

Obstructive Nephrolithiasis

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Keywords: Nephrolithiasis, kidney stone, flank pain

Procedures: None

LEARNING OBJECTIVES

1. Create a differential for flank pain
2. Order appropriate studies to elucidate the cause of the patient's flank pain
3. Recognize what imaging is most appropriate for diagnosis of obstructive nephrolithiasis
4. Discuss management of obstructive nephrolithiasis

CRITICAL ACTIONS

- ✓ Obtain IV access with a large-bore peripheral IV
- ✓ Place patient on monitors with continuous oxygen saturation and vital monitoring
- ✓ Ask for a full set of vital signs including HR, BP, oxygen saturation, and temperature
- ✓ Obtain EKG
- ✓ Ask for and interpret appropriate labs (CBC, Cardiac Biomarkers, Chemistry, LFTs, Lipase, UA, and Urine Culture)
- ✓ Administration of IV fluids
- ✓ Administration of analgesics
- ✓ Request imaging- CT or US
- ✓ Reassessment of patient's pain and vital signs
- ✓ Appropriate consultations called (urology)
- ✓ Closed loop communication
- ✓ Synthesis of the case
- ✓ Disclose appropriate information to the patient/family
- ✓ Summary of case to team or consultant

CASE ONE-LINER

45-year-old male presents with flank pain

PRESENTATION

SETTING	Hospital ED
ADDITIONAL ROLES	Sim operator, sim RN, debrief manager CONSULTANTS: Urology, Cardiology (for preclinical students)
PATIENT	45yo male
CHIEF COMPLAINT	Left-sided flank pain
Hx of PRESENTING ILLNESS	A 45-year-old male, otherwise healthy, presents to the ED with sudden onset 10/10 sharp left flank pain radiating to the right groin that started 1 hour ago. It varies in intensity, "comes in waves," and he has associated nausea and vomiting. Patient also notes 1 episode of hematuria. Has never had a similar episode before.
ROS	(+) Flank pain, nausea and vomiting, hematuria (-) Diarrhea, constipation, CP, dyspnea, fever or chills.; no dysuria
PMH/PSH	Laparoscopic cholecystectomy
MEDICATIONS	None
ALLERGIES	None
SOCIAL Hx	Father with DM; married; no smoking, no drugs, occasional alcohol

INITIAL VITAL SIGNS

HR	BP	RR	PULSE OXIMETRY	TEMP	WEIGHT
122	150/90	22	98% on room air	98.7F	80 kg

PHYSICAL EXAM

Items in red
need to be
verbalized

GENERAL: AAOX3, laying down clutching left side
HEENT: PERRL, normocephalic, atraumatic, tongue midline
NECK: No JVD, no crepitus
CV: Tachycardic, regular rhythm, no murmurs, rubs, or gallops
PULM: CTAB in all fields, no tachypnea
ABD: Soft, nontender/non-distended. L CVA TTP. +BS
GU: Physiologic scrotum, penis, and perineum; no testicular tenderness
EXT: No edema. 2+ pulses throughout, strength 5/5 and equal throughout
SKIN: No rashes or ecchymosis
NEURO: Normal

PHASE 1: INITIAL PRESENTATION

TIME	CLINICAL PROMPT	EXPECTED MANAGEMENT	CONSEQUENCES	CRITICAL ACTIONS
00:00-03:00	45-year old male presents with sudden onset L flank pain	<ul style="list-style-type: none"> Order full set of vital signs, cardiac monitors, continuous pulse oximetry Order large-bore IVs Obtain a focused history and physical examination Introduce self to patient and EMS team Ask pt about social history and allergies Introduce self to pt 	<ul style="list-style-type: none"> RN prompts, “Do you want vitals/patient on the monitor/IV access?” if not requested 	<ul style="list-style-type: none"> Obtained a complete set of vital signs? I P N Obtained a focused history? I P N Performed a focused physical exam? I P N Ordered large bore IV? I P N Recognized abnormal VS? I P N Confirmed pt allergies? I P N

PHASE 2: REASSESSMENT AND SECONDARY INTERVENTION

TIME	CLINICAL PROMPT	EXPECTED MANAGEMENT	CONSEQUENCES	CRITICAL ACTIONS
3:01-6:00	<p>Pt remains in severe pain, groaning</p> <p>Repeat Vital Signs (with analgesia) BP: 130/80 HR: 104 RR: 18 T: 98.8F Pox: 98% on RA</p>	<ul style="list-style-type: none"> Order STAT labs including UA Order STAT EKG Order IV fluid resuscitation Order analgesia Order antiemetics Order imaging for diagnosis of kidney stones (CT or US) 	<ul style="list-style-type: none"> RN to prompt, “Did you want any imaging/labs?” if none ordered. RN to prompt, “Did you want any treatment for the HR, his nausea, or his pain?” if no IVF, antiemetics, or analgesia ordered 	<ul style="list-style-type: none"> Ordered STAT labs? I P N Ordered STAT UA? I P N Ordered STAT EKG? I P N Ordered IV fluids? I P N Ordered analgesia and antiemetic? I P N Ordered appropriate diagnostic imaging? I P N

PHASE 3: REASSESSMENT, TERTIARY INTERVENTION, RESULTS, RESOLUTION

TIME	CLINICAL PROMPT	EXPECTED MANAGEMENT	CONSEQUENCES	CRITICAL ACTIONS
6:01-10:00	<p>Patient slightly more comfortable with interventions</p> <p><i>If no interventions conducted, patient should grow angry</i></p>	<ul style="list-style-type: none"> • Call consultant (Urologist to ask if this patient can go home) • Formulate differential including: obstructive nephrolithiasis, pyelonephritis, aortic pathology, torsion, ACS, MSK back pain, etc. • Update the patient of results and plan • Make disposition clear (ADMIT) 	<ul style="list-style-type: none"> • Labs result at 6:30 • RN to prompt, “Staying or going?” if no clear disposition • RN to prompt, “What did the imaging/labs show?” if no interpretation shared • RN to prompt, “What’s the plan?” if no consult called • RN to prompt, “Could this be a kidney stone?” if DDx does not include kidney stone 	<p>Formulated broad DDx? I P N</p> <p>Interpreted test results accurately? I P N</p> <p>Called consultant? I P N</p> <p>Presented case to specialist succinctly and directly? I P N</p> <p>Updated patient at any point? I P N</p> <p>Made disposition clear? I P N</p>

PHASE 4: CONCLUSION & DEBRIEFING

TIME	ACTIONS
10:00-20:00	<p>Debrief</p> <p>Q&A Session/Teaching</p> <p>Evaluations</p>

DEBRIEFING POINTS

GENERAL POINTS	SCENARIO-SPECIFIC POINTS
<ul style="list-style-type: none"> • What went well? • What are some opportunities for improvement? • Did you identify any gaps in knowledge? • Was there any delay in treatment? • How was communication between team members? 	<ul style="list-style-type: none"> • Differential for flank/back pain • Medication choices in suspected obstructive nephrolithiasis • Appropriate imaging and lab diagnostics. Include a discussion of POCUS • Treatment and management options for obstructive nephrolithiasis <ul style="list-style-type: none"> • When do patients need to be admitted and when can they be discharged home? • What is the likelihood of stones passing on their own?

ORAL BOARDS PEARLS

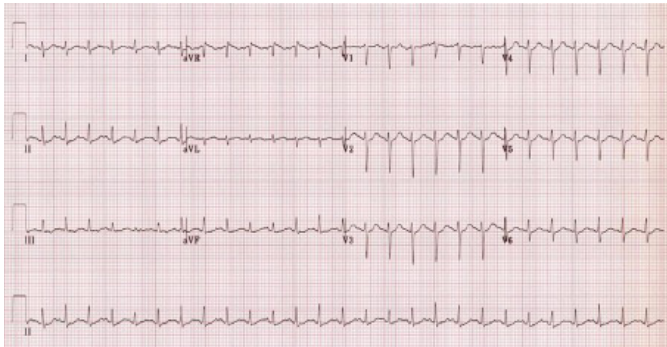
- Have a format for how you would like to approach each case
- Remember to make the patient NPO, re-assess the vital signs, re-assess after each intervention, and follow up on any studies
- Remember to explain to the patient/family the same way you would in real life
- If the examiner attempts to cue you or ask “anything else”, take a moment to synthesize what has been done to help organize your thoughts (this may be your final chance to correct something you forgot!) and ensure the examiner recorded all of your intended actions
- Make sure you consider GU pathology such as testicular torsion and perform the associated GU exam

SCENARIO STIMULI

Complete Blood Count		Coagulation Profile	
WBC	10.0 (Normal 5.0 - 14.5 x 10 ³ /mL)	PT	12 (Normal 11-13.5 seconds)
Hemoglobin	13.8 (Normal 11.5-15.5 gm/dL)	PTT	25 (Normal 25-35 seconds)
HCT	41 (Normal 35%-45%)	INR	1.0 (Normal 0.8-1.1)
Platelets	220 (Normal 150-450 x 10 ³ /mL)	SO2	57
MCV	84 (Normal 76-90 fL/red)		
Basic Metabolic Panel		Urinalysis	
Sodium	137 (Normal 136-145 mEQ/L)	Hemoglobin	Positive
Potassium	4.0 (Normal 3.5-5.5 mEQ/L)	RBC	> 50
Chloride	105 (Normal 95-105 mEQ/L)	LE	Negative
CO ₂	23 (Normal 17-29 mEQ/L)	Nitrites	Negative
BUN	15 (Normal 5-20 mg/dL)	WBC	11
Creatinine	2.2 (Normal 0.5-1.1 mg/dL)	Bacteria	None
Glucose	97 (Normal 70-110 mg/dL)		

IMAGING

Representative EKG



Interpretation: Sinus tachycardia

Representative CT



Representative US

