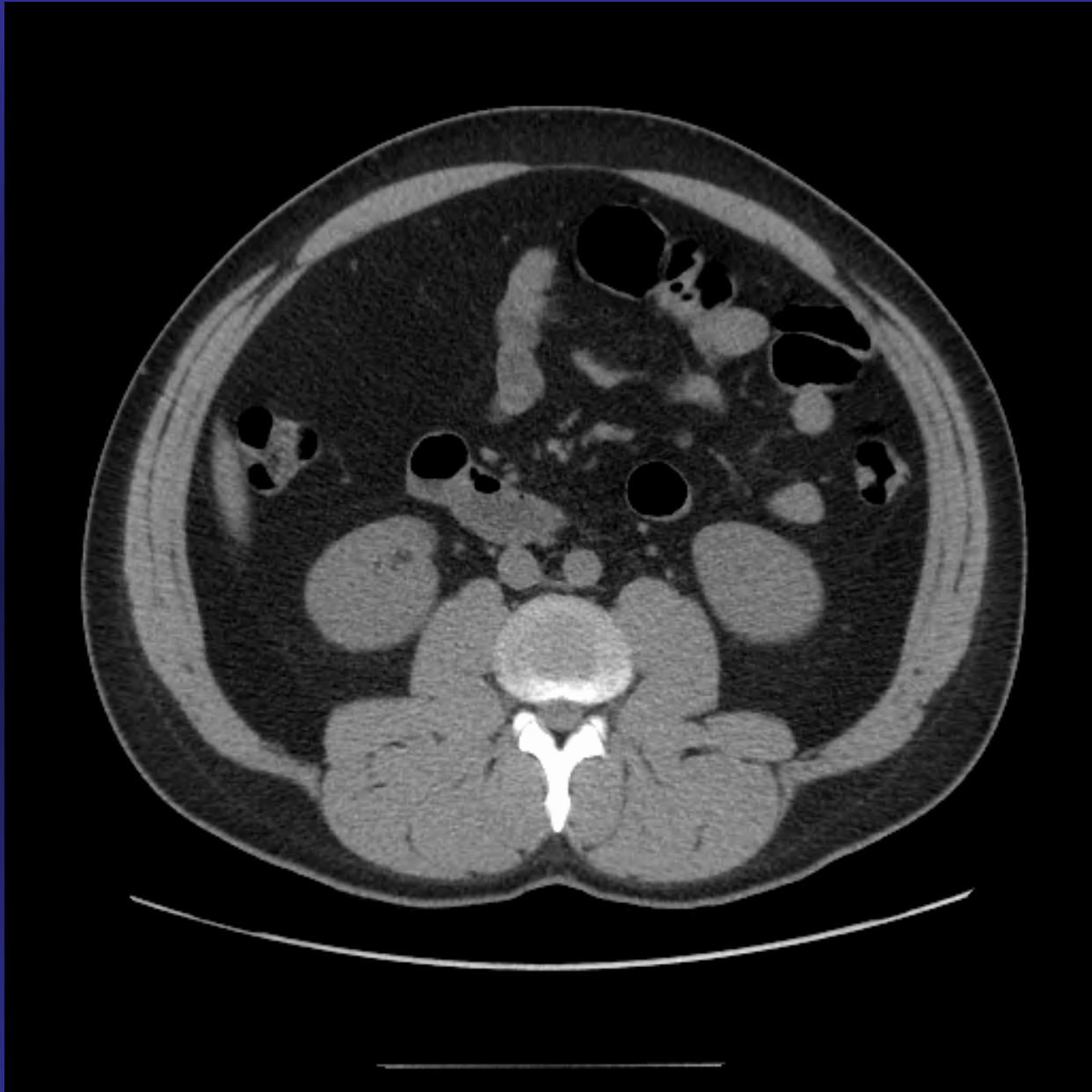


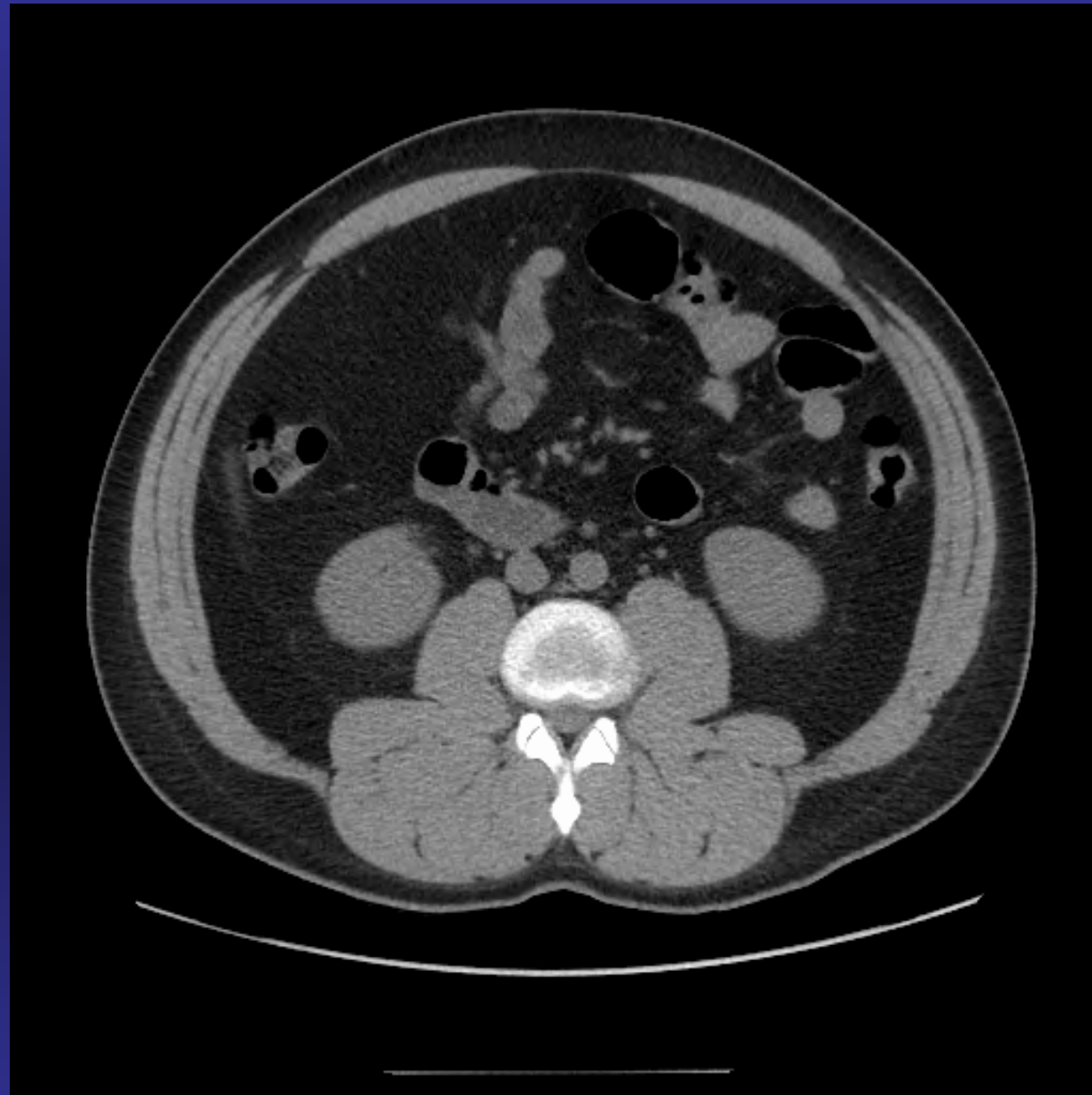


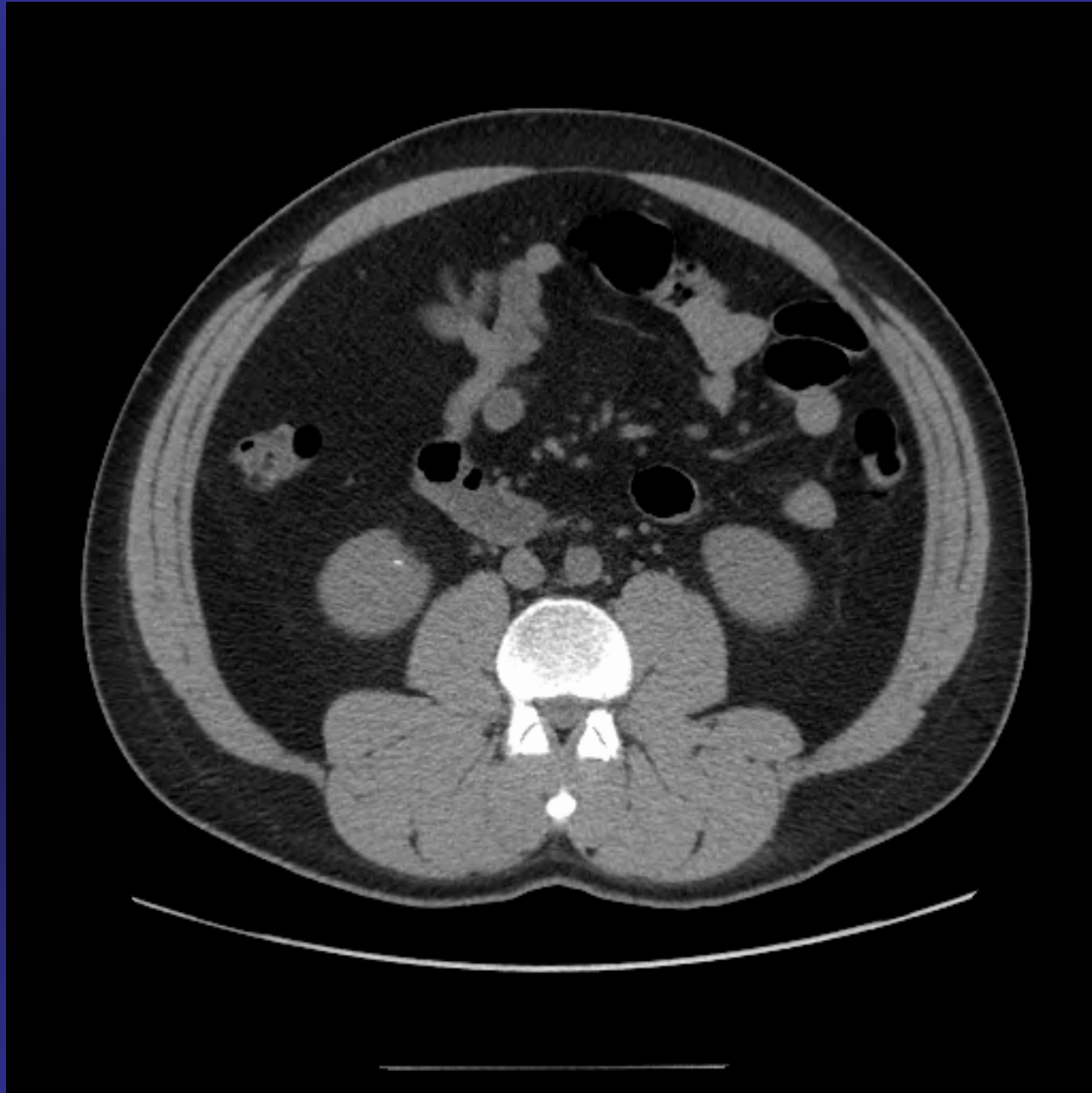
Patient Presentation

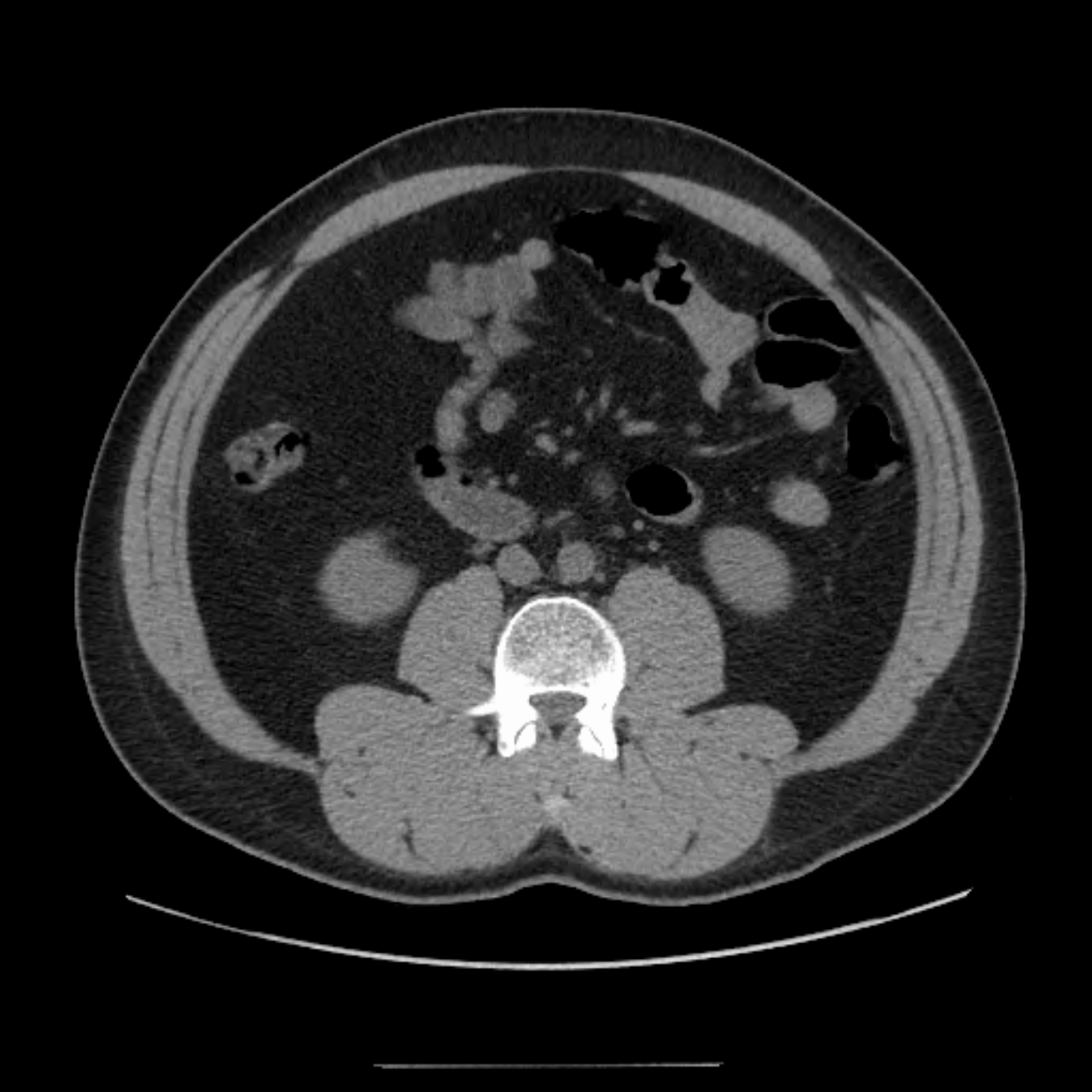
- 30 year old man, here for 3rd opinion
- Long history of right flank pain
- Diagnosed with recurrent pyelonephritis but found to have a small stone that he passed, calcium oxalate
- Several “stone passage events” over the past 10 years, none visibly passed
- No history of febrile UTI
- Found to have single 2-3 mm lower pole stone by OS urologist
- Cystogram negative for reflux, ureteroscopy couldn’t locate stone
- Complains of intermittent gross hematuria, episodic severe flank pain with emesis, takes narcotics intermittently; **frequent ER trips**
- Seeing pain management: gabapentin, baclofen both have failed











Peer-Review Guidelines and Best Practice Statements: Chronic Flank Pain

ABSOLUTELY
NOTHING

Chronic Flank Pain: Stages of Grief

77 y.o. / M

59 y.o. / F kidney pain/ ref by:pcp/ pt scheduled by pcp m(kg)/ referral will be faxed t...

54 y.o. / M left upper quadrant pain

64 y.o. / M per my chart

Hope



Exhaustion



Careful Thinking



Trial and Error



“Acceptance”



Chronic Flank Pain: Select Conditions

- Papillary Calcifications
 - Medullary Nephrocalcinosis
 - Medullary Sponge Kidney
 - Caliceal stones
- Polycystic Kidney Disease
- Loin Pain Hematuria Syndrome

Chronic Flank Pain: Papillary Calcifications

- Medullary Nephrocalcinosis
 - Deposition of calcium salts in the medulla of the kidney
 - Many causes: hyperparathyroidism, RTA type 1, MSK, etc.
- Medullary Sponge Kidney (MSK)
 - Cystic dilation of the renal medullary & papillary portions of the collecting ducts
 - 1/5000 but much more common in stone formers
 - Present with flank pain, hematuria, recurrent UTIs, nephrocalcinosis
- Randall's plaques

Chronic Flank Pain: Papillary Calcifications

- Randall's plaques
 - What we agree upon
 - Calcium phosphate precipitates in the LOH erode through the papilla
 - Acts as a nidus for the formation of attached calcium oxalate stones
 - What is debated
 - Can attached small papillary stones / intraductal calcifications cause stone symptoms / flank pain?
 - Can removing / releasing these calcifications improve pain?
 - Can treating small caliceal stones relieve pain?

Papillary Calcifications: Presentation

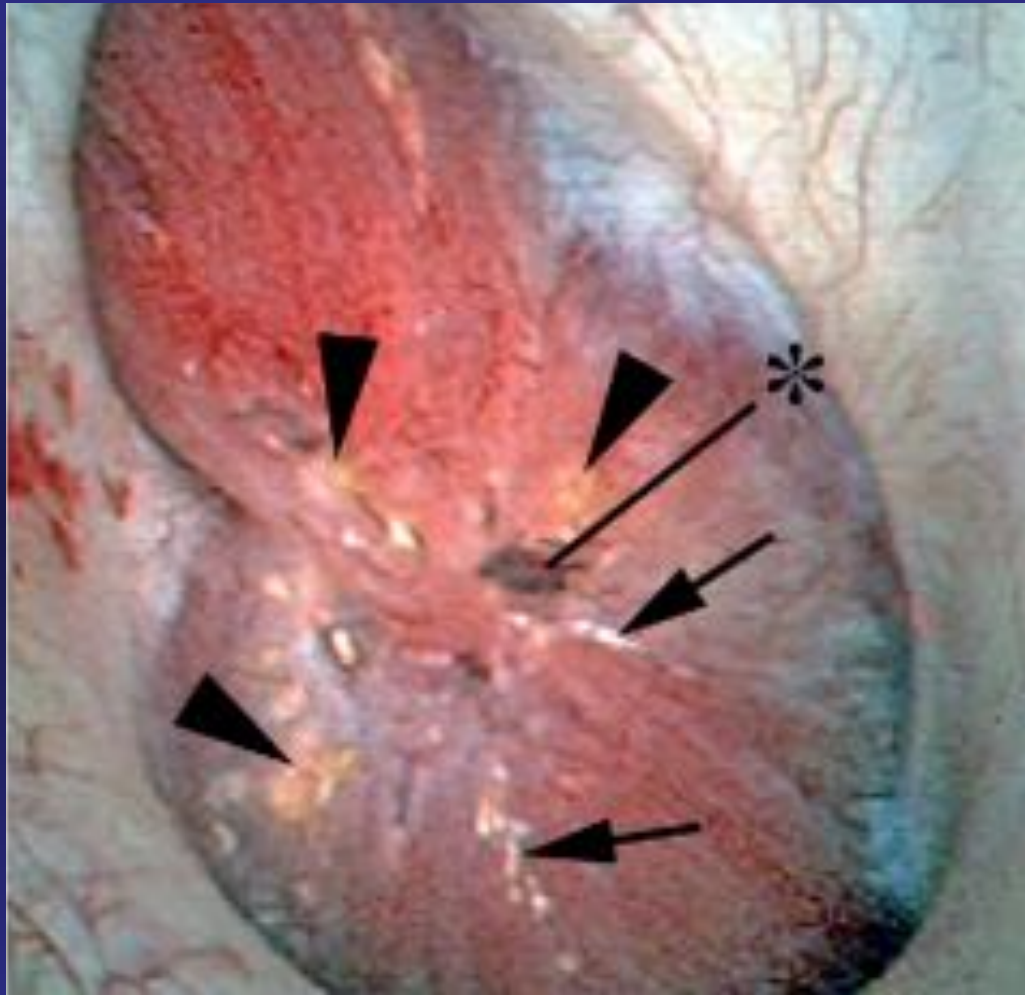
- Usually a history of kidney stones
- Usually has seen other urologists in the past and told their stones aren't the cause of their pain
- Flank Pain
 - Not typical episodic colic, but rather a constant pain
 - Dull, achy, pressure (“fist in my side”)
 - Pain disproportionate to size and location of stones
- Radiologic appearance

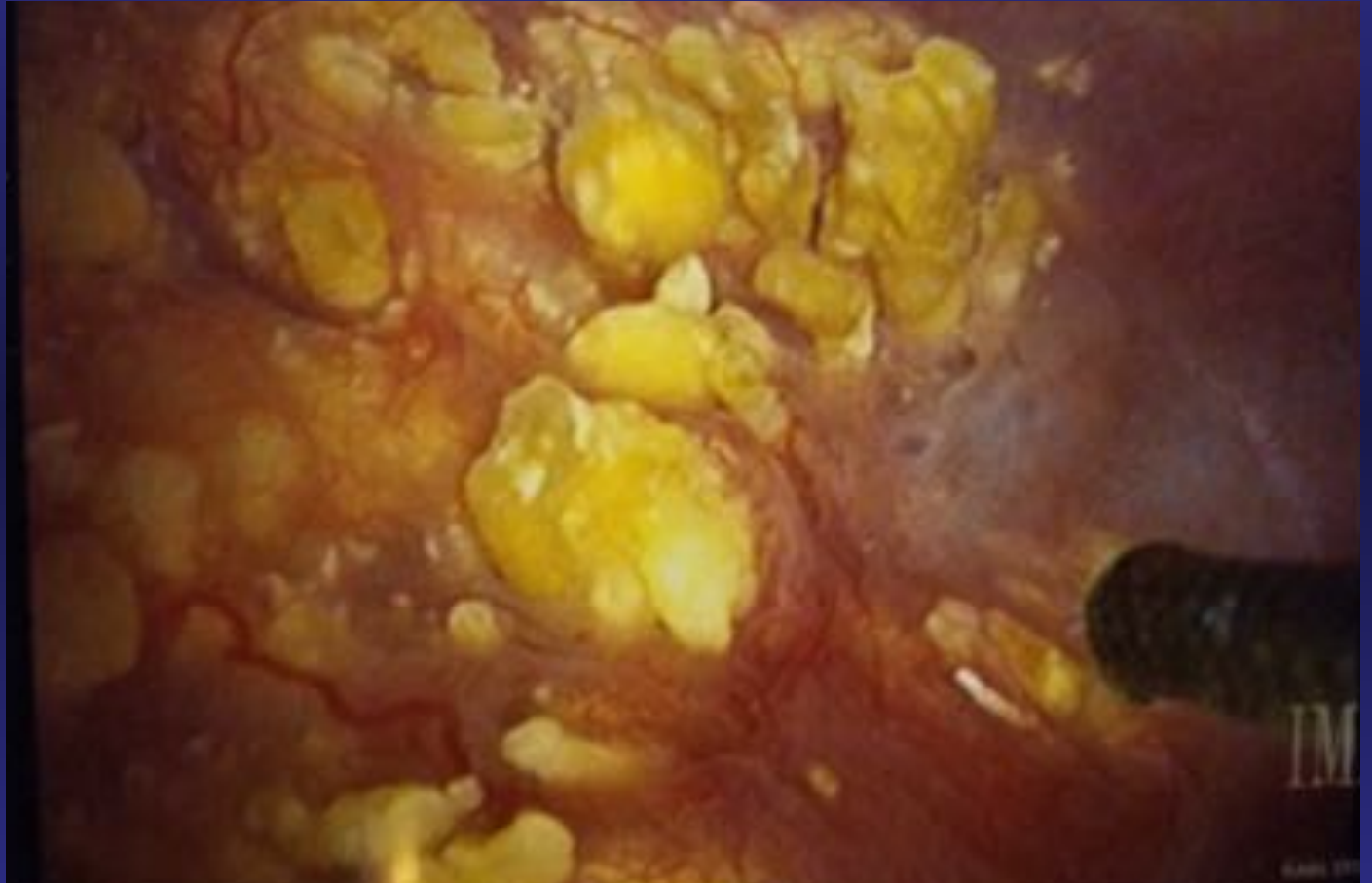




Papillary Calcifications: Treatment

- Case report by Kerbl and Clayman, Urology, 2000
 - 43 year old woman with chronic flank pain and 4 caliceal stones, all < 3 mm
 - Ureteroscopy found all were attached, most covered with urothelium
 - Laser incised (0.8 to 1.0 J, 8 – 10 Hz)
 - Pain free at 16 months follow-up
- Taub DA et al, Urology, 2006
 - Laser papillotomies performed on 36 patients (1.0 J and 10 Hz), 46 renal units
 - Papillary and intraductal calcifications as well as overlying cystic dilations were vaporized
 - 56% successfully contacted and participated in a survey
 - 93% had “some less” pain and 85% had “much less pain”
 - Chart review of the remaining patients suggested that 64% had some success





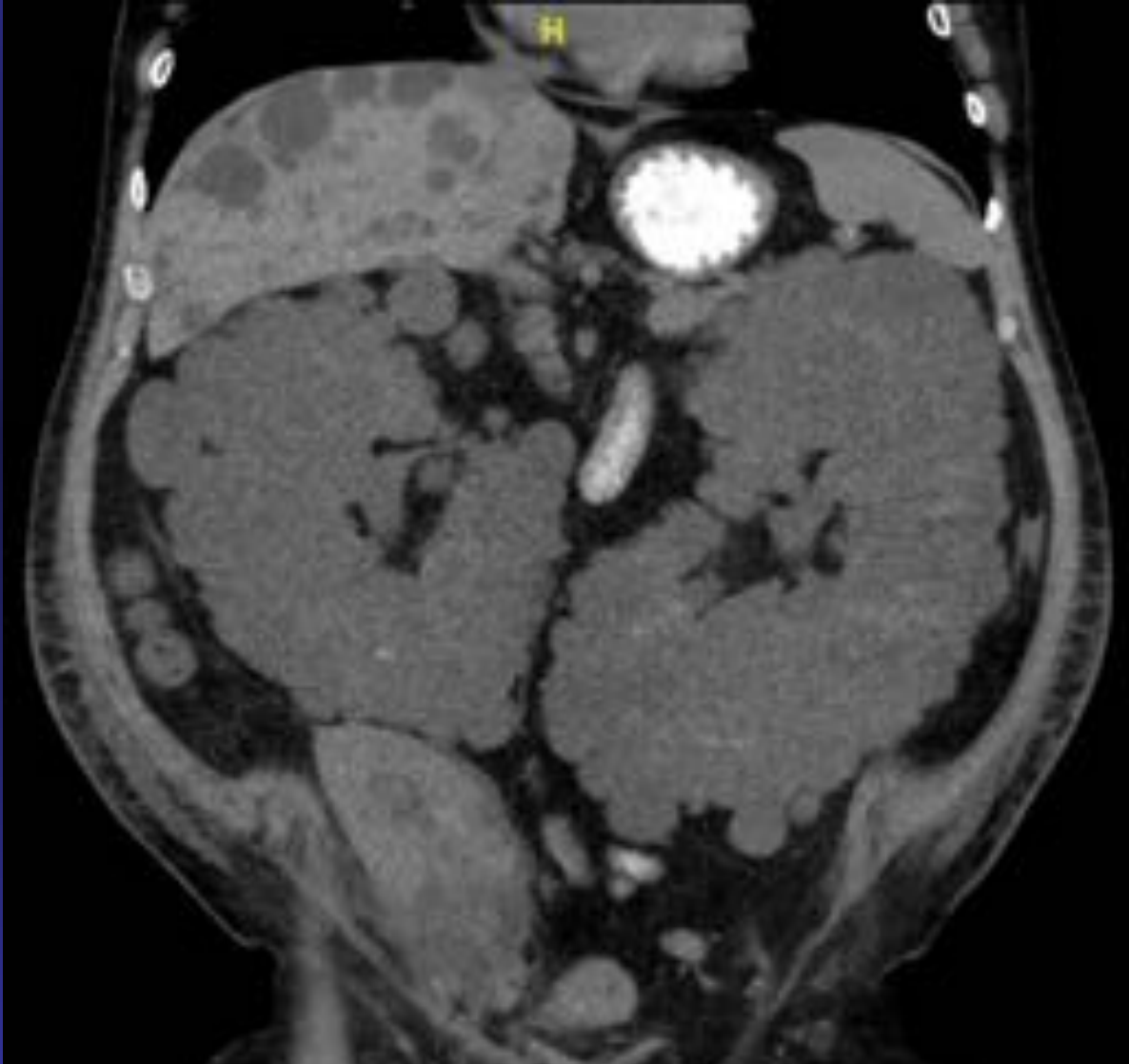
Multi-Institutional Assessment of Laser Papillotomy

- Treated papillae with stones attached or if contained discrete suburothelial stones
- 26 patients had one procedure & 39 patients had multiple procedures
- Follow-up available in 77% (50 pts)
- 83% reported significantly less pain for 3 months or longer
 - Mean response was 26 months, 60% reported mean duration > 1 year
 - MSK patients (34%) had lower response rates (73%)
- 8% required post-op hospitalization
- No difference in GFR or risk of HTN

What about small caliceal stones?

- Coury TA et al, Urology, 1988
 - 25 of 26 patients treated with either PSE or ESWL had complete relief of pain
- Brandt B et al, Scan J Urol Nephrol, 1993
 - 35 patients with “uncharacteristic” flank pain and small nonobstructing caliceal calculi
 - 86% were relieved of their symptoms

Chronic Flank Pain: PCKD



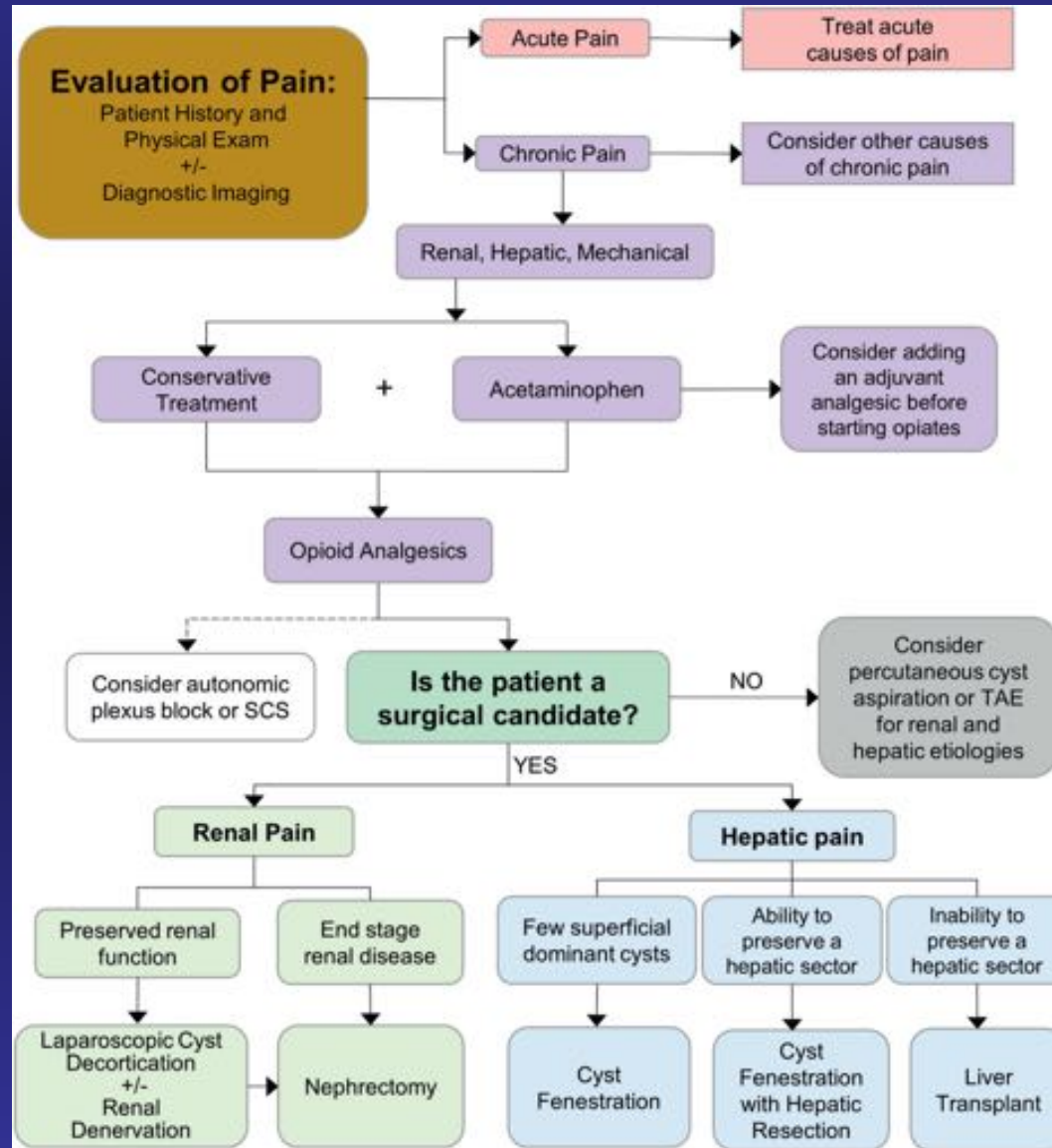
Chronic Flank Pain: Polycystic Kidney Disease

- Pain is a prominent feature (60%)
- Up to 39% are dissatisfied with pain due to impact on quality of life
- Patients experience a wide variety of pain chronicity, severity and location
 - Acute flank pain could be due to infection, stones, clot colic, or hemorrhage
 - Chronic flank pain due to mass effect on the back neuro-musculature as well as compression of renal capsule and/or other intra-abdominal organs

Polycystic Kidney Disease: Treatment

- Conservative: ice, heat, whirlpool, psychobehavioral modification
- Analgesics: acetaminophen over NSAIDs except in acute episodes
 - Tramadol, gabapentin, amitriptyline
 - Opioids are last resort
- Tolvaptan: V_2 receptor blocker, decreases cystic pressure and fluid
- Nerve blocks (celiac and/or splanchnic) and Spinal Cord Stimulation
- Cyst Aspiration and Ablation
 - Pain recurs in 67% if aspiration alone; only useful if a few dominant cysts
- Renal Denervation
 - Pat Casale: 2 small pediatric laparoscopic series with excellent short term results

Polycystic Kidney Disease: Treatment





Chronic Flank Pain: Loin Pain Hematuria Syndrome (LPHS)

- Poorly defined disorder characterized by recurrent or persistent flank pain and usually microscopic or gross hematuria (not always)
- Up to 50% have nephrolithiasis
 - Contamination with the non-MSK patients in the laser papillotomy series?
- Episodes of gross hematuria often accompanied by worsening pain
- Often associated with nausea and vomiting
- Renal biopsy: glomerular bleeding despite being normal visually

LPHS: Diagnosis

- Exclude other causes of flank pain and hematuria
 - If stones in the past, document absence of obstruction during acute pain episodes
- Pain must be typical of LPHS
 - Severe, constant or frequently recurrent, at CVA, worse with percussion
 - Usually unilateral at presentation but most eventually develop bilateral pain
 - Burning or throbbing
 - Exacerbated by riding in a car, exercising, and laying down
 - > 6 months
- Hematuria > 5 RBCs is present in 95% of patients
- Renal biopsy if suspect glomerular disease (IgA nephropathy)

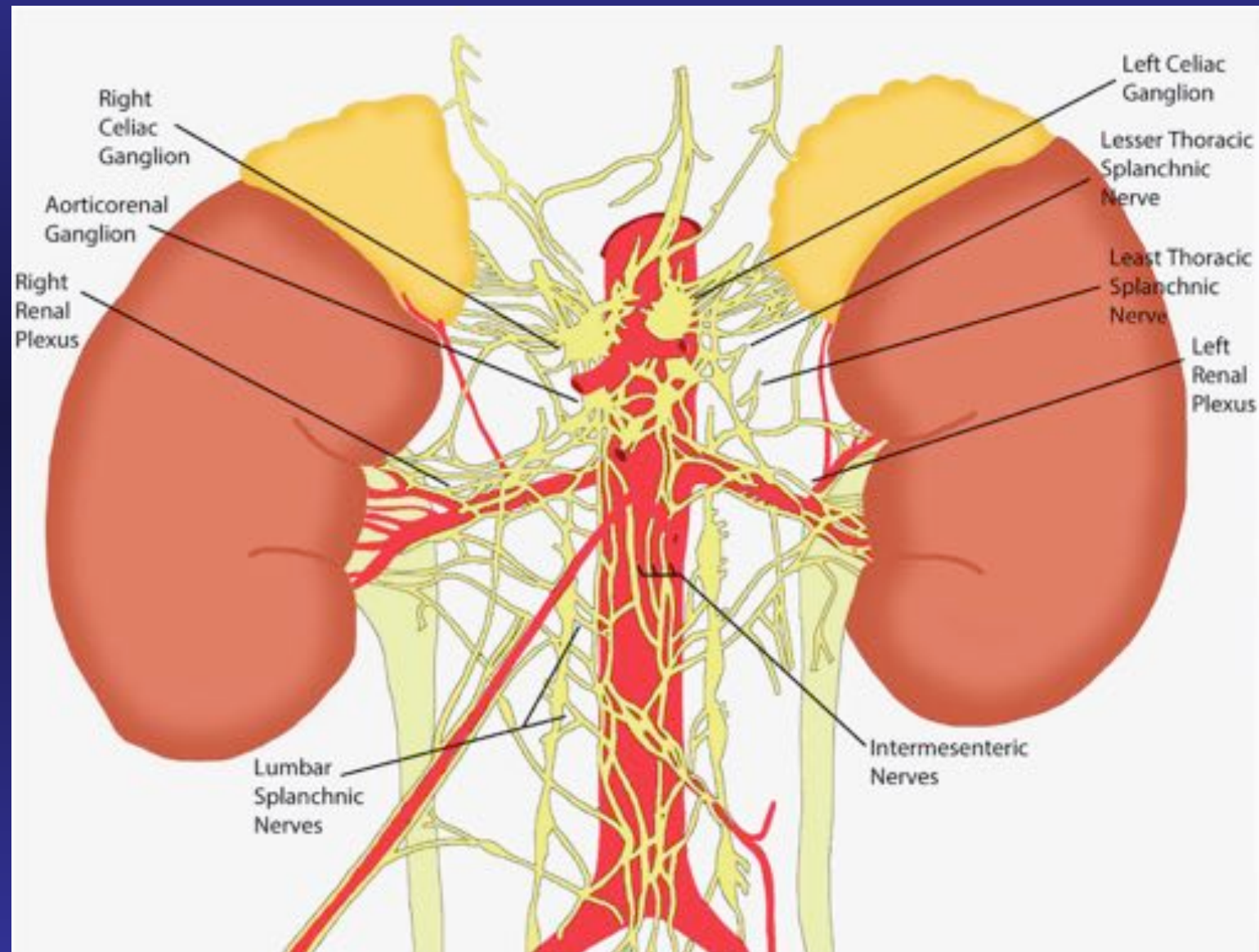
LPHS: Treatment

- Counseling
 - Reassurance: “kidney function is normal”, “avoid aggravating activities”
- Medical Management
 - ACEI or ARB: 7 person series showed 57% with fewer or less severe episodes
 - Aggressively manage 24-hour urine metabolic profile, especially in stone pts
 - Try to avoid opioids (including implantable drug delivery system)
- Invasive Management
 - Nerve Blocks and Ablations
 - Surgical Renal Denervation
 - Renal Autotransplant
 - Nephrectomy – not recommended

Renal Nerve Anatomy

- The renal plexus is derived from direct branches of the:
 - celiac plexus
 - celiac ganglia
 - aorticorenal ganglia
 - thoracic splanchnic nerves (T9-T12)
 - upper lumbar splanchnic nerve (L1)
 - superior portions of the intermesenteric plexus
- The *majority* of the fibers converge around the renal artery
 - Circumferential but more on the ventral surface
 - Generally run in the tunica adventitia and surrounding tissues

Renal Nerve Anatomy



LPHS: Nerve Blocks

Research and find a great interventional pain management specialist!!!

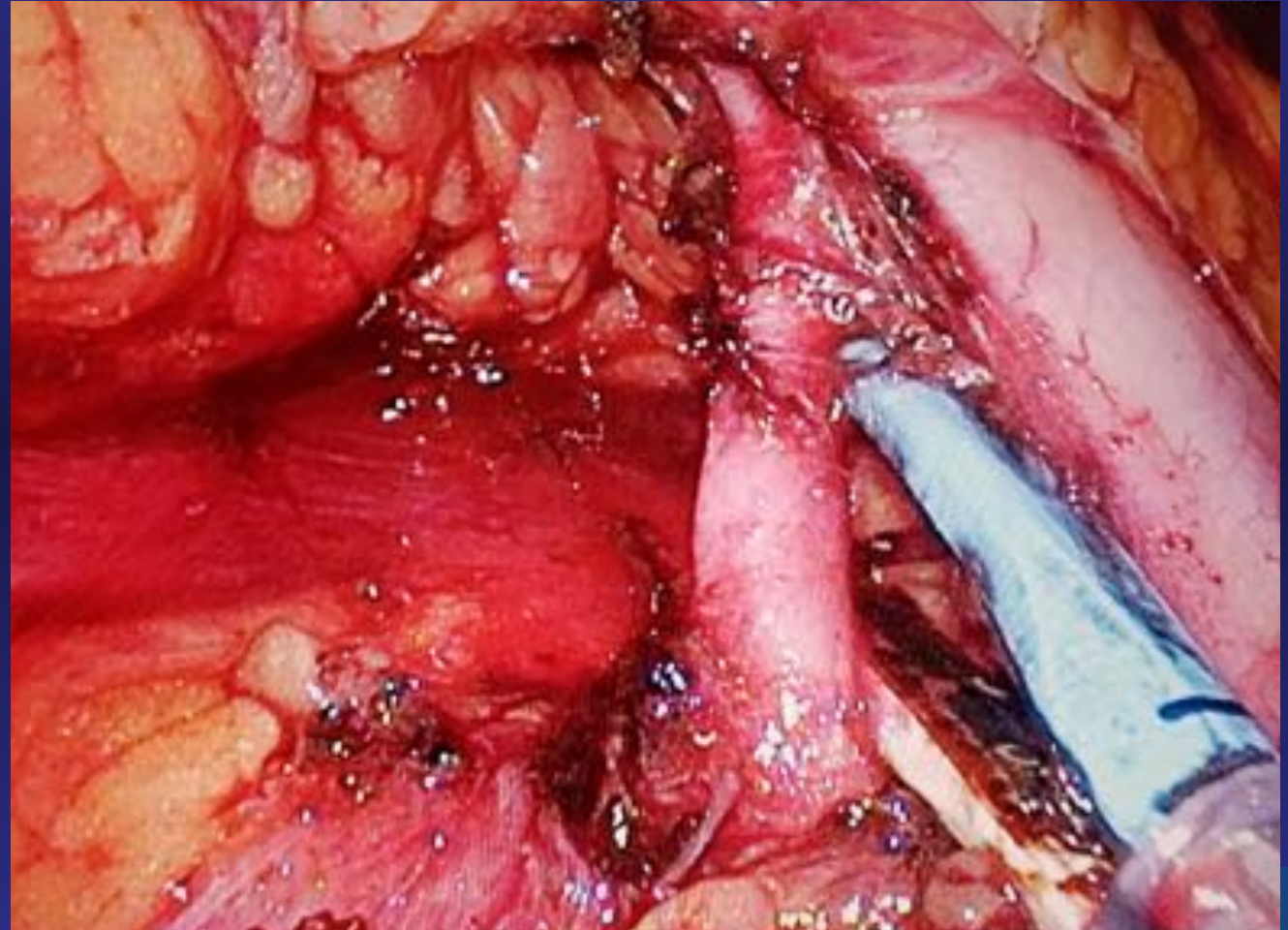
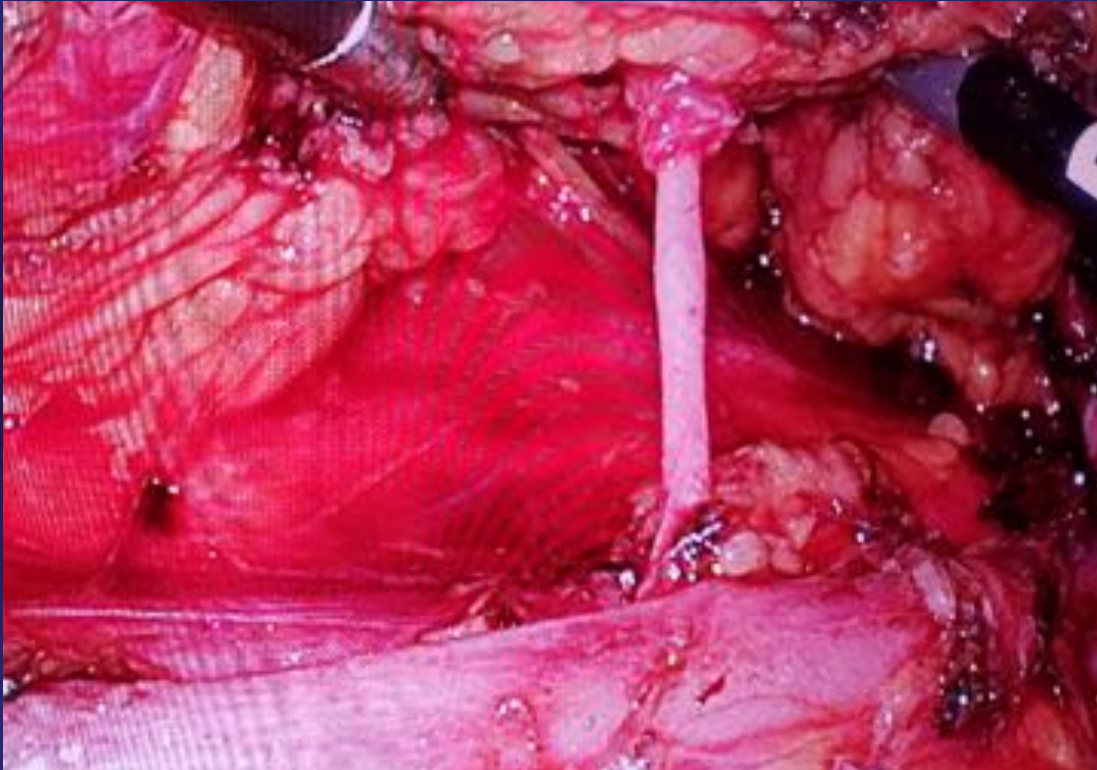
Email Correspondence from Brian Bruel, MD:

- Abdominal wall – transversus abdominus & intercostal blocks
- Upper abdomen and chest wall – Serratus anterior & intercostal blocks
- Muscular trigger points – quadratus lumborum and psoas injections
- Kidney / ureter – Splanchnic / Celiac plexus block
- *Spinal Cord Stimulation or DRG Stimulation

LPHS: Surgical Renal Denervation

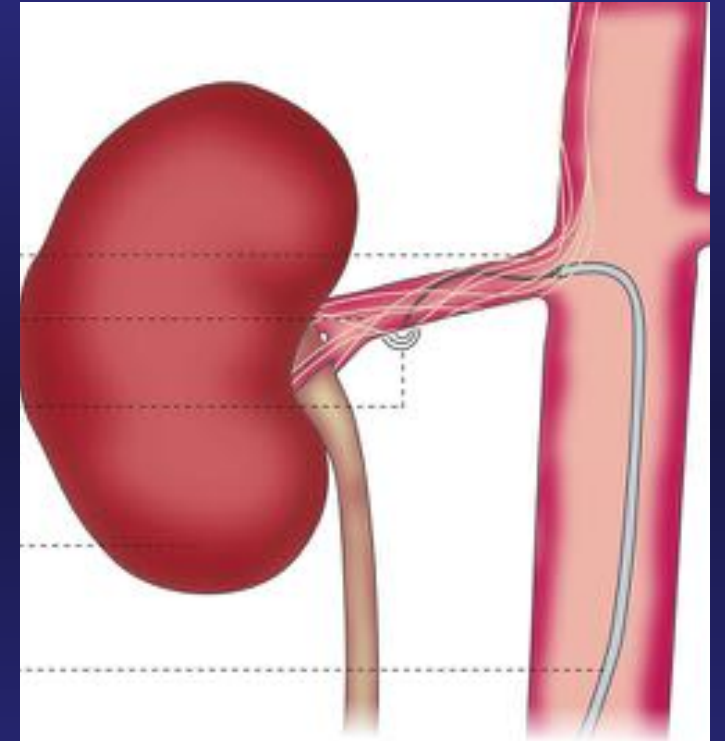
- Sheil AG et al. Am J Kidney Dis: 32(3), 1998
 - 18 patients undergoing “renal neurectomy”
 - **67% of patients had recurrent pain**
 - 3 of 4 who went on to renal autotransplant had relief
- Kadi et al. Minim Invasive Ther Allied Technol: 22(6), 2013
 - 9 patients with 11 laparoscopic denervations, **44% curative**
 - 22% had reduced analgesic requirement, 66% had improved QOL?
- Greenwell TJ et al. BJUI: 93(6), 2004
 - 32 patients undergoing 41 laparoscopic denervations, full data on 33 units
 - 42% had nephrolithiasis
 - **73% had recurrent ipsilateral pain** within 5 years of surgery
 - 1/3 of these had a lower analgesic requirement
 - 9 pts went on to nephrectomy and 3 developed contralateral LPHS

LPHS: Renal Denervation



LPHS: Endovascular Renal Denervation

- Several catheter-based percutaneous radiofrequency ablation systems
- 3 small series reported in the literature
 - 2 / 4 patients cured, 2 / 4 75% reduction in meds
 - Pooled data from 6 patients
 - no change in Max VAS but decrease in pain medication
 - 11 / 12 patients with $> 30\%$ improvement at 6 months



LPHS: Autotransplant

- The ultimate renal denervation
- Be very careful in stone formers, consider psychiatric assessment
- Chin JL et al. J Urol: 160 (4), 1998
 - 22 patients with 26 renal autotransplantations
 - 69.2% success, however 2 graft losses and 3 required transplant nephrectomy
- Sheil AG et al. Am J Kidney Dis: 32(2), 1998
 - 30 patients with 40 renal autotransplantations, 25 of which completed follow-up
 - 75% were pain free with follow-up between 1 and 13 years (mean, 8.4 years)
 - 30% significant complications

Autotransplant: Predicting Success

MUSC Health
 MUSC Health
 EXCELLENCE. INTEGRITY. CARE.

Is it Possible to Predict Success of Renal Auto-transplantation for Chronic Kidney Pain? Development of an Algorithm Utilizing Celiac Plexus Block

Tipton TJ, Hill H, Chavin KD, Smith AR, Prasad MM, Savage SJ
 Department of Urology, Medical University of South Carolina, Charleston, SC

INTRODUCTION

- Chronic kidney pain can be frustrating for patients and physicians due to a lack of consensus evaluation or treatment.
- Chronic narcotics are commonly used with unhelpful effects often without satisfactory resolution of pain.
- The celiac plexus provides sensory innervation to multiple intraabdominal organs, including the kidneys.
- Temporary alleviation can be achieved with celiac block.
- Skeletonizing the renal artery, auto-transplantation and nephrectomy have all been used as last-ditch efforts.
- We introduce a practice pattern whereby patients first undergo celiac block and, if successful, then undergo definitive management.

METHODS

- Six patients were retrospectively identified who were considered for renal auto-transplant.
- Indications included ureteral stricture disease, chronic pain, and renal vascular disease.
- A single surgeon performed all autotransplants.
- Celiac block was performed in 3 patients with chronic flank pain prior to surgery.
- Age, BMI, Creatinine, length of follow up, subjective pain score and use of narcotics at last visit were assessed.

RESULTS

- 5/6 patients underwent auto-transplant.
- Of these 5, 2 had celiac block prior to surgery, both of which reported alleviation of pain following the block.
- The patient who did not undergo auto-transplant also had a successful celiac block but elected for simple nephrectomy.
- All 3 patients who had celiac block and subsequently underwent surgery had resolution of pain and were not on narcotics at last follow-up.
- Mean age 36.8 yrs.; mean BMI 26.2; mean follow up 11.7 mo.
- All 3 patients had normal renal function at last follow-up with mean serum Cr of 0.88 mg/dL.

DISCUSSION

- Chronic renal pain is frustrating for patients, their families, and their physicians.
- Invasive surgical options are considered when conservative measures fail, but not even these methods guarantee pain relief, and risk significant morbidity.
- Based on our experience, we recommend celiac plexus block prior to consideration of more invasive treatment when conservative options fail.

Autotransplant: Predicting Success

1 Year Follow-up: Percutaneous Renal Hilar Blockade to Predict Success of Renal Auto-Transplantation for Loin Pain Hematuria Syndrome

Mitchell Bassett, MD¹, Jeffrey Campese², MD, ^{*}, Ryan O'Hara, MD¹, Alec Rosales², Robin Kim, MD¹, Raion Hardman, MD, PhD¹, Blake Hamilton, MD¹
 Department of Surgery, Division of Urology¹; Division of Transplantation and Advanced Hepatobiliary Surgery²; Department of Radiology, Section of Interventional Radiology¹
 University of Utah School of Medicine, Salt Lake City, Utah

Introduction:

- Loin pain hematuria syndrome (LPHS) is not well understood
- Renal auto-transplantation (RAT) has been used to treat LPHS in pts who fail standard treatment and remain in debilitating pain
- Successful pain relief after RAT ranges from 25-65%
- Patient selection for RAT remains challenging
- Various nerve blocks have been used in patient selection for RAT
- We report our 12 month outcomes using RHB to predict success of RAT using a multidisciplinary approach

Hypothesis:

- Percutaneous renal hilar blockade will predict success of renal auto-transplantation in loin pain hematuria syndrome

Methods:

- Prospectively maintained database of LPHS diagnosis at the University of Utah
- Referral for RHB where appropriate
- 28 RHBs found from 12/2013-present
- If >50% pain reduction after RHB, referral to kidney transplant surgeon for discussion of RAT
- Questionnaires given pre-RHB, post-RHB, and at 12-months after RAT



Results:

Demographics

No. of pts with LPHS diagnosis	39
Female	17 (50%)
Age (median)	32.5
Left flank pain	17 (50%)
No. referred for RHB	28
No. with RHB >50% Reduction in Pain	25 (89%)
Mean Pain Scale Pre-RHB	9.0
Mean Pain Scale Post-RHB	3.5
Pain Reduction (%)	91%
No. with RHB >100% Reduction in Pain	9 (36%)
Mean Pain Scale Pre-RHB	4.6
Mean Pain Scale Post-RHB	1.1
Pain Reduction (%)	100%

Quality of Life



Success of RAT at Treating LPHS Syndrome



Among pts who had >50% response to RHB and underwent RAT:

- 86% overall pain reduction at 12 months
- All rated success of RAT as "Very Successful"
- All would undergo RAT again
- 100% graft function at 12 months

12 Month FU after RAT

No. who proceeded to RAT	16
No. with 12 month FU	7
Mean Pain Scale Pre-RAT	7.1
Mean Pain Scale Post-RAT	3.3
Mean Pain Scale at 12 Month FU	1.2
Pain Reduction at 12 Month FU (%)	86%
Graft Function at 12 Month FU (%)	100%

Pre/Post RAT Pain Scores



Conclusion:

- Renal hilar blockade accurately predicts the success of renal auto-transplantation in patients with loin pain hematuria syndrome

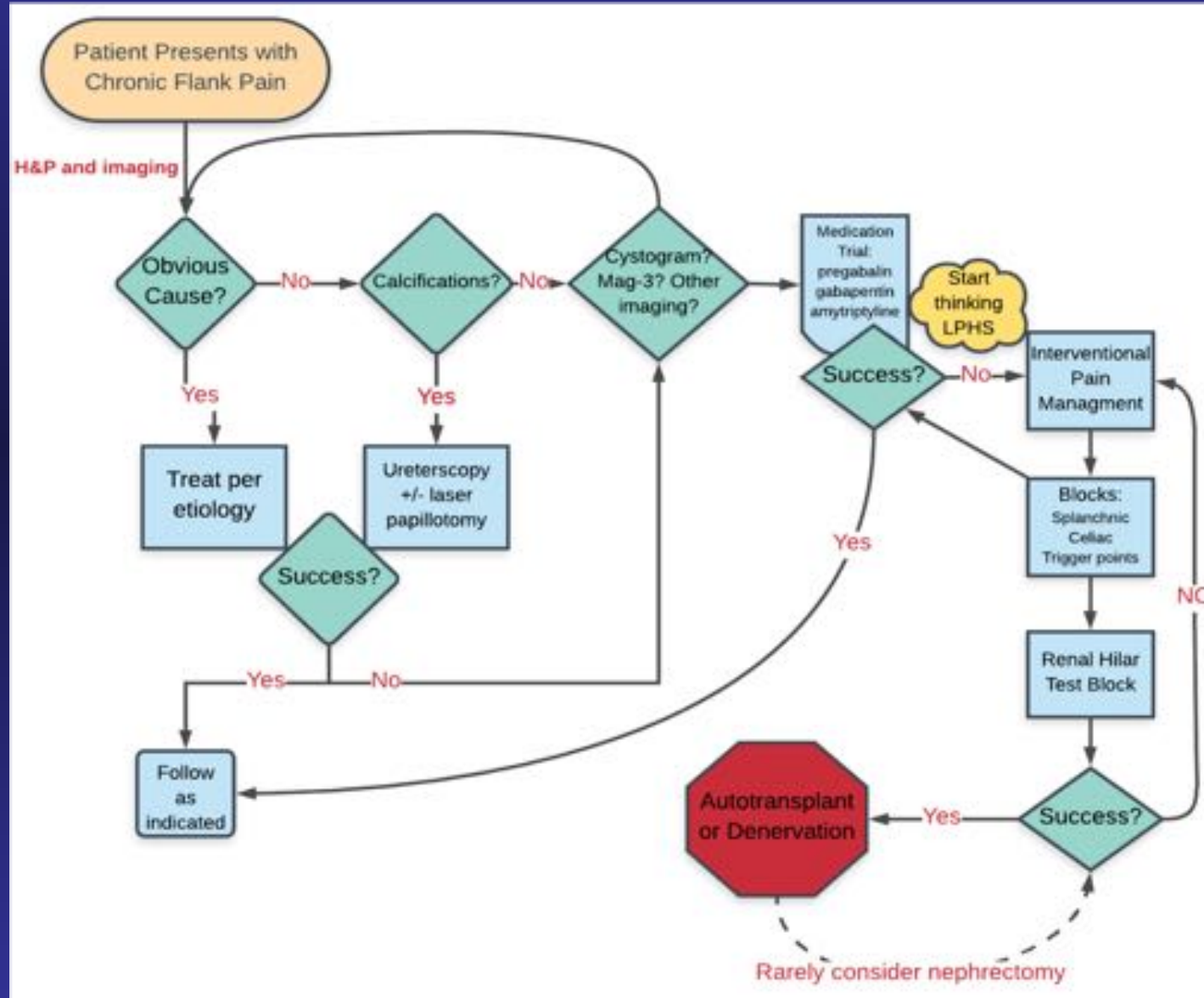
LESS Autotransplant



Patient Presentation

- RS is a 30 year old man, here for 3rd opinion
- Long history of right flank pain (only ever the right)
- Started in teen years, diagnosed with recurrent pyelonephritis but found to have a small stone that he passed, calcium oxalate.
- Several “stone passage events” over the past 10 years, none visibly passed
- No history of febrile UTI
- Found to have single 2-3 mm lower pole stone by OS urologist but cystogram negative for reflux, ureteroscopy couldn't locate stone
- Complains of intermittent gross hematuria, episodic severe flank pain with emesis, takes narcotics intermittently; **frequent ER trips**
- Seeing pain management: Neurontin, baclofen both have failed

Chronic Flank Pain Algorithm



Conclusions

- Chronic flank pain can be the result of a wide variety of pathology
- A detailed history, physical, and imaging work-up is essential
- Laser papillotomy may be a reasonable option in patients with chronic flank pain papillary calcifications or small caliceal stones
- Involvement of an interventional pain management specialist is hugely beneficial for the patient and the urologist!

Thank You



