

# Canadian Undergraduate Urology Curriculum (CanUUC): HEMATURIA



# 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 2-3 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

# Cases

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
  - Decrease in the force of stream; slow flow
- **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
- **URINE CYTOLOGY**
- **UPPER TRACT STUDY**
  - Imaging (CT Hematuria Protocol or Renal US)
- **LOWER TRACT STUDY**
  - Cystoscopy

**BOLDED Terms are MANDATORY investigations.**

# 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



# Upper Tract Investigations - CT

## ➤ CT Hematuria Protocol (Triphasic CT Scan)

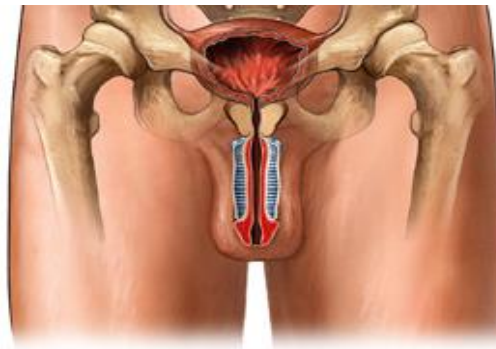
- 1. Unenhanced Phase – assess for calculi and hydronephrosis
- 2. Nephrographic Phase – assess for enhancing renal masses
- 3. Excretory Phase – assess the ureters for upper tract malignancy/filling defects

## ➤ Needs IV Contrast and therefore needs to have a normal serum Cr



# 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 follow-up of bladder tumors

# Urologic Causes of Hematuria

## ➤ Upper tract

- Renal cell carcinoma
- Renal calculi
- Obstruction
- Hydronephrosis
- Infection

## ➤ Lower tract

- Bladder cancer
- BPH
- UTI
- Urethral Stricture
- Trauma

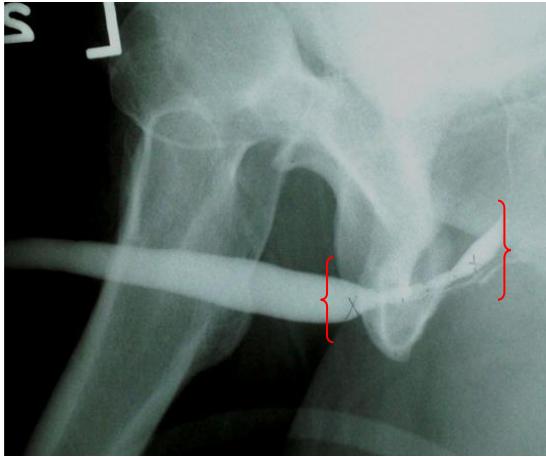
# Case 1: Results

- 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 urethral 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 by stretching or incising
  - 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:**
- Smokers
- Occupational exposure to dyes
- Radiation therapy to pelvis
- Cyclophosphamide exposure
- 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?

- RBC casts
  - Proteinuria
  - Dysmorphic red blood cells
  - 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

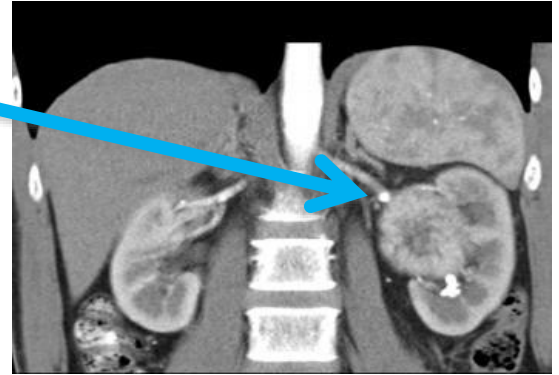
### ➤ **Lower tract**

- Normal cystoscopy
- Normal cytology



## Further Evaluation: CT Abdomen

- 4cm central left renal mass
- Differential Diagnosis:
  - RENAL CELL CARCINOMA
  - Oncocytoma
  - Angiomyolipoma
  - Lymphoma
  - Mets from another primary malignancy
- 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, CT etc)
- Hematuria – very common symptom
- 15% have “classic triad” of flank pain, abdominal mass, & hematuria
  - This triad is rare now – late findings
- 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

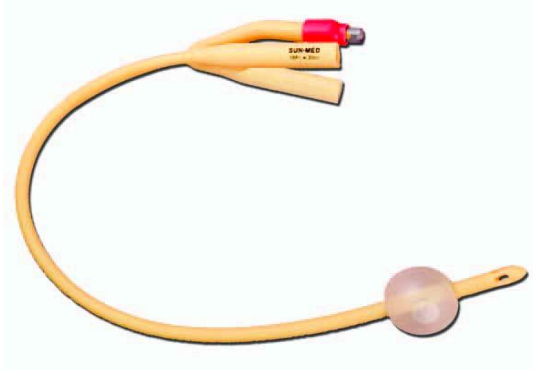
# Does this patient need investigation?

- Yes! Definitely
- Gross hematuria
- Smoker

# Treatment Plan

- **Needs catheter (large lumen or 3 way for CBI)**
- **Upper tract imaging**
  - Renal ultrasound
- **Lower tract study**
  - Cystoscopy
- **Urine Cytology**

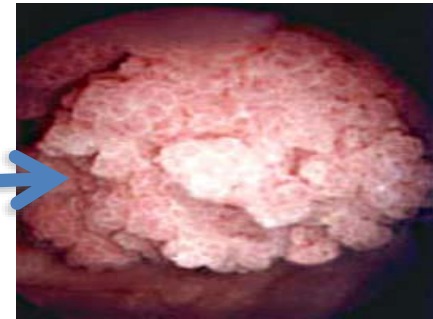
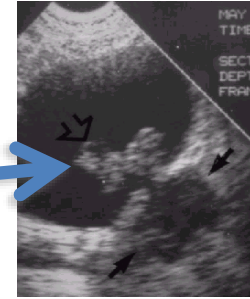
# Clot Retention



- Bladder hemorrhage and large clots
- Place large bore 3-way catheter
  - 3 lumens – balloon, inflow and outflow
- Manually irrigate clots
- Continuous bladder irrigation (CBI) – Flushes out blood before clots can form

# Case 3 Investigations

- **Renal ultrasound**
  - Normal kidneys
  - Possible bladder lesion
- **Urine Cytology**
  - “Atypical cells”
- **Cystoscopy**
  - Papillary bladder tumour



# Bladder Cancer: Urothelial 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



# UCC: Treatment

## ➤ TURBT

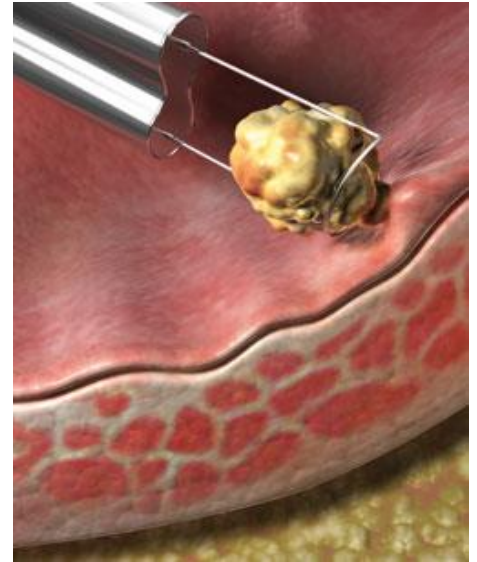
- Stages the cancer
- Treatment for early stage cancers

## ➤ Prone to recurrence

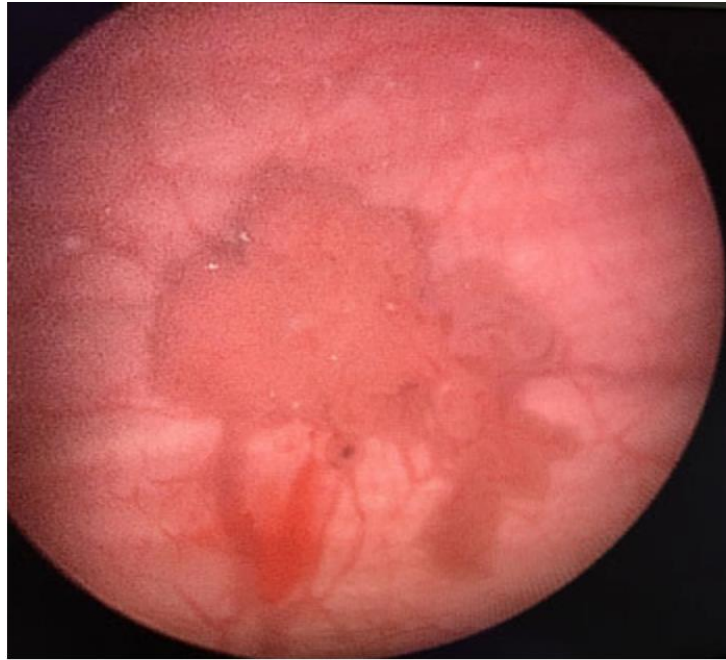
- Cystoscopic surveillance

## ➤ Higher stage lesions

- Intravesical immunotherapy (i.e. BCG)
- Radical cystectomy
- Combined chemoradiotherapy



# Transurethral Resection of Bladder Tumour (TURBT)



Bladder Tumor Before TURBT Surgery

# When To Re-evaluate Hematuria

- The likelihood of tumors developing within 2 to 5 years after a negative evaluation is in the 0 to 3% range
- Cytology, urinalysis and blood pressure checks at 6m, 12m, 24m and 36m after negative evaluation
- Re-evaluate if :
  - Gross hematuria
  - Positive or atypical urine cytology
  - New onset of irritative voiding symptoms without infection