Canadian Undergraduate Urology Curriculum (CanUUC): Hematuria

Last reviewed June 2014
Objectives:

1. Define microscopic and macrosopic (gross) hematuria.
2. Outline the investigations required (upper and lower urinary tract) when evaluating hematuria.
3. Describe the common causes of hematuria.
4. List the common risk factors for urothelial malignancy.
5. Outline the evaluation of a renal mass.
6. List how hematuria of nephrologic origin differs from hematuria due to a urologic source.
What is hematuria?

- **GROSS HEMATURIA**
  - Visible blood in the urine
  - This is always significant!

- **MICROSCOPIC HEMATURIA**
  - Greater than 2 RBC/HPF on two microscopic analysis
  - Absence of recent menses, exercise, or instrumentation
Hematuria: Why Care?

- SHOULD BE REGARDED AS A SYMPTOM OF UROLOGIC MALIGNANCY UNTIL PROVEN OTHERWISE
- 1-16% PREVALENCE IN THE POPULATION
- HEMATURIA CARRIES A 5-10 FOLD RISK OF UROLOGIC MALIGNANCY
28 year old male with gross hematuria
49 year old female with microscopic hematuria
67 year old male with gross hematuria and clot retention
Case 1

“Something’s wrong down there…”
A 28 year old male

- 2 episodes of gross hematuria
  - Self-limiting
- LUTS for 6 months
  - Urinary hesistancy
  - Decreased in the force of stream
- Non-Smoker
- No pain, No Trauma
Does this patient need evaluation?

⇒ YES!

⇒ GROSS HEMATURIA CARRIES A FIVEFOLD YIELD OF REPRESENTING SIGNIFICANT UNDERLYING PATHOLOGY

⇒ NEEDS EVALUATION REGARDLESS OF AGE
Key Points on History

- **PAIN WITH HEMATURIA** usually from upper tracts
  - Usually represents a stone or infection
- **PAINLESS HEMATURIA** usually more worrisome
- **Presence of clots**
  - Usually indicates more significant hematuria
What investigations are required?

- Urinalysis, urine C&S, lytes, Cr
  - R/O infection, renal failure
- UPPER TRACT STUDY
  - Imaging
- LOWER TRACT STUDY
  - Cystoscopy
Upper tract investigations

- **Ultrasound**
  - Very useful first line imaging of upper tracts
  - Assess for mass, calculus, hydronephrosis

- **Computerized tomography (CT)**
  - For evaluation of any abnormalities on ultrasound

- IVP and retrograde pyelograms used selectively
Lower tract investigations

- Radiographic studies do not rule out lower urinary tract pathology
- **Cystoscopy** is the gold standard for evaluating the lower urinary tract
Other Tests: Urine cytology and markers

- **Urine Cytology**
  - Sensitivity 34%, Specificity 81%
  - Greatest sensitivity in high grade urothelial tumors

- **Bladder Tumor Marker Tests**
  - More sensitive than cytology but less specific
  - Possibly a role in followup of bladder tumors
Urologic causes of hematuria

<table>
<thead>
<tr>
<th>Upper tract</th>
<th>Lower tract</th>
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<tbody>
<tr>
<td>Renal cell carcinoma</td>
<td>Bladder cancer</td>
</tr>
<tr>
<td>Renal calculi</td>
<td>BPH</td>
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<tr>
<td>Obstruction/Hydronephrosis</td>
<td>UTI</td>
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<tr>
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<td>Urethral Stricture</td>
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</tbody>
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Case 1: Results

- Urinalysis, urine culture
  - 1-5 WBC, 5-10 RBC
  - No growth
  - Neg STI’s

- Renal Ultrasound
  - Normal upper tracts

- Cystoscopy
  - Narrow bulbar urethral stricture
  - Stricture dilated sequentially
Case 1: Continued

- Hematuria and LUTS improved after cystoscopy and dilation
- Symptoms recurred in 6 months
- Urinary retention
- Repeat cystoscopy with urethrogram
  - 5cm bulbar urethral stricture
Urethral Stricture

- Fibrosis of urethra and corpus spongiosum causing:
  - LUTS/retention
  - UTI
  - Hematuria

- Etiology
  - Trauma
  - Idiopathic
  - Infection
  - Iatrogenic
Urethral Stricture: Treatment

- **Dilations, urethrotomy:**
  - Forcibly opening strictured segment
  - Not usually curative
  - Temporary relief
- **Urethral reconstruction**
  - >90% success
  - Tissue transfer (buccal mucosa)
Case 2

“An incidental finding...”
A 49 year old female

- Routine insurance urinalysis
  - Dipstick: 1+ Hgb
  - Microscopic: 5 RBC/HPF
- Negative urine C&S, N Cr (65)
- No Gross Hematuria
- Non-Smoker
- No LUTS, No pain, No calculi
Does this patient need investigation?

⇒ Yes!

⇒ Age >40 with microscopic hematuria
Microscopic Hematuria: Who to investigate?

- Patients **over the age of 40** need full urologic evaluation
  - Yield 11%
- Complete investigation **NOT** needed for **microscopic** hematuria in a nonsmoker less than 40 years of age
- Upper tract imaging reasonable in all patients
- Cystoscopy can be deferred in patients under 40 without risk factors for lower tract pathology
When do people under 40 with microscopic hematuria require full cystoscopy?

- People with risk factors for lower tract malignancy:
  1. Smokers
  2. Occupational exposure to dyes
  3. Radiation therapy to pelvis
  4. Cyclophosphamide exposure
  5. Analgesic abuse with phenacetin
Does a positive dip always indicate hematuria?

→ No

→ Causes of a false +ve dipstick
  - Dehydration
  - Myoglobinuria
  - Menstrual blood contamination
  - Oxidizing agents (Vitamin C, etc.)
Hematuria: Is Urine Dipstick Accurate?

- Sensitivity 0.91
- Specificity 0.99
- False positive 16% therefore confirm with microscopic exam of urine sediment
- Good for screening
When to suspect a nephrologic (glomerular) source?

1. RBC CASTS
2. PROTEINURIA
3. DYSMORPHIC RED BLOOD CELLS
4. ELEVATED CREATININE

*IF THESE ARE PRESENT THERE MAY BE NO NEED TO INVESTIGATE FOR UROLOGIC SOURCE*
Case 2: Investigations

peror tract
- 4cm left renal mass on ultrasound
- No calculi or hydronephrosis

Lower tract
- Normal cystoscopy
- Normal cytology
Further evaluation: CT abdomen

- 4cm central left renal mass
- Differential Diagnosis:
  - RENAL CELL CARCINOMA
  - Oncocytoma
  - Angiomyolipoma
  - Lymphoma
- A SOLID RENAL MASS IS CONSIDERED CARCINOMA UNLESS PROVEN OTHERWISE
Renal Cell Carcinoma

- 3% of all adult malignancies
- 90% of malignant renal tumours
- Males:females = 2:1
- Risk factors:
  - Smoking (mild)
  - von Hippel Lindau (VHL) syndrome
  - “Bad luck”
Renal Cell Carcinoma: Presentation

- Age 40-60
- ~60% are incidentally discovered (ultrasound, etc)
- Hematuria
- 15% have “classic triad” of flank pain, abdominal mass, & hematuria
- Paraneoplastic syndromes
  - Hypercalcemia, Cushing’s, etc.
Renal Cell Carcinoma: Diagnosis

- Based on radiographic studies
  - Incidental ultrasound
  - CT is the method of choice
  - Generally do not do biopsy
Renal Cell Carcinoma: Treatment

**Localized disease:**
- Nephrectomy (is the only cure)
- Radical vs. Partial (small or bilateral tumours)
- Radiotherapy not beneficial
- Chemotherapy ineffective

**Metastases:**
- Palliative radiotherapy (bony lesions)
- Tyrosine kinase inhibitors (TKI’s)
Case 3

“Those damn cigars…”
A 67 year old male

- Gross hematuria for 2 weeks
- Passing clots per urethra for 2 days
- Unable to void for 8 hours
- Smoker x 30 years
- Urinalysis: 4+ Hgb, >50 RBC/HPF
Does this patient need investigation?

- Yes! Definitely
- Gross hematuria
- Smoker
Treatment plan

- Needs catheter (large)
- **Upper tract imaging**
  - Renal ultrasound
- **Lower tract study**
  - Cystoscopy
- Urine Cytology
Clot Retention

- Bladder hemorrhage and large clots
- Place large bore 3-way catheter
- Manually irrigate clots
- Continuous bladder irrigation (CBI)
Case 3 Investigations

- Renal ultrasound
  - Normal kidneys
  - Possible bladder lesion
- Urine Cytology
  - “Atypical cells”
- Cystoscopy
  - Papillary bladder tumour
Bladder cancer: Transitional Cell Carcinoma

- Most common cause of gross hematuria over age 40
- Male: Female (3:1)
- Most common bladder tumour (>85% tumours)
- Radiologic investigations have a high false negative rate
- Cystoscopic (“visual”) diagnosis
TCC: Treatment

- **TURBT**
  - Stages the cancer
  - Treatment for early stage cancers
  - Prone to recurrence
  - Cystoscopic surveillance
  - Higher stage lesions
    - Intravesical immunotherapy (i.e. BCG)
    - Radical cystectomy
    - Combined chemoradiotherapy
TURBT
When to re-evaluate hematuria

- The likelihood of tumors developing within 2 to five years after a negative evaluation is in the 0 to 3% range.

- Annual cytology and urinalysis for 3 years.

- Re-evaluate if:
  - An increase in the hematuria
  - Episode of gross hematuria
  - New onset of irritative voiding symptoms