HEMATURIA

(Last updated 07/22/2019; Reviewed by: Sidhant Singh, MD)

PRESENTING COMPLAINTS: Fever, pain, urinary frequency, discolored urine

FINDINGS

- **A** Check airway
- **B** ↑/N RR
- **C** ↓/↑/N BP, ↑/N HR, weak/N pulse
- **D** Variable altered (V,P,U,D)*
- **E** Ascites, edema, flank fullness, fever, purpura/petechial
- **Lpc** Urine dipstick and analysis, CBC, BT/ INR/aPTT/PT, ↓/N pH
- **U_{PC}** Bright echogenic foci with acoustic shadowing (calculi), FAST**

***V** (verbal), **P (**pain), **U** (unconsciousness), **D** (delirious)

U_{PC} (point of care ultrasound) **L_{PC}** (point of care labs)

****FAST:** Focused Assessment with Sonography in Trauma

DEFINITION (based on urine microscopy)

- **Hematuria**: **3+ RBCs per high-power field (HPF) in sediment**
    - Gross hematuria: grossly red urine
    - Microscopic hematuria: RBCs on microscopy but not visible to the naked eye
- **Pseudohematuria: Grossly red urine but <3 RBCs/HPF**
    - Pigmenturia: caused by many drugs/foods, such as phenytoin, rifampin, beets, carrots
    - Hemoglobinuria: hemolysis (low haptoglobin)
    - Myoglobinuria: rhabdomyolysis (high CK, normal haptoglobin)

OTHER HISTORY

- **History:** Renal or ureteric stones, recent abdominal trauma, recent sore throat, smoking, secondary malignancy, family or personal history of bleeding disorders, visit to developing countries (dengue)
- **Symptoms:** Fever, frequency, urgency, dysuria, hesitancy, abdominal pain, nausea, vomiting, dizziness, palpitations, weight loss, anorexia
- **Signs:** Flank or suprapubic tenderness, palpable abdominal mass, bony tenderness (in case of secondary spread), prostate enlargement, prostatic tenderness on per rectal examination

DIFFERENTIAL DIAGNOSIS

- **Glomerular**
    - Proteinuria, dysmorphic RBCs, RBC casts, reduced GFR, edema, hypertension

- **Transient:** Postinfectious glomerulonephritis (GN), exercise-induced hematuria, interstitial nephritis (medications)
- **Persistent:** IgA nephropathy, thin basement membrane nephropathy (usually urinary protein excretion, blood pressure, and renal function are normal), other GN

- **Extra-glomerular**
  - Non-dysmorphic RBCs and blood clots
  - **Transient:** Urinary tract infection (dysuria, frequency, urgency, flank pain, fever), stones (costovertebral angle tenderness), trauma (Foley insertion), sickle cell disease, bleeding diathesis (thrombocytopenia, not warfarin)
  - **Persistent:** Malignancy (cigarette smoking, age ≥ 50, past cyclophosphamide), recurrent infections, indwelling catheter, BPH (hesitancy, nocturia), endometriosis (cyclical), schistosoma haematobium, tuberculosis, hemorrhagic cystitis (pelvic irradiation, cyclophosphamide, mitotane)

OTHER INVESTIGATIONS

- **Differentiate** glomerular vs extra-glomerular etiology (see above)
- **Monitor:** Vital signs, including: blood pressure, heart rate ,temperature
- **Labs:** Complete urinalysis (including number of RBC/HPF and WBCs, bacteria, nitrites, protein, casts, crystals), CBC, renal function test, urine culture, blood culture (If significant bleeding, get coagulation studies and blood typing/cross match)
- **Imaging:** Ultrasound (stones and structural defects), CT urography and cystoscopy (to screen for lesions, unless clear glomerular or infective etiology)

THERAPEUTIC INTERVENTIONS

- **General:** Treatment varies depending on etiology and degree of hematuria
- **Specific for key etiologies**
  - **UTI/Pyelonephritis:** Antimicrobial treatment
  - **BPH:** Tamsulosin, Consider long-term finasteride/dutasteride
  - **Gross hematuria/ hemorrhage:** Fluid replacement, RBC transfusion for acute anemia (Hgb threshold 7-8 g/dL for hemodynamically stable medical and surgical patients; Symptomatic anemia (e.g. ongoing bleeding, acute coronary syndrome, new symptoms suggestive of acute stroke) should be treated with transfusion in all patients with Hgb <10 g/dL]); Episodic gross hematuria in IgA nephropathy generally does not require further evaluation or treatment
  - **Severe bleeding diathesis:** Consider vitamin K or platelet-transfusion, correct thrombocytopenia (platelets < 50 G/L), reverse effects of anticoagulant drugs, correct coagulopathy (INR > 1.5, PTT > 50 sec)

- **Consult:** Urology (all causes) and nephrology (For proteinuria, RBC casts, decreased renal function, dysmorphic RBCs)
- **Medication:** Steroids for glomerulonephritis, Prophylactic antibiotics for recurrent infection
- **Urological intervention:** Lithotripsy for stone
- **Surgical intervention:** Patient with history of trauma and hemodynamic instability with continuous bleeding

ONGOING TREATMENT

- **Follow-up management if negative work-up:** If persistent or recurrent hematuria: consider cytology, perform yearly urinalysis, consider repeat work-up in 3-5 years
- **Monitoring:** Hemodynamic and respiratory status**,** urine output**, r**esolution of hemodynamic instability
- **Further Labs/imaging:** Repeat blood count and coagulation testing, consider urine culture in suspected infection, CT scan for suspected tumor, cystoscopy for suspected bladder source of bleeding**;** If recurrent bleeding: consider cytology, yearly urine analysis, repeat work in 3-5 years

CAUTIONS

- **Urine Dipstick:** Sensitive, but not specific for hematuria (If positive, do microscopy); Can be false-negative in presence of Vitamin C; the presence of many epithelial cells indicates vaginal or skin contamination
- **Warfarin:** Warfarin-related nephropathy is a type of acute kidney injury (AKI) that is caused by excessive anticoagulation with warfarin or sometimes other anticoagulants; Microscopic and, less commonly, gross hematuria may be present

REFERENCES & ACKNOWLEDGMENTS

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