

Nephrology: Hematuria & Bladder Cancer

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Introduction to Hematuria

Definition

Hematuria is the presence of blood in the urine. It is crucial to understand that **hematuria is not a disease itself; it is a manifestation (a symptom or sign) of an underlying disease**. It requires a thorough diagnostic work up to find the cause

Types of Hematuria

We can divide hematuria into two main categories:

1. **Gross (Macroscopic) Hematuria:** Visible blood in the urine.
2. **Microscopic Hematuria:** Blood detected only under a microscope. The classical definition is the presence of **3 or more Red Blood Cells (RBCs) per High Power Field (HPF)** in two out of three properly collected urine specimens.

Clinical Pearl: Gross hematuria is highly alarming. If a patient presents with gross, **painless hematuria**, it is considered highly suspicious for **bladder cancer** until proven otherwise.

Discoloration vs True Hematuria

When taking a patient's history, if a patient complains of "blood in the urine" it is better to document it as (red urine) or (discoloration of urine) initially. This is because the redness might be caused by:

- Food dyes (e.g. beets, berries).
- Certain medications.
- Myoglobinuria or hemoglobinuria (which are not true RBCs).

Microscopic Hematuria Considerations

Microscopic hematuria can sometimes be physiological. It can be detected in normal, healthy individuals after strenuous physical activity or sexual intercourse. Therefore, it should always be repeated to confirm its persistence. Furthermore, urine dipsticks can have:

- False positives: Caused by myoglobin, hemoglobin or contamination (e.g. iodine/ Betadine)
- False negatives: High doses of Vitamin C (Ascorbic acid)

Classification by Etiology

- **Medical Hematuria:** Typically nephrological causes (e.g. glomerulonephritis) treated with medication.
- **Surgical Hematuria:** Urological causes requiring intervention, such as BPH (Benign Prostatic Hyperplasia), bladder cancer, kidney tumors, urinary tract stones and trauma.

Bladder Cancer (Urothelial Carcinoma)

Epidemiology and Risk Factors

-Bladder cancer is more common in males, but stage-for-stage, it carries a higher mortality rate in females.

-**Histology:** The most common type is **Urothelial Carcinoma** (formerly Transitional Cell Carcinoma). The second most common is Squamous Cell Carcinoma, followed by Adenocarcinoma.

-**Smoking** is the most important risk factor for urothelial carcinoma.

-Occupational exposure: Chemicals in industries like painting, hairdressing and hydrocarbon exposure increase the risk.

-Schistosomiasis (Bilharzia): A parasitic infection common in regions like Egypt. Chronic irritation from this parasite is strongly associated with **Squamous Cell Carcinoma** of the bladder. Chronic irritation from long-term catheters or bladder stones can also lead to squamous cell carcinoma.

Diagnostic Workup

Any patient with unexplained hematuria must undergo a mandatory workup to rule out bladder cancer, consisting of three tests:

1. **Urine Cytology:** Examining shed bladder cells under a microscope to detect malignancy. It has high specificity (if it's positive, cancer is highly likely) but low sensitivity (a negative result does not rule out cancer).
2. **CT Urography(CTU):** A CT scan with contrast and delayed imaging to evaluate the upper urinary tract (kidneys, ureters) and detect filling defects caused by tumors.
3. **Cystoscopy:** The gold standard. A camera is inserted through the urethra into the bladder to directly visualize the mucosa and any tumors.

Management of Bladder Cancer

Bladder cancer is clinically divided into two distinct categories that dictate treatment:

1. Non-Muscle Invasive Bladder Cancer(NMIBC)

- These tumors (stages Ta, T1 or CIS)have not invaded the detrusor muscle.
 - Treatment: The primary treatment is **Transurethral Resection of Bladder Tumor (TURBT)**. The surgeon uses a cystoscope to cut and remove the tumor from the bladder wall. This procedure is both diagnostic (for staging and grading) and therapeutic.
 - Adjuvant Therapy: After TURBT, intravesical therapy (instilling medication directly into the bladder via a catheter) is used to prevent recurrence. Based on the risk level, the patient may receive:
 - Single early instillation of intravesical chemotherapy.
 - Intravesical BCG (Bacillus Calmette-Guerin)**: A vaccine that recruits the local immune system to attack cancer cells. The patient holds the fluid in the bladder for about an hour and rolls in bed to ensure it coats the entire bladder surface.
- Clinical Note:** There is a well-documented global shortage of the BCG vaccine, which has prompted ongoing research and literature regarding alternative intravesical treatments.

2. Muscle-Invasive Bladder Cancer(MIBC)

- These tumors (Stage T2 and above) have invaded the bladder muscle wall. It is a severe, aggressive and highly lethal disease.
- Neoadjuvant Chemotherapy: There is strong evidence for giving systemic chemotherapy (like the MVAC or the Gem-Cis (Gemcitabine and Cisplatin) protocol) before surgery to improve survival.
- Surgical Treatment: The gold standard is **Radical Cystectomy** with pelvic lymph node dissection.
 - In males: Removal of the bladder and prostate.
 - In females (Anterior Exenteration): Removal of the bladder, uterus, cervix and anterior vaginal wall.
 - Partial Cystectomy: Indicated only in a very few, highly selected cases.
 - Surgical Duration: Radical cystectomy is a major complex procedure that typically takes 6 to 8 hours to complete.

3. Metastatic Bladder Cancer

- Systemic Chemotherapy:** The traditional standard for metastatic disease.
- Immunotherapy:** Introduced effectively around 2016, immunotherapy has now become a significant therapeutic option for metastatic cases.

Urinary Diversion (Post-Cystectomy)

Once the bladder is removed, the ureters must be diverted so urine can exit the body. Common methods include:

1. **Ileal Conduit:** The gold standard and most common method. A 10-15 cm segment of the ileum(small intestine) is isolated, the ureters are attached to one end and the other end is brought out to the skin as a stoma. Urine drains continuously into a bag.
2. **Orthotopic Neobladder:** A new bladder is constructed from a larger segment of the bowel(shaped into a sphere to hold pressure) and connected to the native urethra, allowing the patient to urinate normally.
3. **Continent Cutaneous Reservoir (e.g. Indiana Pouch):** A pouch is made from the bowel with a specialized stoma (often using the appendix or a catheterizable segment) that does not leak. The patient empties the pouch by inserting a catheter into the stoma at regular intervals.

Versions	Slide and Place of Error	Before Correction	After Correction
V0 → V1	Page 3 (Management of Bladder Cancer Section)	Missing some extra clinical notes and management details mentioned verbally by the doctor during the lecture	<ul style="list-style-type: none"> - Added a clinical note about the global BCG shortage under NMIBC - Added "Gem-Cis protocol" as an option under Neoadjuvant Chemotherapy - Added specific notes for "Partial Cystectomy" and "Surgical Duration (6-8 hours)" under MIBC - Added a new subsection "3. Metastatic Bladder Cancer" to include Immunotherapy
V1 → V2			



DOPAMINE

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