



Canadian Undergraduate Urology Curriculum (CanUUC): Hematuria



Last reviewed June 2014

Objectives:

- 1 Define microscopic and macroscopic (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

Outline

- ① 28 year old male with gross hematuria
- ② 49 year old female with microscopic hematuria
- ③ 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 hesitancy
 - 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

⇒ Upper tract

- Renal cell carcinoma
- Renal calculi
- Obstruction/Hydronephrosis

⇒ Lower tract

- Bladder cancer
- BPH
- UTI
- Urethral Stricture

Case 1: Results

⇒ Urinalysis, urine culture

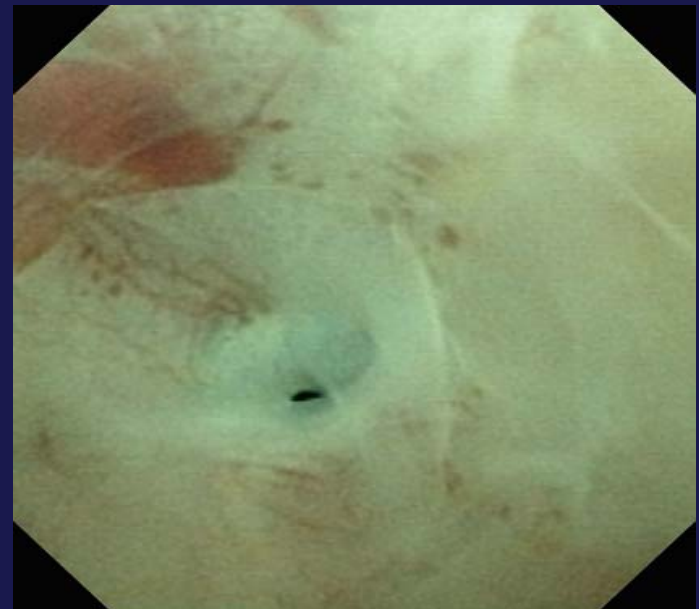
- 1-5 WBC, 5-10 RBC
- No growth
- Neg STI's

⇒ Renal Ultrasound

- Normal upper tracts

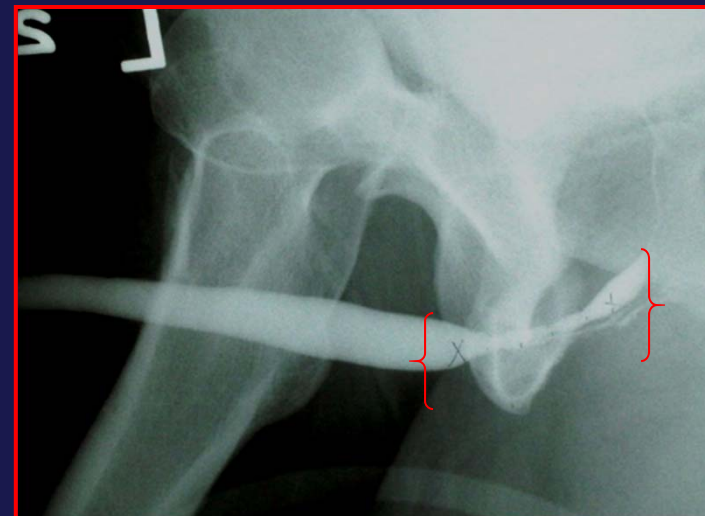
⇒ Cystoscopy

- 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

⇒ Upper tract

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

⇒ Lower tract

- Normal cystoscopy
- Normal cytology



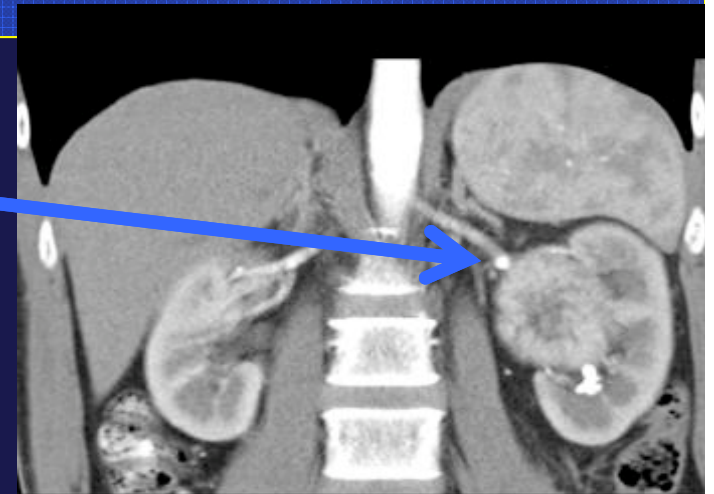
Further evaluation: CT abdomen

⇒ 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?

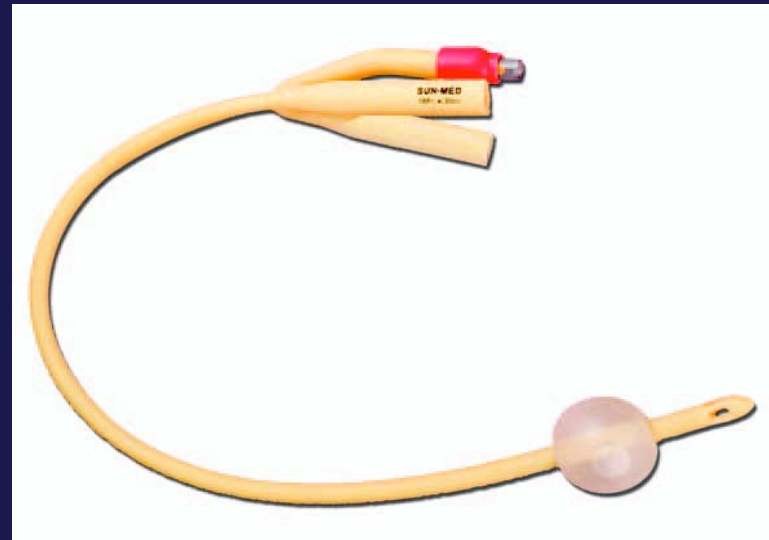
- ⇒ **Yes! Definitely**
- ⇒ **Gross hematuria**
- ⇒ **Smoker**

Treatment plan

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

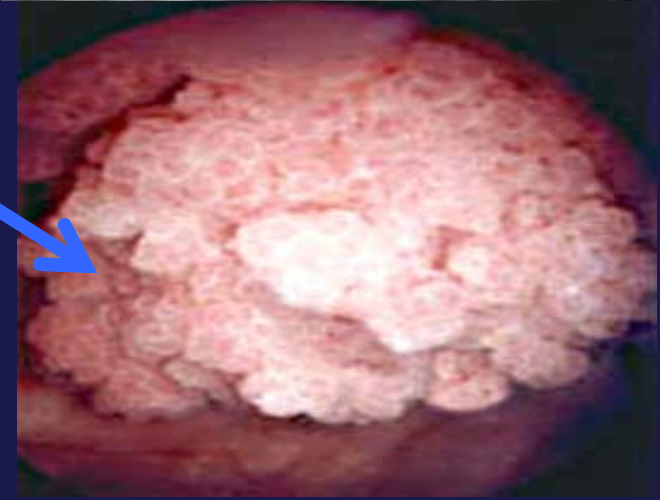
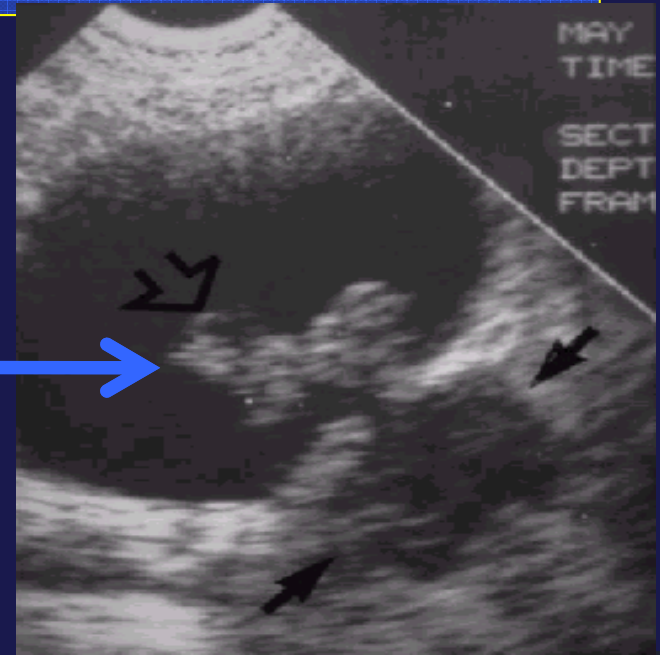
Clot Retention

- ⇒ 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

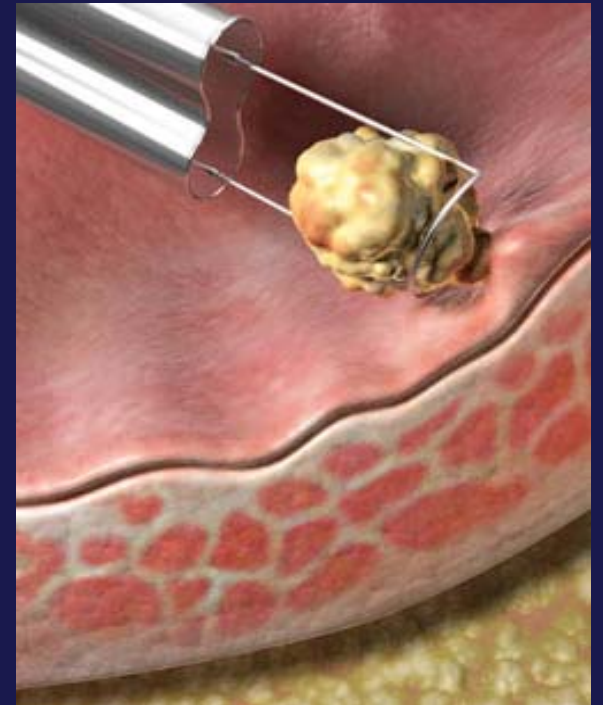
- Stages the cancer
- Treatment for early stage cancers

⇒ 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