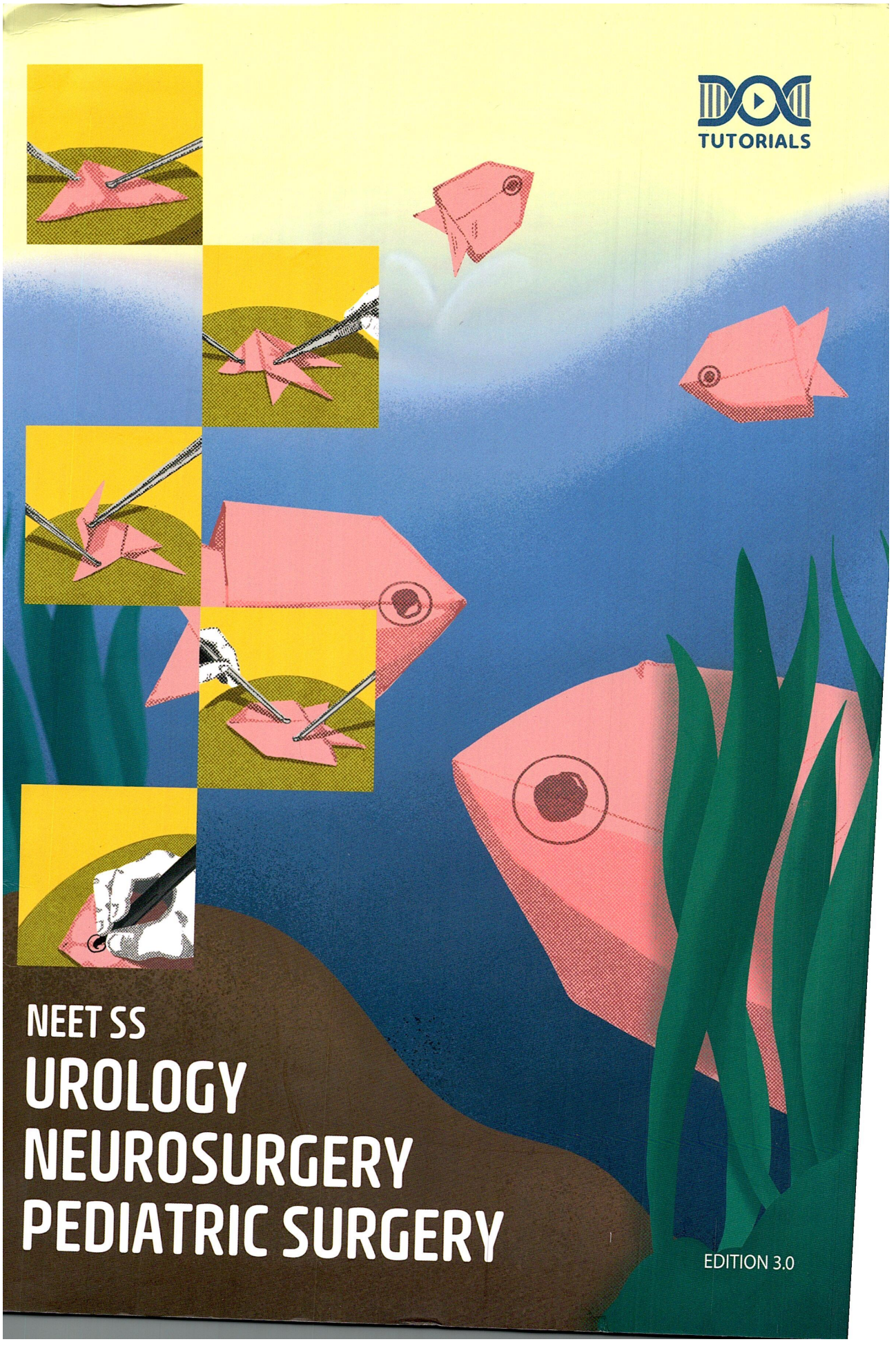

TUTORIALS
NEET SS
UROLOGY
NEUROSURGERY
PEDIATRIC SURGERY
EDITION 3.0

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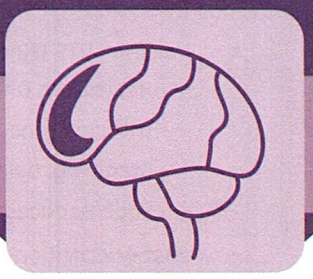
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URINARY SYMPTOMS AND INVESTIGATIONS (PART 1)



Fundamentals of Urology: Symptoms and Investigations

- Urinary Tract Division:
  - The tract is divided into the upper urinary tract (kidneys and ureters)
  - The lower urinary tract (bladder, prostate, and urethra).

Basic Urinary Symptoms: Pain

00:06:30

- Dysuria:
  - Pain or discomfort while passing urine, described as feeling like "passing razor blades".
  - Indicates lower urinary tract pathology, such as lower UTIs urethral or bladder stones.
  - If routine cultures are negative- cystoscopy and biopsy to rule out carcinoma in situ.
- Renal Pain:
  - A constant, gnawing pain caused by the distension or inflammation of the renal capsule.
  - It is usually localized to the renal angle, which is the junction of the 12th rib and the erector spinae muscles.
  - Causes include pyelonephritis or obstruction.
- Ureteric Colic:
  - Often incorrectly referred to as renal colic.
  - Waxing and waning pain caused by an obstruction (like a stone) in the ureter.
- Mechanism:
  - The obstruction causes hydroureteronephrosis, distending the renal capsule and inducing hyper-peristalsis proximal to the stone.
  - This leads to the accumulation of prostaglandins and lactic acid, which irritates Type A and C nerve fibers.
  - **Presentation:** The pain radiates from the loin (back) down to the groin or testicles.
  - **Treatment:** NSAIDs are the drug of choice .
- Suprapubic Pain:
  - It is caused by bladder distension or bladder inflammation
  - Interstitial cystitis, where pain is often relieved by passing urine
- Testicular Pain:
  - **Acute:** Sudden, severe onset in a young male treated as a surgical emergency
  - To rule out testicular torsion- immediate exploration to save the testis.
  - **Chronic/Aching:** Conditions like varicocele or large hydroceles cause a heavy, dragging sensation that typically worsens towards the end of the day .
  - Chronic Orchialgia:
    - A difficult-to-treat chronic pain that may occur after vasectomy due to distal obstruction;
    - Treated with neuromodulators (like pregabalin) and cord blocks.
- Perineal Pain:
  - Deep-seated, ill-defined pain that can indicate chronic prostatitis, Chronic Pelvic Pain Syndrome (CPPS), or pelvic malignancies.
  - Malignancies may require an MRI if regular evaluations are negative.

Lower Urinary Tract Symptoms (LUTS)

00:24:30

- Storage LUTS (Mnemonic: FUN): Issues with the bladder storing urine.
  - **Frequency:** Voiding more than the normal 5-6 times per day.
  - **Urgency:** A sudden, compelling desire to pass urine that is difficult to defer.
  - **Nocturia:** Waking up at night one or more times to void, preceded and followed by sleep.

- **Voiding LUTS (Mnemonic: HISP):** Issues related to outlet obstruction (e.g., prostate, sphincter, or urethra).
  - **Hesitancy:** Difficulty initiating urination.
  - **Intermittency:** The urinary stream stops and starts during a single void.
  - **Straining:** Using abdominal pressure to initiate or maintain the urinary stream
  - **Poor/Reduced Stream:** A thinner and weaker urinary flow.
- **Post-Micturition LUTS:**
  - **Incomplete Emptying:** Feeling that the bladder is not fully empty after urination.
  - **Post-Micturition Dribble:** Urine gets trapped in the obstructed prostatic urethra
  - This is typically seen in Benign Prostatic Hyperplasia (BPH).
- **Other Key Terms:**
  - **Strangury:** A constant, painful need to void, often associated with urethral stones or severe LUTS.
  - **Urge Incontinence:** Involuntary leakage immediately preceded by urgency.
  - **Stress Incontinence:** Involuntary leakage triggered by increased intra-abdominal pressure (e.g., coughing, standing), mostly seen in postmenopausal women.
  - **Nocturnal Enuresis:** Involuntary loss of urine while sleeping.
- **Symptom Scoring Systems:**
  - LUTS are quantified using tools like the AUA symptom score (measuring 7 symptoms on a 0-5 scale to classify severity as mild, moderate, or severe)
  - And the International Prostate Symptom Score (IPSS).
  - The IPSS is the gold standard because it factors in the patient's **Quality of Life**, which helps determine the necessity of intervention (e.g., alpha-blockers or surgery) and measure treatment success.

Hematuria (Blood in Urine)

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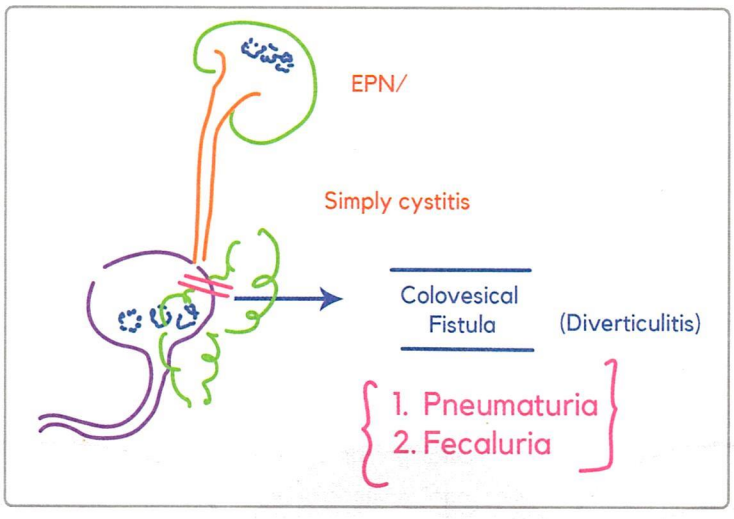
Passing blood in urine is a major presenting symptom that must be thoroughly evaluated.

- **Visible vs. Non-Visible:**
  - Microscopic hematuria is defined as >2 or >3 RBCs per high power field.
  - Visible hematuria has a 20% probability of revealing a malignancy,
  - Microscopic hematuria still carries a 5% risk, making evaluation mandatory for both.
- **Timing of Hematuria:**
  - **Initial:** Suggests a pathology in the urethra.
  - **Total:** Suggests a pathology in the bladder or upper urinary tract.
  - **Terminal:** Suggests bleeding from the prostate or the bladder trigone.
- **Clot Shape:**
  - Serpentine (worm-like) clots suggest upper tract (kidney/ureter) tumors because they take the shape of the tube.
  - Whereas amorphous (featureless) clots indicate a bladder tumor.
- **Causes (Mnemonic: TIN):** Trauma, Infection, Neoplasm.
  - Remember that hematuria in patients taking anticoagulants must still be fully investigated and never ignored.
- **Classic "Too Late" Triad:** Hematuria, palpable loin mass, and loin pain characterize advanced Renal Cell Carcinoma (RCC).
- **Mandatory Investigations:**
  1. Urine culture and microscopy,
  2. Imaging (CECT Urogram or Ultrasound KUB)
  3. Cystoscopy
- **False Hematuria (Red/Brown Urine not caused by blood):**
  - **Dietary/Metabolic:**
    - Large amounts of beetroot (betanin pigment), porphyria, hemoglobinuria, or myoglobinuria (rhabdomyolysis/compartment syndrome).
  - **March Hematuria:**
    - Hemoglobinuria -army recruits due to muscle lysis from prolonged marching.
  - **Medications:** Rifampicin, Isoniazid, phenazopyridine, and laxatives with phenolphthalein turn urine red. Nitrofurantoin and metronidazole (along with high bilirubin) can turn urine brown.

Other Rare & Unique Presentations

00:54:35

- **Uremia Presentation:**
  - Completely asymptomatic urinary retention can silently progress to renal failure,
  - Causing patients to present late with edema, facial puffiness, or pulmonary edema.
  - In children, undiagnosed posterior urethral valves can present as failure to thrive or encephalopathy.
- **Hematospermia:**
  - Passing blood in semen. It is usually a benign, self-limiting.
- **Pneumaturia:** Passing gas or bubbles in urine.
  - Due to gas-forming infections or an abnormal communication like a colovesical fistula .



- **White Urine:**
  - **Dhat Syndrome:** Passage of semen in urine.
  - Usually seen in anxious young men; requires reassurance.
- **Chyluria:**
  - Milky white urine caused by chyle leaking due to lymphatic obstruction.
  - It is often painless and worsens after eating a high-fat meal.
  - Treatment involves fat restriction or surgical ligation of lymphatic channels. If mixed with blood, it is called hematochyluria.



Haematochyluria with milky-red urine the blood settles after some time, leaving chyluria above

URINARY SYMPTOMS AND INVESTIGATIONS PART 2

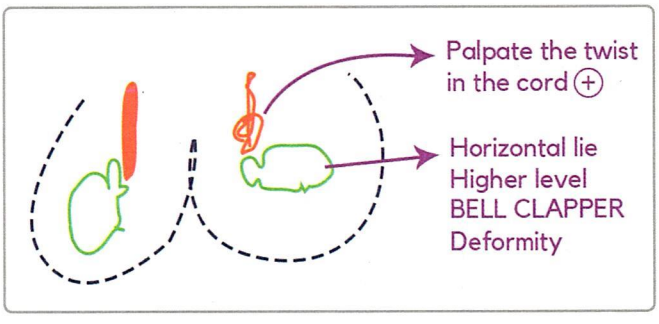
1. Absent Testis

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- **Definition:** An empty scrotum where the testis is not in its normal position.
- **Causes:**
  - **Undescended Testis.**
  - **Ectopic Testis:.**
- **Clinical Evaluation:**
  - Obtain a history, checking for a pre-term delivery.
  - Look for an associated **inguinal hernia,** as the testis could be trapped within it.
  - Examine the contralateral testis.
  - Check for scrotal rugae.
  - Well-developed rugae indicate the testis is still in the trunk,
  - Poorly developed rugae can be an indirect sign of a vanishing testis.

2. Acute Testicular & Scrotal Pain

- **Torsion of Appendage (Appendix Testis):**
  - The most common cause of acute testicular pain in children under 5 to 10 years.
  - Involves torsion of the hydatid of Morgagni, a vestigial organ.
  - Presents with upper pole point tenderness and a classical **"blue dot sign".**
  - It is a self-limiting condition.
  - Management: Use Doppler ultrasound to rule out true testicular torsion.
  - If in doubt, proceed with scrotal exploration.
- **Testicular Torsion:**
  - Typically seen in pre-pubertal and adolescent boys.
  - Presents with acute, severe, tender scrotal pain.
  - **Clinical Signs:**
    - Testis lies horizontally at a higher level known as the **"bell clapper deformity".**



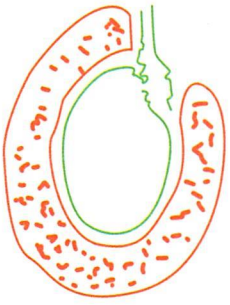
  - Diagnostics: Doppler ultrasound shows decreased or absent blood flow.
  - Management:
    - Immediate surgical exploration/extraction is required;

3. Testicular and Scrotal Swellings

00:08:40

- **Klinefelter Syndrome:**
  - Chromosomal abnormality characterized by very tall stature
  - Bilateral small, firm testes.
- **Hydrocele:**
  - A painless collection of fluid within the tunica vaginalis.

- Increases gradually over months or years and is **brilliantly transilluminant.**
- The testis is **not separately palpable** from the swelling.



- Painless swelling
- ↑ size
- Transillumination +ve
- Testis not separately palpable
- USG scrotum

4. Epididymal Conditions



- **Acute Epididymitis:**
  - Acute inflammation confined to the epididymis.
  - Presenting with pain, swelling, and point tenderness.
  - Most common in sexually active males (frequently caused by Chlamydia).
  - Doppler ultrasound reveals **increased blood flow**, differentiating it from torsion.
- **Epididymal Cyst:**
  - A painless cystic swelling that transilluminates brilliantly.
  - Displaying a **"Chinese lantern pattern"**.
  - Key differentiating factor from hydrocele: **the testis is separately palpable.**
- **Genitourinary Tuberculosis (TB):**
  - A rare condition spread hematogenously, usually beginning in the epididymis
  - Presents with nodular induration of the epididymis and vas deferens.
  - Can form a **"cold abscess"**

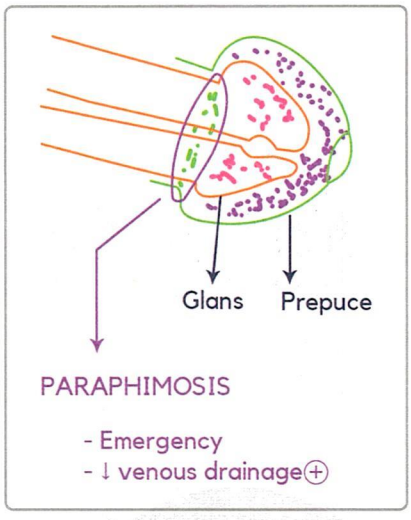
5. Spermatic Cord Conditions

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- **Varicocele:**
  - Dilatation of the pampiniform plexus veins.
  - Most commonly idiopathic and left-sided. Long-standing cases can cause testicular atrophy and reduced volume.
  - **Right-sided Varicocele (Red Flag):**
    - Sudden onset, non-reducing right-sided varicocelesuspicion for a **renal tumor.**
    - This happens because a renal tumor thrombus invades the IVC and obstructs drainage from the right gonadal vein.
- **Congenital Hydrocele of the Cord:**
  - A small cystic swelling confined purely to the spermatic cord structure, communicating with neither the peritoneal cavity nor the tunica vaginalis.

6. Conditions of the Prepuce (Foreskin)

- **Phimosis:**
  - Narrowing of the distal prepuce, preventing retraction over the glans.
  - Can entrap urine and cause **Balanoposthitis** (inflammation of the glans and foreskin).
- **Paraphimosis (Urological Emergency):**
  - Foreskin is forcefully retracted and trapped , forming a constricting ring.
  - This restricts venous drainage, leading to glans edema, severe swelling, and potential ischemia.
  - Treatment: Requires a dorsal slit to release the ring, followed by circumcision.



- **Balanitis Xerotica Obliterans (BXO):** Depigmentation and scarring of the distal prepuce, which serves as a precursor for the development of urethral strictures.

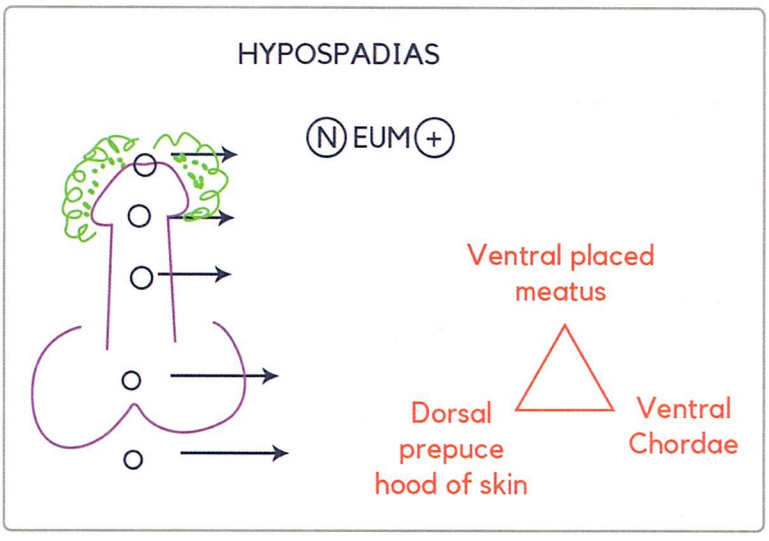
7. Penile Conditions

- **Peyronie's Disease:**
  - An idiopathic condition causing fibrosis/plaque formation in the corpora cavernosa (most commonly on the dorsal aspect).
  - Common in middle-aged men with diabetes.
  - Presents as a painless hard lump that causes painful angulation or curvature of the penis during erection.
  - Treatment:
    - Managed conservatively (painkillers/anti-inflammatories) in the acute phase.
    - Surgery (excision/grafting or plication) is reserved for stable disease (3–6 months later) with severe angulation.
- **Penile Fracture:**
  - Laceration or breach of the tunica albuginea.
  - Usually occurs due to blunt trauma.
  - **Presentation:** An audible "crack," immediate loss of erection (detumescence).
  - Bleeding/hematoma along the shaft, and acute bending (deviation) opposite to the side of the tear ("eggplant deformity").
  - Treatment: Immediate surgical exploration and primary repair to prevent long-term erectile dysfunction.
- **Genital Warts:** Found on the glans penis, typically following an HPV infection.
- **Carcinoma In Situ:** Presents as painless, red, velvety patches and is a precursor for penile cancer. It requires a biopsy for differentiation.
  - Erythroplasia of Queyrat: Occurs on the glans penis.
  - Bowen's Disease: Occurs on the penile shaft skin.

8. Urethral and Meatal Abnormalities

- **Hypospadias:**
  - A developmental anomaly due to poor development of the urethral plate.
  - Features a triad:
    1. A **ventrally placed meatus**

2. A **dorsal hood of prepuce**
3. **Ventral chordee** (downward curvature of the penis).



- **Epispadias:**
  - The opposite of hypospadias;
  - The urethral meatus opens on the **dorsal** (top) aspect of the penis.
  - Can be isolated or associated with exstrophy abnormalities.
- **Urethral Caruncle:**
  - A minor prolapse of the urethral mucosa, commonly seen in older women.
  - Appears as a small, raspberry-like swelling at the external meatus. Often self-limiting but may bleed to the touch.

URINARY SYMPTOMS AND INVESTIGATIONS PART 3

Basic Blood Investigations for Urological Patients

00:00:25

- **Full Blood Count (FBC):**
  - Essential when a urinary tract infection, such as pyelonephritis, is suspected.
- **Renal Function Tests (RFTs):**
  - Includes blood urea, serum creatinine, and electrolytes.
  - These are vital for detecting kidney function deterioration,
  - Hyperkalemia in CKD and hyponatremia in older men with urinary retention.
- **Creatinine and eGFR:**
  - Surrogate marker for renal function.
  - Though it can remain normal despite wide variations in the GFR.
  - An **estimated GFR (eGFR)** provides a more accurate prediction of kidney function.
- **Stone Disease Panel:**
  - First-time kidney stone -require tests for **calcium, uric acid, parathormone (PTH).**
  - Recurrent stones require a complete metabolic panel including a 24-hour urine collection to measure calcium, uric acid, and citrate.
- **Serum Alkaline Phosphatase (ALP):**
  - Elevated ALP indicates increased bone turnover.
  - Tested in suspected cases of bone metastasis due to urologic malignancy.
  - Seen in prostate cancer.

Tumor Markers in Urology

- Tumor markers are substances secreted by tumors into the bloodstream.
- In urology useful for two malignancies: **prostate cancer** and **testicular cancer**.
- There are no routine markers for kidney or bladder tumors.
- **Testicular Cancer Markers:** Alpha-fetoprotein, Beta-hCG, and LDH.

Prostate Specific Antigen (PSA)

00:09:40

- **Nature of PSA:**
  - It is a glycoprotein secreted by prostate epithelial cells.
  - It is **organ-specific, not tumor-specific,**
  - Elevated due to benign prostatic hyperplasia (BPH), prostatitis, or prostate cancer.
- **Mechanism of Elevation:**
  - Increased PSA due todisruption or breach in the prostatic architecture.
- **PSA Cut-offs:**
  - PSA >10 ng/mL strongly suggests significant pathology like cancer,
  - The 4-10 ng/mL range is considered a "gray area".
- **Medication Effects:**
  - 5-alpha reductase inhibitors- >6 months reduce PSA by half
  - Therefore, the PSA must be multiplied by two to determine the actual value.
  - Aspirin, statins, and thiazide diuretics can also influence PSA levels.
- **Infection Effects:**
  - Takes about six weeks for PSA to return to its baseline level.
- **Monitoring and Follow-up:**
  - PSA is used post-treatmentto monitor for recurrence.
  - After successful total prostate removal, PSA should be undetectable (<0.02 ng/mL).
- **PSA Derivatives (Useful in the 4-10 ng/mL Gray Area):**
- **Percentage of Free PSA:**
  - If <15%, there is a high chance of carcinoma
  - Warranting a multi-parametric MRI (mpMRI) or TRUS-guided biopsy.
    - **PSA Density:**
      - PSA divided by prostate weight.
      - A density <0.15 ng/mL/g is likely benign, higher values warrant biopsy.
    - **PSA Velocity:**
      - The annual increase in PSA.
      - An absolute increase of >0.75 ng/mL/year is considered suspicious.
    - **PSA Doubling Time:**
      - Used to monitor treatment response;
      - Rapid doubling indicates active tumor growth.

Urine-Based Tests

00:21:20

- **Urine Dipstick:**
  - A simple, cheap, and rapid screening test using a reagent strip with multiple pads.
  - Detect glucose, bilirubin, ketones, blood, pH, proteins, nitrites, leukocyte esterase.
- **Sample Collection:**
  - To avoid cross-contamination collect a **midstream urine sample.**
- **Urine Microscopy and Culture:**
  - Culture provides an antibiogram to guide treatment.
  - Normal WBCs are 3-5 per high power field (HPF); pyuria is >5/HPF.
  - Normal RBCs are 0-2/HPF; **microscopic hematuria** is ≥3 RBCs/HPF.

- Requires further evaluation with ultrasound, CT IVP, or cystoscopy.

- **Early Morning Urine for Tuberculosis:**
  - TB bacilli shed episodically, mostly overnight.
  - Three consecutive early morning samples are collected to increase the yield.
- **Urine Cytology:**
  - Low-grade tumors only shed about 15% of the time,
  - while high-grade tumors shed up to 50%.
  - A positive cytology strongly points to a high-grade tumor.
- **Chyluria:**
  - The presence of milky-white lymphatic fluid in the urine,
  - Due to abnormal communication between the pelvicalyceal and lymphatic systems

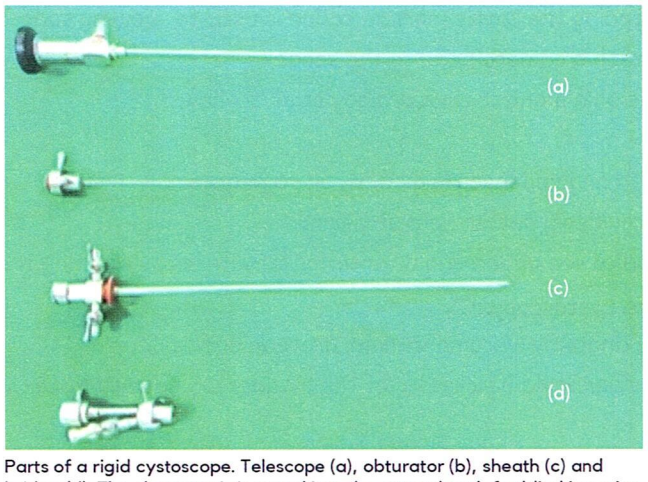


Haematochyluria with milky-red urine the blood settles after some time, leaving chyluria above

Endoscopy in Urology

00:29:45

- **Purpose:**
  - **Cystoscopy** views the urethra and bladder,
  - **Ureteroscopy** visualizes the ureters and renal pelvis.
- **Rigid vs. Flexible Endoscopes:**
  - **Rigid Endoscopes:**
    - Used mostly under general anesthesia.
    - They have larger working channels, excellent optics.



Parts of a rigid cystoscope. Telescope (a), obturator (b), sheath (c) and bridge (d). The obturator is inserted into the outer sheath for blind insertion of the cystoscope sheath - usually in Females. The light cable and camera are attached to the telescope, which replaces the obturator in blind insertions. In males, the bridge is attached to the sheath to provide additional length and the telescope is placed through the bridge for insertion of the cystoscope under vision.