

A HIGH-YIELD GUIDE FOR MEDICAL STUDENTS

The Urology Clerkship Handbook

Everything you need to look sharp on your urology rotation:
the wards, the OR, the consults, and the conditions you will
actually see.

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FIRST EDITION

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The Urology Clerkship Handbook: A High-Yield Guide for Medical Students. First Edition.

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This book is for education only. It is not medical advice.

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Preface

Most students walk onto a urology rotation knowing almost nothing about the specialty and quietly dreading the pimp questions, the OR, and the catheters. That fear is unnecessary. Urology is one of the most learnable rotations in medicine, because a small number of patterns explain most of what you will see: the colicky stone, the retention, the painless bleed, the acute scrotum, the elevated PSA.

This handbook exists to compress that pattern set into something you can read in a weekend and carry for the whole block. It is deliberately practical. It tells you how the days are structured, what the team wants from you, how to present a patient, and how to reason through the symptoms and conditions that fill a urology service. It favors the high-yield over the exhaustive, and it flags the handful of true emergencies where minutes matter.

It is written to be read cover to cover before your rotation, then used as a quick reference during it.

How to Use This Book

- **Before your rotation:** read Part 1 (rotation success and anatomy) and skim the symptom chapters in Part 2. You will walk in oriented instead of lost.
- **During your rotation:** when you pick up a consult, read the matching symptom or condition chapter that morning. It takes ten minutes and transforms your presentation.
- **The night before the OR:** read the relevant condition chapter and the matching procedure entry in Chapter 23 so you can follow the case.
- **Before you get pimped:** Chapter 24 has fifty of the questions attendings actually ask, with concise answers. Chapter 25 is pure quick reference.
- **To test yourself like the exam:** Part 5 is a bank of 88 board-style vignettes (MCCQE and USMLE level) with full explanations. Do a topic block after reading its chapter, then redo your misses a week later.
- **Callouts:** boxes marked **PEARL** are high-yield shortcuts; boxes marked **WARNING** are the mistakes and emergencies you cannot afford to miss.

A note on scope: this is a student-level guide, pitched at what a clerk needs to reason well and look prepared. It is not a residency or board reference, and it does not try to be.

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PART 1

Succeeding on the Rotation

Chapter 1: How to Excel on Your Urology Rotation

Most students walk onto a urology rotation knowing almost nothing about the specialty and expecting it to be niche. It is not niche. Urology is a high-volume surgical service that touches emergency medicine, oncology, primary care, and the operating room every single day. The good news: because expectations of visiting students are calibrated low, it is genuinely easy to stand out. This chapter tells you exactly how the days are structured, what the team wants from you, and how to turn a two- or four-week block into a strong evaluation or a letter of reference.

What a Urology Rotation Actually Looks Like

Your week will be a rotating mix of four settings. Learn the rhythm early so you can position yourself where you are useful.

Setting	What happens	Where a student adds value
OR days	Scheduled cases: TURPs, ureteroscopies, nephrectomies, cystoscopies, scrotal and penile surgery	Scrub in, retract, help position, close skin, know the case
Clinic days	High-volume outpatient visits: LUTS, hematuria, stones, cancer follow-up, ED	See patients first, write notes, present efficiently
Consults	ED and inpatient referrals: retention, colic, gross hematuria, infected obstructed systems	Be the first responder, gather data, call the resident with a plan
Call	Overnight or weekend coverage of the above	Show up, stay useful, do not disappear

Urology runs early. Rounds and first cases often start before the rest of the hospital wakes up. Arrive earlier than you think you need to, especially on OR days, because the team pre-rounds on inpatients before heading to the theatre.

The single most useful habit is knowing the day's schedule before you are asked. Pull up the OR slate and the clinic list the night before. Know the patient names, the planned procedures, and one or two facts about each. This alone puts you ahead of most students.

What Residents and Attendings Actually Expect

Lower your assumptions about surgical knowledge and raise your assumptions about reliability. Nobody expects a third-year to know operative steps. They expect you to be present, prepared, honest, and easy to have around.

What earns trust, in order:

1. **Reliability.** You are where you said you would be, when you said you would be there.
2. **Preparation.** You know the patients and did a little reading on the day's cases.

3. **Honesty.** When you do not know something, you say so instead of bluffing.
4. **Usefulness.** You look for the small jobs (chasing a lab, grabbing a chart, holding a leg) without being told.
5. **Attitude.** You are pleasant at 6 a.m. and still pleasant at 6 p.m.

Notice that four of the five have nothing to do with medical knowledge. Knowledge is the easiest thing to fake competence in and the hardest to actually build in two weeks. Character shows immediately.

PEARL: The fastest way to a good evaluation is to make the resident's life easier. Residents write or heavily influence your evaluation, and they remember the student who chased down the potassium result without being asked far longer than the one who quoted a guideline.

OR Etiquette: The Rules Nobody Writes Down

The operating room has a culture, and violating it quietly tanks your reputation. Master these mechanics before you worry about anatomy.

Before the case

- Introduce yourself to the scrub nurse and the circulating nurse. They run the room, and they decide whether you are welcome.
- Ask the resident or attending, "Is it alright if I scrub in?" Do not assume.
- Help transfer and position the patient. Urology uses lots of lithotomy (legs up in stirrups) and lateral positioning. Offer to help lift.
- Learn where the sterile field ends. When in doubt, stay far back with your hands above your waist and below your shoulders.

Scrubbing and gowning

- Scrub your hands and forearms per your institution's technique. Watch someone do it once, then copy exactly.
- Keep your hands up and in front of you after scrubbing. Do not touch anything.
- Let the scrub nurse gown and glove you. Do not grab.
- Once gowned, your sterile zone is the front of your body from nipples to waist and your gloved hands and forearms. Everything else is contaminated. Do not fold your arms into your armpits, do not drop your hands, do not turn your back to the field.

During the case

- **Positioning yourself:** Ask "Where would you like me?" and then hold that spot. Do not drift.
- **Retracting:** This is your main job. Hold steady, hold quietly, and do not let go until told. Your arm will ache. Keep holding. Retracting well is genuinely valued.
- **Suction and camera:** If handed the suction or the laparoscopic camera, keep the field clear and the target centered. Follow the operating hand.

- **Cutting sutures:** When asked to cut, cut on the flat of the scissors, leave the length you are told (a common instruction is a few millimeters for buried sutures, longer for ties you will remove later), and cut tip-first with the blades slightly open. If unsure of length, ask "How long?" once. Cutting too short can undo a knot; cutting long leaves a nuisance.
- **Asking questions:** Read the room. During a difficult or bloody part, stay silent. During calm dissection or closing, a focused question is welcome. Never ask a question that forces the surgeon to stop what they are doing at a critical moment.

WARNING: If you think you have broken sterility, say so immediately. "I think I contaminated my glove" costs you nothing and prevents an infection. Hiding a break to avoid embarrassment is the one OR mistake that can genuinely harm a patient and permanently damage how the team sees you.

After the case

- Help move the patient to the bed and off to recovery.
- Offer to write the brief operative note or post-op orders if your level allows.
- Thank the nursing staff. They remember.

Clinic Flow and Seeing Patients Efficiently

Urology clinic is fast. An attending may see thirty or more patients in a day. Your job is to see patients ahead of the attending, gather a focused story, and present it in under two minutes so the visit stays on schedule.

A workable clinic system:

1. **Grab the next chart** and skim the reason for visit and the last note. A stone patient needs a different history than a cancer follow-up.
2. **Do a focused history and exam.** Do not do a full head-to-toe. In urology, focused means the relevant symptom cluster (see Chapter 2), a targeted exam, and the red flags.
3. **Form a one-line assessment and a suggested next step** before you leave the room.
4. **Present to the attending, then go back in together.**

Efficiency is a skill you can visibly demonstrate. Tailor the depth of your workup to the visit type. A 25-year-old back for a stone check does not need a sexual history; a 60-year-old with erectile dysfunction does.

PEARL: In clinic, always know the last PSA, last creatinine, last imaging, and last cystoscopy for the patient in front of you. These four data points drive most urology decisions, and having them ready makes your presentation instantly useful.

How to Present a Urology Patient

A good presentation is short, ordered, and ends with a plan. Lead with a one-liner, give only the relevant positives and negatives, then state what you think and what you would do. The urology team cares about specific data points depending on the complaint, so front-load those.

For the three most common consults, here is what the team wants to hear immediately:

Complaint	Lead with these facts
Renal colic	Stone size, stone location, degree of hydronephrosis, signs of infection, renal function, single kidney or not
Gross hematuria	With or without clots, retention or not, anticoagulation, smoking history
Urinary retention	Bladder volume drained, is a catheter in now, creatinine, medications, neuro symptoms

Worked Example: Renal Colic Consult

Here is a complete presentation script for a patient you have just seen in the emergency department, presenting to the on-call urology resident. This is the format to aim for.

"Hi, this is [your name], the medical student with urology. I am calling about a consult from the emergency department.

One-liner: This is a 42-year-old man, otherwise healthy with two prior kidney stones, presenting with 8 hours of acute left-sided colicky flank pain radiating to the groin, with nausea and one episode of vomiting.

HPI: The pain came on suddenly this morning, is intermittent and severe, and he cannot get comfortable. He has associated gross hematuria. He has no fevers or chills, no dysuria, and no rigors. He is passing urine normally and has not had any retention.

Relevant history: He passed two stones in the past, both spontaneously, never needed a procedure. No known solitary kidney. No prior urologic surgery. He takes no regular medications, no anticoagulants, and has no allergies.

Vitals and exam: He is afebrile at 37.0, heart rate 92, blood pressure 138 over 84, satting well. He has left costovertebral angle tenderness. Abdomen is soft, no peritoneal signs. He looks uncomfortable but hemodynamically stable.

Labs: White count is normal at 8.5, creatinine is at his baseline of 85, and urinalysis shows blood but no leukocytes or nitrites, so no signs of infection.

Imaging: CT KUB shows a 5 mm obstructing stone at the left vesicoureteric junction, with mild proximal hydronephrosis. No other stones, and the right kidney is normal.

Assessment and plan: This is an uncomplicated, likely-to-pass 5 mm distal ureteric stone with no signs of infection and normal renal function. I have started him on IV fluids, analgesia, and an antiemetic, and his pain is now controlled. My plan would be medical expulsive therapy with an alpha blocker, discharge home with analgesia and a stone strainer

once his pain is settled, and outpatient urology follow-up with a repeat KUB. I wanted to confirm that plan with you and ask whether you would like anything else done before discharge."

Notice the structure: identity, one-liner, focused HPI, only the relevant history, stability, the four or five data points that matter (size, location, hydronephrosis, infection, function), and a specific proposed plan phrased as a question. That last part, offering a plan rather than just dumping data, is what separates a strong student from an average one.

WARNING: The one thing you must never miss on a stone consult is the obstructed, infected system. Fever, an elevated white count, or pus cells with an obstructing stone is a urologic emergency requiring urgent decompression, not medical expulsive therapy. If you see those features, say so at the very top of your presentation, because it changes everything.

Being Useful on Consults

Consults are where students shine, because the work is front-loaded and you can do most of it independently before the resident even arrives.

When a consult comes in, your job is to become the person who already knows the story:

- Read the ED or ward note and the reason for referral.
- See the patient. Take the focused history and do the exam.
- Pull the vitals trend, the relevant labs, and the imaging (and actually look at the images, not just the report).
- Answer the questions the team will ask before they ask them (the tables above tell you which).
- Have a suggested plan ready.

Then call or find the resident and present. If you have done this well, the resident can act on your work almost immediately, and that is exactly the impression you want to leave.

Small logistics that make you indispensable on consults: know how to find imaging on the hospital system, know how to reach the referring team, and keep a running list of the patients you are following so nobody falls through the cracks.

Common Student Mistakes

Avoiding these puts you above the median without any extra knowledge.

Mistake	Do this instead
Disappearing between cases or after clinic	Tell someone where you are going and when you will be back; ask if you can help first
Bluffing an answer	Say "I do not know, I will look it up," then actually do
Being squeamish about GU exams or complaints	Treat the DRE, scrotal exam, and sexual history as routine medicine, because they are
Talking during the hard part of a case	Watch the surgeon's hands; save questions for calm moments
Overlong, disorganized presentations	Lead with the one-liner and the key data points; end with a plan
Contaminating the field and hiding it	Announce any break in sterility instantly
Ignoring the nurses and clerks	Learn their names; they make your rotation easier or harder
Being on your phone	Keep it away unless you are looking something up for the team

The theme across every entry is the same: reliability, humility, and situational awareness beat raw knowledge every time at your level.

Turning the Rotation into a Strong Evaluation or Letter

If you want a strong evaluation, or a letter for residency applications, be deliberate about it from day one.

Signal interest early and honestly. If you are considering urology, say so to the resident and attending in the first few days. It changes how much they invest in teaching you. Do not fake interest you do not have; it shows.

Pick a small area to go deep on. You cannot learn all of urology in a block. Choose one common condition (stones, BPH, or hematuria are good choices) and read enough to hold an intelligent conversation. Depth in one area reads as competence more than shallow coverage of everything.

Ask for feedback at the midpoint. A simple "Is there anything I could be doing better or getting more involved in?" halfway through gives you time to act on it, and it signals maturity.

Be consistent, not spectacular. Evaluations are written on the sum of many small interactions, not one brilliant answer. Show up early, stay engaged, and be pleasant every day.

If you want a letter, ask directly and at the right time. Near the end of the rotation, ask the attending you worked with most: "I have really enjoyed this rotation and I am applying in urology. Would you feel comfortable writing me a strong letter of reference?" The word "strong" gives them a graceful way to decline if they cannot, which protects you from a lukewarm letter. Provide your CV, a photo if customary, and a reminder of specific cases you worked on together to make their job easy.

PEARL: Keep a private log of the cases and consults you were involved in, with a one-line teaching point from each. It makes your reading targeted, gives you specifics to reference when requesting a letter, and becomes gold when you are asked about your clinical experience at interviews.

Key Points

- Urology days split into OR, clinic, consults, and call; know the schedule before you are asked.
- Reliability, preparation, honesty, and a good attitude matter more than urology knowledge at the student level.
- Master OR mechanics (scrubbing, sterile field, retracting, suture cutting) and always announce a break in sterility.
- In clinic, know the last PSA, creatinine, imaging, and cystoscopy for every patient.
- Present with a one-liner, the handful of data points that matter for the complaint, and a proposed plan phrased as a question.
- On a stone consult, always screen for the obstructed, infected system, a true emergency.
- On consults, do the legwork early so the resident can act on your presentation immediately.
- To earn a letter, signal genuine interest early, be consistent, ask for feedback at the midpoint, and request the letter directly near the end.

Chapter 2: Essential Anatomy and the Urologic History and Physical

You do not need surgical-level anatomy to excel as a student. You need the clinically relevant relationships that explain why patients present the way they do and why the exam findings mean what they mean. This chapter covers exactly that, then walks through the focused urologic history and the GU physical exam step by step.

Clinically Relevant GU Anatomy

Kidneys and ureters

The kidneys are retroperitoneal organs lying roughly at the level of the T12 to L3 vertebrae. The right kidney sits slightly lower than the left because the liver pushes it down. This matters because flank pain and a palpable mass localize differently on each side.

At the renal hilum, the structures run in a consistent front-to-back order: vein, artery, then pelvis (renal vein anterior, renal artery in the middle, renal pelvis and ureter most posterior). A quick way to remember it is that the vein is most anterior.

The ureters are muscular tubes that carry urine from the renal pelvis to the bladder. They run down the retroperitoneum along the front of the psoas muscle, cross over the iliac vessels at the pelvic brim, then dive into the pelvis to enter the bladder posteriorly. Two relationships are worth knowing: the gonadal (testicular or ovarian) vessels cross in front of the ureter partway down, and near the bladder the vas deferens in men (and the uterine artery in women) crosses over the ureter, the classic "water under the bridge."

Ureteral narrowing points

The ureter narrows at three anatomic points. These are exactly where stones get stuck, so this is high-yield.

Narrowing point	Location	Clinical relevance
Ureteropelvic junction (UPJ)	Where the renal pelvis funnels into the ureter	Common site for stone impaction; also site of congenital UPJ obstruction
Crossing of the iliac vessels	At the pelvic brim, where the ureter crosses the iliac vessels	Stones lodge here as the ureter bends over the vessels
Ureterovesical junction (UVJ)	Where the ureter enters the bladder wall	Narrowest point of the ureter; the most common site for a stone to hang up

A stone that clears the UVJ is usually home free, which is why distal stones near the bladder are the ones most likely to pass on their own.

Bladder and the trigone

The bladder is a hollow muscular reservoir. Its wall is made of the detrusor muscle. On the inside of the bladder base sits the **trigone**, a smooth triangular area whose three corners are the two ureteric orifices and the internal urethral opening. Unlike the rest of the bladder lining, which is folded and mobile, the trigone is smooth and firmly anchored. It is a sensitive region, and irritation there (from infection, stones, or a catheter balloon) produces the intense urgency and suprapubic discomfort patients describe.

Prostate zones and why they matter

The prostate sits just below the bladder and surrounds the first part of the urethra. It is divided into zones, and knowing two of them explains most of prostate medicine.

Zone	Share of gland	Clinical significance
Peripheral zone	Largest portion of glandular tissue	Where most prostate cancers arise; the part you feel on rectal exam
Transition zone	Small, surrounds the urethra	Where benign prostatic hyperplasia (BPH) grows, squeezing the urethra and causing LUTS
Central zone	Surrounds the ejaculatory ducts	Less commonly a source of disease
Anterior fibromuscular stroma	Non-glandular front portion	Not a source of cancer or BPH

This zonal anatomy is the reason for two everyday facts. First, BPH arises in the transition zone right around the urethra, so even a modestly enlarged gland can obstruct flow. Second, cancer favors the peripheral zone at the back of the gland, which is exactly the surface your finger reaches on a rectal exam, which is why the DRE is useful for cancer detection but poor at assessing the transition-zone bulk causing obstruction.

Spermatic cord contents

The spermatic cord suspends the testis and carries its blood supply and the vas deferens. A simple "rule of threes" captures the contents.

Category	Structures
Three arteries	Testicular artery, cremasteric artery, artery to the vas deferens
Three other structures	Vas deferens, pampiniform venous plexus, lymphatics
Three nerves	Genital branch of the genitofemoral nerve, cremasteric fibers, sympathetic (autonomic) nerves (the ilioinguinal nerve runs alongside the cord rather than within its coverings)
Three fascial coverings	Internal spermatic fascia, cremasteric fascia and muscle, external spermatic fascia

Two clinical hooks: the pampiniform plexus is the venous network that becomes tortuous and dilated in a varicocele, and the artery to the vas is one reason the testis can sometimes survive on collateral flow.

Penile anatomy basics

The penis contains three cylinders of erectile tissue. The paired **corpora cavernosa** run along the top (dorsal) and are the main erectile bodies. The single **corpus spongiosum** runs underneath (ventral), surrounds the urethra, and expands at the tip to form the glans. A tough sheath called the tunica albuginea wraps the corpora and is what allows rigidity to build; Buck's fascia envelops all three bodies. Blood arrives mainly through the cavernosal arteries (branches of the internal pudendal artery), and sensation travels through the dorsal nerve of the penis, also from the pudendal nerve.

Neuroanatomy of continence and erection, kept simple

You only need the big picture here, and two mnemonics carry most of it.

For sexual function, remember **"Point and Shoot."** Parasympathetic nerves from the sacral cord (S2 to S4) drive erection (Point). Sympathetic nerves from the thoracolumbar cord drive emission and ejaculation (Shoot). Somatic input through the pudendal nerve provides sensation and the muscular contractions of orgasm.

For bladder control, remember **"Sympathetic Stores, Parasympathetic Pees."** During storage, sympathetic activity relaxes the detrusor and keeps the internal sphincter closed. During voiding, parasympathetic activity from S2 to S4 contracts the detrusor to empty the bladder. The external urethral sphincter is under voluntary somatic control through the pudendal nerve, which is why the sacral roots are summarized as "S2, 3, 4 keep the pee off the floor." This framework explains why spinal cord injuries and pelvic nerve damage produce predictable patterns of retention or incontinence.

The Focused Urologic History

Urology histories are pattern-driven. A few well-chosen questions usually point straight at the diagnosis. Tailor your questions to the presenting complaint rather than asking everything.

Characterizing lower urinary tract symptoms (LUTS)

LUTS split cleanly into two buckets, and sorting them guides your thinking.

Storage symptoms	Voiding symptoms
Urinary frequency	Weak or slow stream
Urgency	Hesitancy (delay in starting)
Nocturia (waking at night to void)	Straining to void
Urgency incontinence	Intermittency (stop-start stream)
	Incomplete emptying and post-void dribbling

Voiding (obstructive) symptoms suggest something blocking outflow, classically BPH in an older man. Storage (irritative) symptoms suggest an irritated or overactive bladder, but they also appear with infection, stones, and bladder cancer, so they always deserve a second look. Quantify what you can: how many times per night, how many pads per day, how long it has been going on.

Hematuria questions

Blood in the urine is one of the most important urologic symptoms because it can be the first sign of cancer. When someone reports hematuria, ask:

- Is the blood visible (gross) or found only on a dipstick or microscope (microscopic)? Visible blood carries a higher risk of malignancy.
- Where in the stream does it appear? Blood at the start suggests a urethral source, at the end suggests the bladder neck or prostate, and throughout the stream suggests the bladder or upper tracts.
- Are there clots? Clots point away from a purely medical (kidney) cause and toward a urologic source.
- Is it painful or painless? Painless gross hematuria is malignancy until proven otherwise. Painful hematuria more often accompanies stones or infection.
- Risk factors: smoking (the biggest modifiable risk for urothelial cancer), occupational chemical exposure, prior pelvic radiation, and anticoagulant use.

WARNING: Never attribute painless gross hematuria to anticoagulation and stop there. Patients on blood thinners get bladder and kidney cancers too, and the anticoagulant simply unmasks the bleeding. Painless visible hematuria warrants a full workup regardless of whether the patient is anticoagulated.

Taking a sexual history without awkwardness

Students dread this and patients sense the dread, which makes it worse. The fix is to normalize it. Signpost that these are routine questions you ask everyone, keep your tone matter-of-fact, and use plain clinical language.

A simple opener: "I am going to ask a few questions about sexual and urinary function. I ask everyone these because they are an important part of your health." Then move through erectile function (ability to achieve and maintain an erection), libido, ejaculatory function, and any pain. For fertility concerns, ask about duration of trying to conceive, prior pregnancies, and partner factors. Your composure gives the patient permission to be honest. Awkwardness is contagious, but so is professionalism.

Red flags to always screen for

Red flag	Concern it raises
Painless gross hematuria	Urothelial or kidney malignancy
Fever with flank pain or an obstructing stone	Obstructed, infected system (emergency)
Acute severe testicular pain in a young male	Testicular torsion (emergency)
New back pain with urinary retention or saddle numbness	Cauda equina or metastatic cord compression
Weight loss, bone pain, or anorexia with urologic symptoms	Advanced malignancy
Inability to pass urine with a painful, distended bladder	Acute urinary retention

Mapping history clues to likely diagnoses

Pattern recognition is most of urology. This table links the classic story to the usual suspect.

History clue	Likely diagnosis
Sudden colicky flank pain radiating to the groin, with hematuria	Ureteric (kidney) stone
Painless visible hematuria, often with clots, in a smoker	Bladder cancer until proven otherwise
Older man with weak stream, hesitancy, nocturia, incomplete emptying	Benign prostatic hyperplasia
Young woman with dysuria, frequency, urgency, and suprapubic pain	Uncomplicated cystitis (UTI)
Fever, rigors, flank pain, and dysuria	Acute pyelonephritis
Acute, severe, one-sided testicular pain with nausea, adolescent	Testicular torsion
Gradual, painless scrotal swelling that transilluminates	Hydrocele
Painless, firm lump felt within the testis	Testicular cancer until proven otherwise
Gradual scrotal ache and a "bag of worms" feeling, often left-sided	Varicocele
Perineal pain, fever, and painful voiding in a younger man	Prostatitis
Sudden inability to void with a tender, distended lower abdomen	Acute urinary retention

The GU Physical Exam, Done Properly

Do these exams with the same calm routine you would use for a heart or lung exam. Always have a chaperone present for genital and rectal exams, explain what you are about to do and why, obtain consent, and keep the patient covered except for the area being examined.

Abdominal and flank exam

Start with the abdomen. Inspect for distension (a full bladder can be visible in the suprapubic area) and prior surgical scars. Palpate for tenderness and masses. A distended, palpable, dull-to-percussion suprapubic mass suggests a full bladder from retention.

For the flank, check for **costovertebral angle (CVA) tenderness**: place one hand flat over the angle between the lowest rib and the spine and give it a firm thump with the ulnar side of your other fist. Sharp pain suggests renal or perinephric pathology such as pyelonephritis or an obstructing stone. Compare both sides.

Digital rectal examination (DRE), step by step

The DRE assesses the prostate and the anorectum. Approach it as routine.

1. Explain the exam, obtain consent, and ensure a chaperone is present.
2. Position the patient: lying on the left side with knees drawn toward the chest is standard, or bent forward over the examination couch.
3. Glove up and lubricate your index finger generously.
4. Inspect the perianal skin first for fissures, hemorrhoids, skin tags, or lesions.
5. Ask the patient to breathe and relax. Rest your fingertip against the anus and apply gentle, steady pressure to let the sphincter relax, then advance slowly.
6. Assess sphincter tone as you enter (relevant if a neurological cause is suspected).
7. Rotate to feel the prostate on the anterior (front) wall. Sweep across both lobes and the midline groove between them (the median sulcus).
8. Note size, consistency, symmetry, any nodules, and tenderness.
9. Withdraw and inspect the glove for blood or stool color, then help the patient clean up.

What a normal prostate feels like: smooth, firm but rubbery (like the tip of your nose or the thenar eminence), symmetric, with a palpable median sulcus and no nodules or tenderness.

PEARL: A normal DRE does not rule out prostate cancer, and an enlarged prostate on DRE does not reliably predict symptom severity. The DRE only reaches the peripheral zone, and BPH grows in the transition zone. Interpret it alongside the PSA and the patient's symptoms rather than in isolation.

DRE findings and what they mean

DRE finding	Likely meaning
Smooth, rubbery, symmetric, sulcus present	Normal prostate
Symmetrically enlarged, smooth, rubbery, sulcus possibly effaced	Benign prostatic hyperplasia
Hard or firm nodule, asymmetry, loss of the sulcus, fixed feel	Suspicious for prostate cancer
Boggy, warm, exquisitely tender gland	Acute prostatitis
Lax or absent sphincter tone	Possible neurological cause (screen for cauda equina)
Blood on the glove with no obvious hemorrhoid	Investigate for a rectal or upper GI source

WARNING: In suspected acute bacterial prostatitis the gland is exquisitely tender. Do a gentle DRE to make the diagnosis, but do not perform vigorous prostatic massage, because it can push bacteria into the bloodstream and precipitate bacteremia.

Scrotal examination, step by step

Examine the scrotum with the patient standing when possible (varicoceles are easier to feel upright), then repeat lying down. Warm your hands. Use both hands, gently rolling structures between thumb and fingers.

1. **Inspect** the scrotal skin, size, and symmetry. Look for swelling, redness, or a visible mass. A "bag of worms" appearance on standing suggests a varicocele.
2. **Palpate each testis** in turn. A normal testis is smooth, firm, ovoid, and mildly tender to squeeze. Feel systematically for any firm, painless intratesticular lump, which is cancer until proven otherwise.
3. **Find the epididymis**, a comma-shaped structure along the upper posterior surface of the testis. Tenderness and swelling here suggest epididymitis.
4. **Trace the spermatic cord** upward toward the inguinal region. Feel the smooth, cord-like vas deferens. Dilated, tortuous veins that feel like worms and increase with a Valsalva (bearing down) suggest a varicocele.
5. **Check for a hernia:** ask the patient to cough or bear down while you palpate at the external inguinal ring above the scrotum, feeling for a bulge or impulse.
6. **Transilluminate any swelling:** in a darkened room, press a bright light against the mass. A fluid-filled swelling such as a hydrocele glows red and transmits the light; a solid mass such as a tumor blocks the light and does not transilluminate.

A quick way to localize a scrotal mass: if you can get your fingers above the swelling (feel normal cord above it), the problem is scrotal; if you cannot get above it, suspect an inguinoscrotal hernia extending down from the abdomen.

PEARL: Transillumination is a cheap, powerful bedside test. Cystic fluid (hydrocele, some spermatoceles) transmits light and glows; solid tissue (tumor, most of a normal testis) does not. It does not replace an ultrasound, but it steers your differential immediately at the bedside.

Penile examination

With consent and a chaperone, inspect and palpate the penis. In an uncircumcised patient, retract the foreskin to inspect the glans, then return it to position afterward to avoid a paraphimosis. Note the position of the urethral meatus (it should be at the tip), any discharge, ulcers, warts, or masses. Palpate the shaft for the firm plaques of Peyronie's disease. Look for phimosis (a foreskin that will not retract) or balanitis (inflammation of the glans).

The focused neurological exam

You do not neuro-examine every urology patient. Reach for it when the history suggests a neurological cause of the bladder or sexual problem: new retention, saddle anesthesia, leg weakness, bowel changes, or known neurological disease.

When indicated, focus on the sacral roots that run the bladder and pelvic floor:

- **Perineal (saddle) sensation** in the S2 to S4 dermatomes.
- **Anal sphincter tone** and voluntary squeeze on DRE.
- **Bulbocavernosol reflex:** gently squeezing the glans (or tugging a urinary catheter) produces a reflex contraction of the anal sphincter, testing the S2 to S4 arc.
- **Lower limb power, reflexes, and sensation** if cord compression or cauda equina is a concern.

A new urinary retention with saddle numbness and reduced anal tone is a cauda equina red flag and needs urgent imaging and senior involvement, not just a catheter.

Key Points

- Stones lodge at the three ureteral narrowing points: the UPJ, the iliac vessel crossing, and the UVJ (the narrowest and most common).
- BPH grows in the transition zone around the urethra, while most prostate cancers arise in the peripheral zone that your finger reaches on DRE.
- Remember "Point and Shoot" for erection (parasympathetic) and ejaculation (sympathetic), and "Sympathetic Stores, Parasympathetic Pees" for the bladder.
- Sort LUTS into storage and voiding symptoms; voiding symptoms suggest obstruction, storage symptoms suggest irritation but can signal cancer.
- Painless gross hematuria is malignancy until proven otherwise, even in anticoagulated patients.
- On DRE, a normal prostate is smooth, rubbery, and symmetric; a hard nodule or asymmetry is suspicious for cancer, and a normal DRE does not exclude it.
- Avoid vigorous prostatic massage in suspected acute bacterial prostatitis because of bacteremia risk.
- Transillumination separates cystic scrotal swellings (hydrocele, glows) from solid ones (tumor, does not), and any firm intratesticular mass is cancer until proven otherwise.

PART 2

Approaching the Common Presentations

Chapter 3: Hematuria

Why This Matters

Blood in the urine is one of the most common reasons a patient lands in front of a urologist. The job is not to panic but to answer one question: is this a sign of cancer or another serious problem, or is it benign? Every case of unexplained hematuria deserves a deliberate answer, because bladder and kidney cancers often announce themselves this way and are far more treatable when caught early.

Definitions

There are two categories.

Gross hematuria is blood you can see: the urine looks pink, red, or the color of tea or cola. Even a tiny amount of blood discolors urine, so gross hematuria looks dramatic but does not always mean heavy blood loss.

Microscopic hematuria is blood you cannot see, found only under the microscope. The current AUA definition, in plain terms: three or more red blood cells per high-power field on a properly collected midstream urine sample, confirmed by looking at the sediment under the microscope. A dipstick that reads positive for blood is only a screen. It must be confirmed with actual microscopy, because dipsticks also turn positive from myoglobin, hemoglobin, and concentrated urine. A single confirmed sample meets the definition.

PEARL: A positive dipstick is not hematuria until microscopy confirms red cells. Red urine with no red cells on micro points you toward myoglobinuria, hemoglobinuria, foods (beets, rhubarb), or drugs (rifampin, phenazopyridine).

Transient vs Persistent

Microscopic hematuria can be a one-time blip. Common transient causes include vigorous exercise, recent sexual activity, menstrual contamination, recent catheter or instrument, and urinary tract infection. Re-test after the trigger resolves (treat the UTI, wait out the exercise or period). If it clears in a low-risk patient, no further workup is usually needed. Hematuria that persists on repeat testing needs a full evaluation.

Anticoagulation Does Not Excuse Hematuria

This is a frequent trap. Being on warfarin, a DOAC, aspirin, or clopidogrel at therapeutic levels does not by itself cause hematuria. What it does is unmask bleeding from a lesion that was already there. So a patient on blood thinners with hematuria gets the same workup as anyone else. Do not blame the anticoagulant and stop looking.

WARNING: Never attribute hematuria to anticoagulation and close the case. Anticoagulated patients have the same rate of underlying malignancy; therapeutic thinning reveals disease, it does not create it.

Glomerular vs Non-Glomerular

The first fork in the road is whether the blood comes from the kidney's filter (glomerular, a nephrology problem) or from the drainage system: collecting system, ureters, bladder, prostate, urethra (non-glomerular, a urology problem). Clues follow.

Feature	Glomerular (think nephrology)	Non-glomerular (think urology)
Urine color	Brown, tea, cola, smoky	Bright red or pink
Clots	Absent	May be present
RBC shape	Dysmorphic, acanthocytes	Normal (isomorphic)
Casts	RBC casts	None
Protein	Often significant proteinuria	Minimal or none
Company it keeps	Hypertension, edema, rising creatinine	Pain, LUTS, stone or mass history

Glomerular bleeding (proteinuria, red cell casts, dysmorphic cells, or rising creatinine) is referred to nephrology. The rest of this chapter is the urologic workup.

Who Is at Risk for Cancer

Risk factors sharpen your suspicion:

- Age (risk climbs after 40)
- Male sex
- Smoking (the single biggest modifiable risk)
- Occupational exposure to aromatic amines (dyes, rubber, leather, paints, chemicals)
- History of gross hematuria (higher yield than microscopic)
- Prior pelvic radiation or cyclophosphamide
- Chronic indwelling catheter or chronic bladder irritation
- Analgesic overuse, aristolochic acid, schistosomiasis (squamous cell bladder cancer)

Focused History and Exam

Ask about: visible versus microscopic, timing in the stream (initial suggests urethral, terminal suggests bladder neck or prostate, throughout suggests bladder or upper tract), clots (long, stringy clots suggest an upper tract source), pain (painless gross hematuria is cancer until proven otherwise), LUTS, recent infection or instrumentation, trauma, smoking and occupation, family history, and the risk factors above.

Exam: vitals, abdominal exam for a mass or palpable bladder, costovertebral angle tenderness, and in men a digital rectal exam of the prostate. In women, exclude a vaginal or menstrual source.

Workup

Start by confirming true hematuria on microscopy, a urine culture if infection is possible, and assessment of renal function and blood pressure to screen for a glomerular cause. Urine cytology is not routine but may be added in high-risk patients.

The urologic workup has two arms: look at the upper tracts with imaging, and look inside the bladder with a camera (cystoscopy). Who gets what depends on risk. The AUA framework sorts patients into low, intermediate, and high risk based on age, smoking history, number of red cells, and whether they have had gross hematuria.

Risk group	Rough picture	Workup
Low	Younger, minimal smoking, few red cells, first evaluation	Shared decision: repeat urinalysis in 6 months, or cystoscopy plus renal ultrasound
Intermediate	Middle-aged, moderate smoking, or more red cells	Cystoscopy plus renal ultrasound
High	Older, heavy smoking, many red cells, or any gross hematuria	Cystoscopy plus CT urography (multiphase CT)

In plain language: the more worried you are, the better your imaging needs to be. Low-risk microscopic hematuria can be watched or worked up modestly. Anyone with gross hematuria or high-risk features gets the full evaluation: a camera in the bladder plus a CT urogram that shows the kidneys and ureters with contrast. If CT contrast is contraindicated, MR urography or retrograde pyelography with non-contrast imaging is the fallback.

PEARL: Cystoscopy is essential in high-risk patients because bladder tumors, especially flat carcinoma in situ, are frequently invisible on any scan. Imaging looks at the kidneys and ureters; the camera looks at the bladder. You need both.

Initial Management and Disposition

Most hematuria is worked up as an outpatient. The emergency is gross hematuria heavy enough to form clots that plug the bladder, causing clot retention: the patient cannot void, the bladder is painfully distended, and blood keeps accumulating (see Chapter 6 for retention and Chapter 16 for emergency management).

At the student level, the moves for clot retention are:

1. Place a large-bore three-way catheter and manually irrigate to evacuate clots.
2. Start continuous bladder irrigation to keep the outflow clear.

3. Resuscitate with IV fluids, send a type and screen, and check hemoglobin and coagulation.
4. Correct any coagulopathy.
5. Call urology.

Call urology urgently for clot retention, hemodynamic instability, a dropping hemoglobin, or inability to pass a catheter. Otherwise, arrange outpatient cystoscopy and imaging, and make sure the patient actually completes the workup.

Key Points

- Confirm hematuria with microscopy; a positive dipstick alone is not enough (AUA: 3 or more RBC/hpf).
- Painless gross hematuria is a urologic malignancy until proven otherwise.
- Anticoagulation does not cause hematuria; it unmasks it, so the workup is unchanged.
- Sort glomerular (brown urine, casts, protein, dysmorphic cells, refer to nephrology) from non-glomerular (bright red, clots, urology).
- Risk-stratify: low-risk microscopic hematuria can be watched or worked up modestly; high-risk or any gross hematuria needs cystoscopy plus CT urography.
- Cystoscopy is non-negotiable in high-risk patients because bladder tumors hide from imaging.
- Clot retention is the emergency: large-bore three-way catheter, irrigation, resuscitate, call urology.

Chapter 4: Flank Pain and Renal Colic

Why This Matters

Renal colic from a kidney stone is one of the most severe pains in medicine, and it is common. But flank pain has dangerous impostors, and one stone scenario (a blocked, infected kidney) can kill within hours. Your job is to recognize the classic stone, rule out the mimics, and never miss infection behind an obstruction.

The Classic Presentation

A stone dropping into the ureter causes sudden, severe, colicky pain that waxes and wanes. The patient cannot get comfortable and writhes or paces, which contrasts with peritonitis, where patients lie perfectly still. Pain often starts in the flank and radiates as the stone travels:

- Upper ureter or kidney: flank and upper abdomen
- Mid ureter: lateral abdomen, can mimic appendicitis on the right
- Distal ureter near the bladder: groin, testicle or labia, plus urinary urgency and frequency

Nausea and vomiting are common. Hematuria (micro or gross) is usual. Fever is not part of an uncomplicated stone; if it is there, worry about infection.

Dangerous Mimics

Before you commit to "stone," clear the impostors.

Mimic	Red flags	How to tell it apart
Abdominal aortic aneurysm (leaking)	Age over 60, hypotension, syncope, pulsatile mass, tearing back pain	A first stone episode over 60 is an AAA until proven otherwise; image before anchoring
Pyelonephritis	Fever, chills, CVA tenderness, systemic illness	Pyuria, positive nitrites, cultures, imaging
Ectopic pregnancy	Reproductive-age woman, missed period, adnexal pain	A beta-hCG is mandatory in every woman of childbearing age
Appendicitis or biliary colic	RLQ or RUQ localization, migratory pain, Murphy sign	Exam and imaging
Musculoskeletal back pain	Positional, reproducible on palpation, no urinary symptoms	History and exam

WARNING: A patient over 60 with a "first kidney stone" may have a leaking aortic aneurysm. Do not accept renal colic as the diagnosis in an older patient until an AAA is excluded.

History and Exam

History: onset and character of pain, radiation, prior stones, family history, hydration and diet, medications, gout, inflammatory bowel disease, prior bariatric surgery, and recurrent UTIs. The single most important question set is about fever, rigors, and feeling systemically unwell, because that changes everything.

Exam: vitals (fever, tachycardia, hypotension), costovertebral angle tenderness, abdominal exam to exclude peritonitis and a pulsatile mass, and a genital exam in men to exclude testicular torsion, which can also refer pain.

Urinalysis

Get a urinalysis on everyone. Hematuria supports a stone, but its absence does not rule one out, especially with complete obstruction. Just as important, look for signs of infection (leukocytes, nitrites, leukocyte esterase) and send a culture. Urine pH gives hints: a high pH points toward urea-splitting organisms and struvite stones, a persistently low pH toward uric acid stones. Always add a beta-hCG in women of reproductive age.

Bloodwork: creatinine (renal function and contrast planning), CBC (white count if infection is suspected), and electrolytes.

Imaging

Non-contrast CT of the abdomen and pelvis (CT KUB) is the gold standard. It finds nearly every stone, gives the exact size and location, shows the degree of obstruction (hydronephrosis), and reveals alternative diagnoses. The main downside is radiation.

Ultrasound is preferred when radiation is the concern: pregnant patients and children first, and often young adults or for repeat imaging over time. Ultrasound reliably shows hydronephrosis and larger stones but misses small and mid-ureteral stones. A plain KUB x-ray is mostly for tracking a known radiopaque stone over time.

PEARL: In pregnancy, ultrasound is the first-line imaging for suspected stones. Reserve other modalities for when ultrasound is non-diagnostic and management truly depends on the answer.

Will It Pass? Size Matters

Spontaneous passage depends mostly on size and location (distal stones pass more easily than proximal ones).

Stone size	Likelihood of passing on its own
Under 5 mm	High (most will pass)
5 to 10 mm	Variable, roughly half, decreasing as size rises
Over 10 mm	Low; usually needs a procedure

Management at the Student Level

For an uncomplicated stone with controlled symptoms and no infection:

- **Analgesia:** NSAIDs are first line. They reduce ureteral spasm and inflammation and work as well as or better than opioids with less nausea. Use opioids as backup and add antiemetics. Avoid NSAIDs in renal impairment or if a procedure is planned soon.
- **Medical expulsive therapy (MET):** an alpha blocker (commonly tamsulosin) relaxes the lower ureter and helps distal stones pass, with the most benefit for stones in the 5 to 10 mm range. Give a limited trial of a few weeks.
- **Hydration and safety-netting:** encourage fluids, give a strainer to catch the stone for analysis, and counsel the patient to return immediately for fever, uncontrollable pain, or persistent vomiting.

The Cannot-Miss Emergency: The Obstructed, Infected Kidney

A stone that blocks the ureter with infection brewing behind it creates a closed, pus-filled system (an infected, obstructed kidney, sometimes called pyonephrosis). Antibiotics alone cannot reach it. It progresses to urosepsis and death quickly. The formula to remember:

Fever plus an obstructing stone equals call urology now.

Management is emergent decompression (a ureteral stent placed by urology, or a percutaneous nephrostomy tube placed by interventional radiology) alongside IV antibiotics and resuscitation. The stone itself is dealt with later; first you drain the system.

WARNING: Never treat a febrile patient with an obstructing stone using antibiotics alone. An infected, obstructed kidney is a surgical emergency that needs drainage the same day.

Disposition: When to Call Urology

Call urology urgently for:

- Fever or sepsis with an obstructing stone (the emergency above)
- Acute kidney injury, or obstruction of a solitary or transplanted kidney
- Bilateral obstruction
- Intractable pain or vomiting despite treatment
- A large stone unlikely to pass

Most patients with a small stone, controlled pain, normal renal function, and no infection go home with analgesia, MET, a strainer, and urology follow-up.

Key Points

- Classic renal colic: sudden, severe, colicky flank-to-groin pain in a patient who cannot lie still, with hematuria and no fever.
- Fever changes everything: fever plus an obstructing stone is a same-day surgical emergency needing decompression, not antibiotics alone.
- A first "stone" over age 60 may be a leaking AAA; get a beta-hCG in every reproductive-age woman.
- Non-contrast CT KUB is the gold standard; ultrasound is first-line in pregnancy and children.
- Stones under 5 mm usually pass; those over 10 mm usually need a procedure.
- NSAIDs are first-line analgesia; an alpha blocker (MET) helps distal stones pass.
- Discharge the uncomplicated stone with analgesia, a strainer, and clear return precautions.

Chapter 5: Lower Urinary Tract Symptoms (LUTS)

Why This Matters

LUTS are extremely common, especially in aging men, and patients often suffer quietly. Most LUTS are benign and treatable with simple measures, but the same symptoms can be the face of infection, cancer, neurologic disease, or retention. The skill is to relieve bother while spotting the few who need more.

Storage vs Voiding

Split symptoms into two buckets. This immediately organizes your thinking.

Storage (irritative)	Voiding (obstructive)
Urinary frequency	Weak or slow stream
Urgency	Hesitancy (trouble starting)
Nocturia (waking to void)	Intermittency (stop-start stream)
Urgency incontinence	Straining to void
	Sense of incomplete emptying
	Terminal and post-void dribbling

A useful third group is post-micturition symptoms: the dribble and the feeling of not being empty right after voiding.

Common Causes by Age and Sex

Group	Usual suspects
Older men	Benign prostatic hyperplasia (classic for voiding LUTS), overactive bladder, prostate cancer, nocturnal polyuria
Older women	Overactive bladder, stress incontinence, pelvic organ prolapse, vaginal atrophy
Any adult	UTI, bladder cancer (irritative symptoms with hematuria), neurologic disease (stroke, Parkinson, MS, cord lesions), diabetes, medications, bladder stones
Men, any age	Urethral stricture, prostatitis

Putting a Number on It: the IPSS

The International Prostate Symptom Score (IPSS) is a short questionnaire: seven questions about specific symptoms, each scored 0 to 5, adding to a total out of 35, plus one "bother" question about quality of life. In plain terms, it turns a vague complaint into a number so you can grade severity (mild, moderate, severe) and track whether treatment is working. It is a communication and follow-up tool, not a diagnosis.

History and Exam

History: sort the symptoms into storage versus voiding, gauge how much they bother the patient, and ask about fluid, caffeine, and alcohol intake, evening drinking (nocturia), and medications (diuretics, anticholinergics, decongestants, opioids). Screen for red flags: hematuria, dysuria or recurrent infection, pain, neurologic symptoms, prior retention, and diabetes.

Exam: abdominal exam for a palpable bladder, external genitalia (phimosis, meatal stenosis), and a focused neuro exam (perineal sensation, tone) when a neurologic cause is possible. The digital rectal exam (DRE) is central in men: it estimates prostate size and screens for the hard nodule, asymmetry, or induration that suggests cancer, and it checks rectal tone. In women, a pelvic exam looks for prolapse and atrophy.

PEARL: Irritative LUTS plus hematuria is bladder cancer until proven otherwise. Do not label new storage symptoms as "just overactive bladder" without checking the urine and considering cystoscopy.

Basic Workup

- **Urinalysis:** mandatory in everyone, to catch infection, hematuria, and glucosuria.
- **Post-void residual (PVR):** a quick bladder scan after voiding shows how well the bladder empties; a high residual signals incomplete emptying or retention and changes management.
- **Bladder diary (frequency-volume chart):** cheap and powerful; separates true polyuria and nocturnal polyuria from a small-capacity bladder.
- **PSA:** consider in men when the result would change management, the man has a life expectancy over 10 years and wants to pursue it (shared decision-making), or when gland size will guide drug choice. It is not automatic (see Chapter 7).
- Check renal function if you suspect retention or obstruction.

Management Ladder

Escalate from simple to complex.

1. **Behavioral and lifestyle (first for everyone):** reduce evening fluids, caffeine, and alcohol; timed and double voiding; bladder training for urgency; treat constipation; review and adjust offending medications; weight loss; pelvic floor exercises.
2. **Alpha blockers** (tamsulosin, alfuzosin, silodosin, and others): relax smooth muscle at the bladder neck and prostate, easing voiding symptoms within days to weeks. Watch for dizziness and orthostatic

drops (more with older agents), retrograde ejaculation, and intraoperative floppy iris syndrome (ask before cataract surgery).

3. **5-alpha-reductase inhibitors (5-ARIs)** (finasteride, dutasteride): shrink the prostate over months. They help men with genuinely enlarged glands and reduce the risk of progression and retention. They work slowly and can lower libido and cause sexual side effects. Remember they cut PSA by about half, so interpret PSA accordingly.
4. **For storage or overactive bladder:** anticholinergics (oxybutynin, solifenacin, tolterodine) or the beta-3 agonist mirabegron. Cautions matter: anticholinergics cause dry mouth, constipation, and cognitive impairment (avoid in frail elderly and dementia), and can tip a man with outflow obstruction into retention, so check the PVR first. Mirabegron can raise blood pressure.
5. **Combination therapy**, then referral for procedures (see Chapter 15 on BPH) when medical therapy fails.

WARNING: Before starting an anticholinergic for storage symptoms, check the post-void residual. Adding it to a poorly emptying bladder (often an older man with obstruction) can precipitate acute urinary retention.

Red Flags Needing Referral

- Hematuria (micro or gross)
- Recurrent or unusual UTIs
- Urinary retention or a high post-void residual
- Abnormal DRE (nodule) or elevated PSA
- Suspected neurologic cause
- Renal impairment or hydronephrosis
- Bladder stones
- Failure of appropriate medical therapy
- Significant symptoms in a young patient

Key Points

- Split LUTS into storage versus voiding symptoms; it organizes the differential immediately.
- BPH is the classic cause in older men, but always consider infection, cancer, neurologic disease, and medications.
- The IPSS quantifies severity and bother and tracks response; it is not a diagnosis.
- Urinalysis is mandatory; a post-void residual and bladder diary add a lot for little cost.
- Manage in a ladder: behavioral first, then alpha blockers, 5-ARIs for enlarged glands, and OAB drugs for storage symptoms.
- Check the PVR before prescribing an anticholinergic to avoid precipitating retention.
- Refer for hematuria, retention, abnormal DRE or PSA, neurologic signs, or failed therapy.

Chapter 6: Acute Urinary Retention

Why This Matters

Acute urinary retention (AUR) is the sudden, painful inability to pass urine. It is one of the most common urologic emergencies, and the immediate fix (draining the bladder) is satisfying and dramatic. The deeper skill is finding the cause, decompressing safely, and spotting the patient whose retention is the tip of a bigger problem.

Causes Framework

Group causes into four buckets. Most male AUR is obstructive from BPH.

Category	Examples
Obstructive	BPH (most common), prostate cancer, urethral stricture, phimosis or paraphimosis, clot retention, bladder stone, pelvic mass, severe constipation
Neurologic	Cauda equina syndrome, spinal cord compression, MS, Parkinson, stroke, diabetic neuropathy, post-spinal anesthesia
Pharmacologic	See the drug table below
Infectious or postoperative	Prostatitis, UTI, and the classic post-op combination of anesthesia, opioids, pain, and bladder over-distension

Culprit Medications

Drug class	Examples	Why it causes retention
Anticholinergics and antimuscarinics	oxybutynin, tolterodine	Weaken the detrusor contraction
First-generation antihistamines	diphenhydramine	Anticholinergic effect
Decongestants (sympathomimetics)	pseudoephedrine, phenylephrine	Tighten the bladder neck
Opioids	morphine	Reduce bladder tone and the urge to void
Tricyclic antidepressants	amitriptyline	Anticholinergic effect
Antipsychotics	many agents	Anticholinergic effect

Presentation and Exam

The typical patient cannot void, has suprapubic pain, and is restless. On exam the bladder is palpable and tender, and dull to percussion above the pubic bone. Do a DRE (prostate size, and check for a fecal

impaction and rectal tone) and a focused neuro exam of the perineum and legs. Inspect the genitals for phimosis, meatal stenosis, or blood at the meatus.

Contrast this with **chronic retention**, which builds slowly, is often painless despite huge volumes, and can present with overflow incontinence (constant dribbling).

WARNING: Retention with saddle anesthesia, bilateral leg weakness, or new back pain is cauda equina syndrome until proven otherwise. This is a neurosurgical emergency: urgent MRI, do not just place a catheter and discharge.

Confirming It: the Bladder Scan

A portable bladder scanner confirms and measures the retained volume. Large volumes (often well over 400 to 500 mL, and sometimes over a liter) confirm retention and distinguish it from anuria, where the bladder is empty because no urine is being made. This distinction matters: catheterizing an anuric patient achieves nothing and delays the real diagnosis.

Immediate Management

The treatment is prompt decompression with a urethral catheter. Measure and record the drained volume. Send urinalysis and culture. Then treat the cause: stop offending drugs, relieve constipation, treat infection.

If the catheter will not pass (a common problem with strictures or a large prostate), do not force it. Chapter 23 covers the difficult catheter: a coudé-tip catheter often navigates an enlarged prostate, and urology can place a suprapubic catheter when the urethral route fails.

Decompression Myths, Explained Simply

Two old teachings deserve correction.

"Drain slowly or you will cause bleeding and shock." The classic worry was that fast, complete emptying causes bladder mucosal bleeding (decompression hematuria) and a drop in blood pressure, prompting the ritual of clamping the catheter after every 500 mL. The evidence says rapid, complete drainage is safe. Any bleeding is usually minor and self-limited, and clamping does not reliably prevent problems. Empty the bladder fully.

Post-obstructive diuresis (POD) is the real phenomenon behind some of that fear. After you relieve a chronically obstructed bladder, the kidneys can pour out large volumes of urine. This happens because retained salt, water, and urea need to be offloaded and the kidney's concentrating ability is temporarily impaired. Most POD is *physiologic*: the body appropriately dumping the fluid it was holding, and it settles on its own. A minority is *pathologic* and can cause dehydration and electrolyte disturbances.

Monitoring for Post-Obstructive Diuresis

Watch for POD in patients who drained a large volume (roughly over 1,000 to 1,500 mL), had chronic retention, or show fluid overload or a raised creatinine. Practical monitoring:

- Measure urine output hourly. POD is generally flagged at more than 200 mL/hr for several hours (or more than 3 L/day).
- Track vitals, weight, and orthostatic blood pressure.
- Check electrolytes and renal function.
- Replace fluids judiciously, matching only a portion of the output (over-replacing keeps the diuresis going). Most physiologic POD resolves as the patient returns to normal fluid balance.

Trial Without Catheter and Alpha Blockers

After the acute episode, the catheter is usually left in for a few days while things settle, then removed to see if the patient can void: a **trial without catheter (TWOC)**. Starting an **alpha blocker** (such as tamsulosin) before the trial improves the chance of voiding successfully. If the TWOC fails, options are re-catheterization with a longer trial, intermittent self-catheterization, or surgery such as TURP (see Chapter 15). Always treat reversible causes first.

When Retention Needs Admission

Most simple AUR is managed by catheterizing and discharging with a leg bag and follow-up for a TWOC. Admit for:

- Significant post-obstructive diuresis
- Acute kidney injury or bilateral hydronephrosis from obstruction
- Urosepsis or infection behind the obstruction
- Inability to catheterize (needs urology, likely a suprapubic catheter)
- Clot retention or an obstructing malignancy
- Any suspicion of cauda equina or spinal cord compression

PEARL: The volume that drains at catheterization is a vital sign. A very large residual predicts post-obstructive diuresis and often a slower recovery, and it should lower your threshold to admit and monitor.

Key Points

- AUR is the painful, sudden inability to void; the immediate treatment is prompt catheter decompression.
- Sort causes into obstructive (BPH most common), neurologic, pharmacologic, and infectious or postoperative.
- Confirm with a bladder scan and distinguish true retention from anuria before catheterizing.
- Drain the bladder completely; the slow-decompression and mandatory-clamping teaching is a myth.

- Post-obstructive diuresis is mostly physiologic; monitor output, electrolytes, and volume status after large drained volumes and replace only part of the losses.
- An alpha blocker before a trial without catheter improves the chance of voiding.
- Admit for POD, AKI, sepsis, failed catheterization, or any hint of cauda equina.

Chapter 7: The Elevated PSA

Why This Matters

A raised PSA is one of the most common referrals in urology and one of the most misunderstood tests in medicine. Handled well, it catches aggressive prostate cancer early. Handled poorly, it triggers anxiety, unnecessary biopsies, and overtreatment of cancers that would never have caused harm. Students are asked about PSA constantly, so understand what it does and does not mean.

What PSA Is and Is Not

PSA (prostate-specific antigen) is a protein made by prostate cells that liquefies semen. The key word is **prostate**-specific, not **cancer**-specific. Anything that disrupts the prostate can raise it. There is no magic cutoff that means cancer: the historical threshold of 4 ng/mL is a convention, and risk rises continuously with the number. A normal PSA does not guarantee no cancer, and a high PSA usually is not cancer.

Benign Causes of Elevation

Cause	General effect on PSA	Practical note
BPH	Mild rise, tracks with gland size	The most common reason overall
Prostatitis or UTI	Can spike substantially	Treat, then repeat in about 4 to 6 weeks
Urinary retention	Transient rise	
Catheter, cystoscopy, biopsy	Rise (large after biopsy)	Wait about 6 weeks after biopsy to recheck
Ejaculation	Small, transient rise	Abstain 48 hours before the test
Vigorous cycling	Small, transient rise	
Digital rectal exam	Negligible	Not a real-world confounder
5-ARI (finasteride, dutasteride)	Lowers PSA by about half	Double the measured value to interpret

PEARL: A man on finasteride or dutasteride has a PSA roughly halved by the drug. To interpret it, double the number. A PSA that fails to fall, or that rises, on a 5-ARI is a warning sign.

Repeating and Confirming

One elevated PSA is not a diagnosis. Before acting, exclude and treat reversible causes (recent ejaculation, instrumentation, infection), wait the appropriate interval, and **repeat the test**. A urinary infection in particular can send PSA soaring; recheck several weeks after it clears. Persistent elevation on a properly timed repeat is what prompts further evaluation.

Interpreting in Context

PSA is read against the patient, not a single line in the sand.

- **Age:** PSA drifts up with age and gland size, so the same value means different things in a 45-year-old and a 75-year-old.
- **Velocity:** a value climbing steadily over serial tests is more concerning than a stable one.
- **Free versus total PSA:** PSA circulates bound and free, and cancer tends to lower the *free* fraction. In the gray zone (around 4 to 10), a low percent-free PSA raises concern and a higher percent-free is reassuring.
- **PSA density:** PSA divided by prostate volume; a high density (a lot of PSA from a small gland) is more worrying than the same PSA from a big gland.

Screening: A Shared Decision

Screening asymptomatic men for prostate cancer is a *choice*, not a reflex. Guidelines (AUA and CUA among them) frame it as shared decision-making: the clinician lays out the trade-offs and the informed patient decides. In plain terms:

- **Benefits:** finding significant cancer early can reduce the chance of it spreading or causing death.
- **Harms:** false alarms, the discomfort and small risks of biopsy, and, most importantly, overdiagnosis: finding slow cancers that would never have hurt the man but that get treated anyway, with real side effects.

In general, screening is discussed with average-risk men roughly between the ages of 50 and 70 who have a life expectancy over 10 to 15 years, and started earlier (around 40 to 45) for higher-risk men: those with a strong family history, men of African ancestry, and carriers of certain genetic mutations. It is generally not pursued in men with a short life expectancy, where the harms outweigh any benefit. Testing is typically repeated every couple of years, individualized to the result. (Follow your local guideline for exact ages and intervals.)

WARNING: Do not order a PSA reflexively. Ordering it without a conversation commits the patient to a cascade (repeat tests, MRI, biopsy) they never agreed to. Screening is a shared decision, especially in older men and those with limited life expectancy.

What Happens Next

When a confirmed elevation warrants it, the patient is referred to urology, and the modern pathway looks like this:

1. **Multiparametric MRI of the prostate** is increasingly done before any biopsy. It highlights suspicious areas (reported on the PI-RADS scale) and helps decide whether a biopsy is needed and where to aim.
2. **Prostate biopsy** samples the gland, now often combining MRI-targeted cores with a systematic set, done through the rectum or the perineum.

3. **Pathology** grades any cancer using the Gleason score and Grade Group, which drive risk and treatment decisions (see Chapter 17).

Additional blood or urine biomarkers (such as percent-free PSA and others) are sometimes used to refine who truly needs a biopsy.

Questions Students Get Asked

- *"Does a high PSA mean I have cancer?"* No. Most elevations are from benign enlargement or infection. It is a flag to look further, not a diagnosis.
- *"Do I need a biopsy right now?"* Usually not immediately; the value is confirmed first, and an MRI often comes before any biopsy.
- *"Will the rectal exam raise my PSA?"* Not meaningfully.
- *"I take finasteride, is my low PSA reassuring?"* Only after accounting for the drug, which halves the number.
- *"Can I have cancer with a normal PSA?"* Yes, which is why symptoms and the DRE still matter.

Key Points

- PSA is prostate-specific, not cancer-specific; many benign conditions raise it.
- There is no clean cutoff; risk rises continuously, and both false reassurance and false alarms are common.
- Confirm an elevated PSA with a repeat test after excluding infection, recent ejaculation, and instrumentation.
- 5-ARIs (finasteride, dutasteride) cut PSA by about half; double the value to interpret it.
- Free/total PSA and PSA density help in the gray zone (about 4 to 10).
- Screening is a shared decision weighing early detection against overdiagnosis, generally for men roughly 50 to 70 with over 10 years of life expectancy, and earlier for high-risk men.
- The modern pathway is confirm, then MRI, then targeted biopsy, with Gleason and Grade Group guiding treatment (see Chapter 17).

Chapter 8: The Acute Scrotum

Why It Matters

The acute scrotum means sudden scrotal pain, swelling, or both. Your only job at the bedside is to answer one question fast: is this testicular torsion? Torsion is a surgical emergency where the testis twists on its cord and loses its blood supply. Every hour of delay costs viable testicular tissue. Miss it, and a young patient loses a testicle. This is one of the true "clock is running" diagnoses in urology, so treat every acute scrotum as torsion until you have proven otherwise.

The Core Triad

Three conditions account for most cases. Learn to separate them on history and exam.

Feature	Testicular torsion	Epididymitis	Torsed appendix testis
Typical age	Bimodal: neonates and 12 to 18	Sexually active adults or older men	Prepubertal, roughly 7 to 12
Onset	Sudden, severe, can wake from sleep	Gradual over hours to days	Gradual, subacute
Where it hurts	Whole testis, may radiate to groin or abdomen	Posterior epididymis first, then diffuse	Upper pole of the testis
Nausea or vomiting	Common	Uncommon	Uncommon
Testis position	High-riding, may lie horizontal	Normal	Normal
Cremasteric reflex	Usually absent	Usually present	Usually present
Prehn sign	Not reliable	Relief on elevation (unreliable)	Not reliable
Fever or dysuria	No	Sometimes	No
Signature clue	None; a clinical emergency	Pyuria on urinalysis sometimes	Blue dot sign

Two exam signs deserve caution. The **cremasteric reflex** (stroke the inner thigh and the testis rises) is often absent in torsion, but its presence does not rule torsion out. **Prehn sign** (pain relief when you lift the scrotum, said to suggest epididymitis) is unreliable and should never be used to exclude torsion.

TWIST Score, Conceptually

The TWIST score is a bedside tool that turns your exam into a risk estimate. It combines five findings: testicular swelling, a hard testis, an absent cremasteric reflex, nausea or vomiting, and a high-riding testis. A hard, swollen testis carries the most weight. Low scores suggest low risk (candidates for ultrasound), while high scores suggest high risk (straight to the operating room). You do not need to memorize exact points as a student. The concept is what matters: structured exam findings can push you toward the OR or toward imaging.

Torsion Is a Clinical Diagnosis

Here is the single most important teaching point of this chapter.

WARNING: If the history and exam suggest torsion, the patient goes to the operating room. Do not delay surgical exploration to obtain an ultrasound. Imaging that holds up the OR can cost the testicle.

Doppler ultrasound can show absent or reduced blood flow and is useful when the picture is genuinely unclear. But ultrasound has false negatives, depends on the operator, and takes time you may not have. When suspicion is high, call urology and prepare for surgery, and let imaging happen only if it does not slow you down.

The 6-Hour Window, Honestly

Testicular salvage falls with time. The numbers below are approximate and vary between studies, but the trend is what you carry forward.

Time from onset to detorsion	Approximate salvage rate
Within 6 hours	Around 90% or higher
6 to 12 hours	Around 50%
12 to 24 hours	Around 20% or less
Beyond 24 hours	Salvage is uncommon

The honest caveat: these are estimates. Some testes torse only partially and survive longer; some torse fully and die inside six hours. The point is urgency, not a guarantee at any hour.

Manual Detorsion (Temporizing Only)

If surgery will be delayed, a clinician may attempt manual detorsion to buy time. Most testes twist inward (medially), so you untwist outward, like *opening a book*: rotate the front of the testis toward the patient's thigh on that side. Success shows up as sudden pain relief and the testis dropping to a lower, more normal position. Some testes need more than one full turn, and a minority twist the other way, so use pain and position as your guide.

PEARL: Manual detorsion is a bridge, not a cure. Even a perfectly detorsed testis still needs surgical exploration and fixation of both testes, because the anatomy that allowed torsion (the bell-clapper deformity) is usually present on both sides.

Epididymitis: Workup and Treatment by Age

Epididymitis is inflammation of the epididymis, usually infectious. The likely organism, and therefore the treatment, depends on age and sexual history.

- **Younger or sexually active men:** think sexually transmitted organisms (chlamydia and gonorrhea). Workup includes urinalysis, urine culture, and nucleic acid amplification testing for STIs. Treatment covers both organisms, typically a single intramuscular dose of ceftriaxone plus a course of doxycycline, per local guidelines. Treat partners and counsel on STI prevention.
- **Older men or those with low STI risk:** think enteric organisms such as *E. coli*, often linked to outflow obstruction or recent instrumentation. Treat with a fluoroquinolone or other agent per local guidelines and urine culture results.

Supportive care matters in both groups: rest, scrotal elevation, ice, and analgesia. Symptoms improve over days, but swelling can take weeks to fully settle.

Torsed Appendix Testis and the Blue Dot Sign

The appendix testis is a small embryologic remnant on the upper pole. It can twist and infarct, most often in prepubertal boys. The pain is real but the testis itself is fine. The classic finding is the **blue dot sign**: a small tender bluish nodule visible through the scrotal skin at the upper pole. Management is conservative with rest and analgesia, and the pain resolves on its own over days. The value of recognizing it is avoiding an unnecessary operation, but you only get to skip surgery once torsion of the testis is confidently excluded.

Other Causes to Keep in Mind

- **Inguinal hernia:** bowel descending into the scrotum can cause swelling and pain. An incarcerated or strangulated hernia is its own surgical emergency.
- **Fournier gangrene:** a necrotizing infection of the perineum and scrotum. Look for pain out of proportion, systemic toxicity, crepitus, or skin necrosis. This is life-threatening and covered in Chapter 16.
- **Trauma:** blunt injury can cause hematoma or testicular rupture; ultrasound and urology involvement guide management.

When to Call Urology

- Any suspicion of torsion. Call early, before imaging, and do not sit on it.
- Suspected testicular rupture or significant scrotal trauma.
- Suspected Fournier gangrene (also involve general surgery and start resuscitation).

- Epididymitis with abscess, failure to improve, or systemic illness.

Key Points

- Treat every acute scrotum as torsion until proven otherwise; the diagnosis is clinical and the clock is running.
- Do not delay the operating room for an ultrasound when suspicion is high.
- Absent cremasteric reflex supports torsion, but its presence does not exclude it; Prehn sign is unreliable.
- Salvage is best within 6 hours and falls steeply after; use this to convey urgency, not certainty.
- Manual detorsion ("open the book," rotate outward) is a temporizing measure; surgery and bilateral fixation still follow.
- Tailor epididymitis treatment to age and STI risk, and always culture and cover appropriately.
- The blue dot sign points to a torsed appendix testis, but only after torsion of the testis is excluded.

Chapter 9: Scrotal Masses and Swellings

Why It Matters

A patient hands you a scrotal lump and a lot of anxiety. Your task is to sort benign fluid collections and veins from the one diagnosis you cannot miss: testicular cancer. Most scrotal masses are benign, but a solid mass inside the testis is cancer until proven otherwise. Getting the sorting right, and choosing the right test, is what this chapter trains.

The Three Sorting Questions

Every scrotal mass can be triaged with three questions.

- 1. **Is it painful or painless?** Acute pain points you back to Chapter 8. Painless masses raise concern for tumor, or suggest a benign chronic lesion.
- 2. **Is it inside the testis or outside it (extratesticular)?** Palpate carefully: can you get above the mass and feel a normal testis separate from it? Intratesticular is the worry.
- 3. **Does it transilluminate?** Shine a light through the scrotum in a dark room. Fluid-filled masses light up; solid masses and blood do not.

Master Table of Scrotal Masses

Mass	What it is	Location	Transilluminates	Pain	Key clue
Hydrocele	Fluid between layers of the tunica vaginalis	Around the testis	Yes	Usually painless	Smooth, cystic, cannot palpate testis behind fluid
Varicocele	Dilated veins of the pampiniform plexus	Above and behind the testis	No	Dull ache, worse when standing	"Bag of worms," usually left-sided, decreases when lying down
Spermatocele	Cyst containing sperm	Head of the epididymis	Yes	Painless	Separate from and above the testis
Epididymal cyst	Simple fluid cyst	Epididymis	Yes	Painless	Small, smooth, separate from testis
Inguinal hernia	Bowel or fat through the inguinal canal	Extends from groin into scrotum	No	Variable	Cannot get above it; may reduce or have bowel sounds
Testicular tumor	Solid neoplasm	Inside the testis	No	Usually painless	Firm, hard, does not transilluminate

PEARL: The single most useful maneuver is deciding whether you can "get above" the mass. A mass you cannot get above is likely an inguinal hernia extending from the abdomen. A mass clearly separate from and above the testis is usually a benign epididymal lesion. A mass that is part of the testis itself is the one that needs urgent attention.

Hydrocele

A hydrocele is a collection of serous fluid within the tunica vaginalis, the sac that surrounds the testis. In infants it reflects a patent processus vaginalis (the connection to the abdomen has not closed) and many resolve on their own in the first year or two. In adults it may be idiopathic or reactive to infection, trauma, or a tumor.

Management is guided by symptoms. Small, comfortable hydroceles need no treatment. Large or uncomfortable ones can be repaired surgically. The important caveat is that a hydrocele can hide a testicular tumor from your fingers, so if you cannot adequately examine the testis, get an ultrasound before you reassure the patient.

Varicocele

A varicocele is a dilated pampiniform plexus, essentially varicose veins of the scrotum. It feels like a "bag of worms" above the testis, is often more prominent on standing and with a Valsalva maneuver, and typically decompresses when the patient lies down.

Why the left side? The left testicular vein drains at a right angle into the left renal vein, a longer and higher-pressure path than the right, which drains directly into the inferior vena cava. That anatomy makes left-sided varicoceles far more common.

Varicoceles are graded by exam:

Grade	Finding
Subclinical	Seen only on imaging, not felt
Grade 1	Palpable only during Valsalva
Grade 2	Palpable at rest without Valsalva
Grade 3	Visible through the scrotal skin

When it matters:

- **Fertility:** varicoceles are the most common correctable cause of male infertility and can be associated with reduced sperm quality (see Chapter 12).
- **The adolescent:** a varicocele with reduced growth of the affected testis (testicular size discrepancy) may warrant referral, since it can affect future fertility.

WARNING: A varicocele that is new, right-sided, or does not go away when the patient lies down is a red flag. It can signal a retroperitoneal mass or renal tumor obstructing venous drainage. These patients need prompt imaging of the abdomen, not reassurance.

The Rule You Cannot Break

Any firm, solid mass within the testis is testicular cancer until proven otherwise. It does not need to be painful; most testicular tumors are painless. Do not wait, do not treat as infection for weeks, and do not attempt a scrotal biopsy. The workup and management of testicular cancer are covered in Chapter 20, but the reflex you build here is simple: solid intratesticular mass equals urgent urology referral.

The Go-To Test

Scrotal ultrasound is the imaging test of choice for nearly every scrotal mass. It reliably distinguishes cystic from solid, intratesticular from extratesticular, and adds Doppler flow information. It is fast, painless, and involves no radiation. When you are unsure what you are feeling, the answer is almost always an ultrasound.

What Needs Referral, and How Fast

Finding	Urgency
Solid intratesticular mass	Urgent referral; do not delay
New, right-sided, or non-reducing varicocele	Prompt referral plus abdominal imaging
Varicocele with fertility concern or adolescent testicular growth lag	Routine urology referral
Symptomatic or enlarging hydrocele	Routine referral
Simple spermatocele or epididymal cyst, asymptomatic	Reassure; refer only if symptomatic
Hernia extending into scrotum	Surgical referral (urgent if incarcerated)

Key Points

- Sort every scrotal mass with three questions: painful or painless, intra- or extratesticular, and does it transilluminate.
- Fluid collections (hydrocele, spermatocele, epididymal cyst) transilluminate; solid masses and blood do not.
- Any firm intratesticular mass is cancer until proven otherwise and warrants urgent referral (Chapter 20).
- Varicoceles are usually left-sided due to venous anatomy and matter most for fertility and the growing adolescent.
- A new, right-sided, or non-reducing varicocele demands abdominal imaging to exclude a retroperitoneal or renal mass.

- Scrotal ultrasound is the go-to test whenever the exam is uncertain or a hydrocele blocks examination of the testis.
- Never biopsy a testicular mass through the scrotum.

Chapter 10: Urinary Incontinence

Why It Matters

Incontinence is the involuntary leakage of urine. It is common, underreported, and quietly disabling: it drives social isolation, skin breakdown, falls, and nursing-home placement in the elderly. Patients rarely volunteer it, so you have to ask. The good news is that most types improve with conservative measures you can start yourself.

The Four Types

Type	What leaks and why	Classic trigger	Typical patient
Stress	Weak outlet; abdominal pressure exceeds urethral resistance	Cough, sneeze, laugh, lift, exercise	Women after childbirth; men after prostatectomy
Urge	Overactive detrusor muscle contracts involuntarily	Sudden urgency, "key in the door," running water	Older adults; overactive bladder
Overflow	Bladder overfills and dribbles; obstruction or weak bladder	Constant dribble, incomplete emptying	Men with BPH; diabetic or neurogenic bladder
Functional	Bladder works, but the person cannot reach the toilet in time	Immobility, cognitive impairment	Frail elderly, dementia, severe arthritis

Mixed incontinence combines features, most often stress plus urge, and is very common in older women. Treat the most bothersome component first.

Focused History

Pin down the pattern, because the type dictates the treatment.

- **When does it leak?** With coughing and effort (stress) or with sudden urgency (urge)?
- **The cough test question:** ask directly whether leakage happens on coughing, sneezing, or lifting. This is the verbal version of the exam maneuver below.
- **Pad questions:** how many pads per day, how saturated, and are they for security or genuinely soaked? Pad count is a practical measure of severity and of response to treatment.
- **Volume and stream:** small frequent leaks with poor stream and incomplete emptying suggest overflow.
- **Fluid and bladder irritants:** caffeine, alcohol, and total fluid intake.
- **Function and mobility:** can the patient get to the toilet, undress, and transfer in time?
- **Medications:** diuretics, alpha-blockers, sedatives, and others that worsen leakage.

Exam Essentials

- **Both sexes:** abdominal exam for a palpable bladder, and a focused neurologic screen (lower-limb strength, sensation, perineal sensation, anal tone) since the bladder is neurologically controlled.
- **Women:** a pelvic exam for prolapse and atrophy, and a **cough stress test** (observe for leakage when the patient coughs with a comfortably full bladder).
- **Men:** a digital rectal exam to assess the prostate and sphincter tone, especially relevant after prostate surgery.

Basic Workup

- **Urinalysis:** first-line for everyone. It screens for infection, blood, and glucose.
- **Post-void residual (PVR):** measure the urine left after voiding, by bladder scan or catheter. A high PVR points to overflow or incomplete emptying and changes management.
- **Bladder diary:** a few days of recorded voids, leaks, and intake is cheap and revealing.
- **Urodynamics** exists to characterize complex or refractory cases in detail, but at student level you only need to know it is a specialist test that measures bladder pressures and flow. It is not part of the routine first workup.

WARNING: Do not start treatment for "overactive bladder" until you have checked a PVR and urinalysis. Giving a bladder-relaxing anticholinergic to a man in overflow retention can precipitate complete urinary retention.

Management Ladders

Start conservative for every type. Lifestyle and pelvic floor work are effective, cheap, and low-risk.

All types, first steps: weight loss, reduce caffeine and alcohol, treat constipation, adjust fluid timing, review medications, and refer for **pelvic floor physiotherapy** (Kegel exercises). Timed and prompted voiding helps urge and functional types.

Stress Incontinence

1. Pelvic floor physiotherapy, ideally supervised.
2. Address contributing factors (weight, chronic cough, atrophy).
3. Procedures when conservative measures fail: a midurethral sling in women, and in men a male sling or an artificial urinary sphincter for more severe leakage. These are introduced conceptually; the specialist selects the option.

Urge Incontinence (Overactive Bladder)

1. Bladder training and pelvic floor therapy.
2. Medications: - **Anticholinergics** (for example oxybutynin, tolterodine, solifenacin) relax the detrusor. They carry meaningful cautions in the elderly: dry mouth, constipation, blurred vision, confusion, and a recognized association between long-term anticholinergic burden and cognitive decline. Avoid in narrow-angle glaucoma and in significant retention. - **Beta-3 agonists** (for example

mirabegron) relax the bladder with less cognitive risk and are often preferred in older patients; monitor blood pressure.

3. Advanced options for refractory cases (botulinum toxin injection into the bladder, nerve stimulation) exist and are specialist-directed.

PEARL: In frail older adults, reach for a beta-3 agonist over an anticholinergic when you can. The cumulative anticholinergic load from bladder drugs stacked on other medications is a preventable driver of falls and confusion.

Overflow Incontinence

1. Relieve the obstruction or support the failing bladder: treat BPH (Chapter 15), and use catheterization (intermittent or indwelling) when emptying is inadequate.
2. Stop medications that worsen retention.

Functional Incontinence

1. Modify the environment and routine: accessible toileting, scheduled voids, mobility aids, and caregiver support. The bladder is fine; the barrier is getting to it.

Post-Prostatectomy Incontinence

Removing the prostate for cancer can weaken the urinary sphincter and cause stress-type leakage. Most men improve over the first year with pelvic floor rehabilitation started early. Persistent, bothersome leakage after that window is treated surgically with a male sling or an artificial urinary sphincter. Counseling patients that improvement takes months prevents a lot of distress.

Red Flags

Escalate rather than reassure when you see:

- New neurologic symptoms (leg weakness, saddle anesthesia, bowel changes) that could signal cord compression or cauda equina.
- Hematuria, which requires a hematuria workup (Chapter 3).
- Recurrent urinary tract infections.
- Significant pain, or a high post-void residual suggesting retention.

Key Points

- Classify incontinence as stress, urge, overflow, or functional (often mixed); the type drives the treatment.
- Always check urinalysis and a post-void residual before treating; do not miss overflow.
- Start with lifestyle changes and pelvic floor physiotherapy for essentially every patient.
- For urge incontinence, prefer beta-3 agonists over anticholinergics in the elderly to limit cognitive and fall risk.

- Overflow incontinence is treated by relieving obstruction or emptying the bladder, not by bladder relaxants.
- Post-prostatectomy stress leakage usually improves within a year with early pelvic floor rehab.
- Neurologic symptoms, hematuria, and recurrent UTIs are red flags that change the workup.

Chapter 11: Erectile Dysfunction and Men's Health Basics

Why It Matters

Erectile dysfunction (ED) is the consistent inability to achieve or maintain an erection sufficient for satisfactory sexual activity. Beyond its effect on quality of life and relationships, ED is a window into a man's vascular and hormonal health. The penis runs on small arteries, and those arteries often show trouble before the coronaries do.

ED as a Cardiovascular Sentinel

The erectile arteries are narrow, so endothelial disease shows up there early. ED frequently precedes a cardiac event by a few years, which makes it a genuine warning sign, not just a bedroom problem.

PEARL: Treat new organic ED as a cardiovascular screening opportunity. Check blood pressure, lipids, and glucose, and ask about smoking and exercise. You may catch undiagnosed diabetes or cardiovascular risk in a man who came in only to talk about erections.

Organic vs Psychogenic

Sorting these two shapes your workup and reassurance.

Feature	Organic	Psychogenic
Onset	Gradual, over months to years	Sudden, tied to an event or partner
Nocturnal and morning erections	Reduced or absent	Preserved
Situational variation	Consistent across situations	Varies (fine with masturbation, not with partner)
Associated conditions	Diabetes, vascular disease, hypogonadism	Anxiety, depression, relationship stress
Age	More common with age	Any age, often younger men

Many men have a mixed picture: an organic problem plus the performance anxiety it breeds.

Focused History

- Confirm what the patient means: erectile difficulty is distinct from low libido, premature ejaculation, or failure to ejaculate.
- Timeline and situational pattern (see the table).

- Presence of morning or nocturnal erections.
- Cardiovascular risk factors, diabetes, medications (antihypertensives, antidepressants, and others can contribute), smoking, alcohol, and recreational drugs.
- Mood, stress, and relationship factors.
- **Validated questionnaires:** tools such as standardized ED questionnaires give a reproducible baseline severity score and let you track response to treatment. You do not need to memorize them, only to know they exist and are used to quantify and follow ED objectively.

Exam and Labs

Examine the genitalia (penile plaques, testicular size and consistency), check secondary sexual characteristics, and screen the peripheral vascular and neurologic systems. A blood pressure and body habitus assessment costs nothing.

Laboratory testing is targeted: fasting glucose or HbA1c, lipids, and testosterone. Testing testosterone correctly matters, because a single low or borderline value is easy to misread.

Testosterone testing done right:

1. Draw it in the **morning**, ideally before 10 or 11 a.m., when levels peak.
2. **Repeat** a low value on a separate morning before diagnosing deficiency; levels fluctuate and a single low reading is not enough.
3. Interpret with **LH and FSH** to localize the problem: low testosterone with high LH and FSH points to the testis (primary), while low testosterone with low or inappropriately normal LH and FSH points to the pituitary or hypothalamus (secondary). Consider prolactin when the picture is secondary.

Management Ladder

Escalate from least to most invasive, and never skip the foundation.

First: Lifestyle and Cardiovascular Risk

Weight loss, exercise, smoking cessation, reduced alcohol, and control of diabetes, blood pressure, and lipids can improve erections and, more importantly, the patient's overall health. Review medications that may be contributing.

Second: PDE5 Inhibitors

Phosphodiesterase type 5 inhibitors (sildenafil, tadalafil, vardenafil, avanafil) are first-line drug therapy.

- **How they work:** sexual stimulation releases nitric oxide in the penis, which raises cyclic GMP and relaxes the smooth muscle so blood fills the corpora. PDE5 breaks down cyclic GMP. Blocking PDE5 lets cyclic GMP accumulate, so erections are firmer and last longer. They enhance the natural response; they do not create an erection without arousal.
- **Counseling points:** they require sexual stimulation to work; some need to be taken a set time before activity and can be blunted by a heavy or fatty meal (agent-dependent); tadalafil is longer-acting and has a daily option. Common side effects are headache, flushing, nasal congestion, dyspepsia, and visual

changes. Warn about the rare but urgent complication of priapism (an erection lasting more than four hours needs emergency care).

WARNING: PDE5 inhibitors are absolutely contraindicated with nitrates (for example nitroglycerin). The combination can cause profound, dangerous hypotension. Always ask about nitrate use before prescribing, and use caution with alpha-blockers.

Third and Beyond (Conceptually)

When oral therapy fails or is contraindicated, specialist options include intracavernosal injections, intraurethral suppositories, vacuum erection devices, and surgically implanted penile prostheses. Students should know these exist and are effective, not the technical detail.

When to Refer

- Failure of, or contraindication to, oral therapy.
- Young men with ED (higher yield for a specific, treatable cause).
- Suspected hormonal cause needing workup and treatment.
- Peyronie's disease, penile deformity, or priapism.

Testosterone Deficiency Basics

Testosterone deficiency (hypogonadism) is diagnosed only when **both** a low biochemical level (correctly measured, as above) **and** consistent symptoms are present. Numbers without symptoms, or symptoms without confirmed low levels, do not qualify.

- **Symptoms:** low libido, fatigue, reduced morning erections, depressed mood, loss of muscle mass, and reduced body hair.
- **Treatment principles:** replacement (gels, injections, and other forms) is offered to symptomatic men with confirmed deficiency after shared decision-making.
- **Safety monitoring:** follow symptoms and testosterone levels, and monitor hematocrit (testosterone can cause polycythemia) and prostate health with PSA and digital rectal exam.

WARNING: Testosterone therapy suppresses sperm production and can cause infertility. Never give testosterone to a man who wants to conceive. It is also avoided in active prostate or breast cancer and in men with a very high hematocrit or untreated severe sleep apnea. Refer men who are hypogonadal and want fertility rather than starting testosterone.

Peyronie's Disease

Peyronie's disease is a fibrous plaque in the tunica albuginea of the penis that causes curvature, sometimes pain, and occasionally difficulty with penetration. It has two phases: an **acute** phase with pain and evolving curvature, then a **stable** phase where the deformity plateaus. Natural history is reassuring in part: pain often fades over time even when the curve persists. It is associated with other fibrotic conditions

such as Dupuytren contracture. Refer for evaluation, and understand that treatment (traction, intralesional injection, or surgery) is generally reserved for the stable phase when the deformity interferes with function.

Key Points

- ED is a cardiovascular sentinel; new organic ED warrants screening for diabetes and vascular risk.
- Distinguish organic (gradual, no morning erections) from psychogenic (sudden, situational, preserved nocturnal erections).
- Test testosterone in the morning, repeat a low value, and interpret it alongside LH and FSH.
- Start with lifestyle and risk-factor control, then PDE5 inhibitors as first-line drug therapy.
- PDE5 inhibitors require arousal and are contraindicated with nitrates.
- Diagnose testosterone deficiency only with both low confirmed levels and consistent symptoms; monitor hematocrit and prostate on therapy.
- Never give testosterone to a man seeking fertility.
- Peyronie's disease often stabilizes; treat deformity in the stable phase when it impairs function.

Chapter 12: Male Infertility Primer

Why It Matters

Infertility is the failure to conceive after 12 months of regular, unprotected intercourse. It affects roughly one in six or seven couples, and a male factor is involved in about half of them, either alone or alongside a female factor. That single statistic drives the key clinical habit: evaluate both partners in parallel. The man's workup is fast, inexpensive, and can uncover serious underlying disease, so he should never be an afterthought.

PEARL: Evaluate the man and the woman at the same time. Waiting to "see if it's her first" wastes months and misses the roughly half of cases with a male contribution. A semen analysis is cheaper and faster than most of the female workup.

Spermatogenesis, Briefly

Sperm are made in the seminiferous tubules of the testis, a process that takes around two to three months from start to mature sperm. It is controlled by the hypothalamic-pituitary-gonadal axis: the hypothalamus releases GnRH, the pituitary releases LH and FSH, LH drives testosterone production by Leydig cells, and FSH supports Sertoli cells that nurse developing sperm. Because the full cycle takes months, any insult (illness, heat, drugs) shows up in a semen analysis weeks later, and any improvement also takes months to appear.

History

The history often points straight at the cause.

- **Developmental:** timing of puberty, undescended testis (cryptorchidism), testicular trauma or torsion, prior hernia or scrotal surgery, and childhood mumps orchitis.
- **Sexual and reproductive:** frequency and timing of intercourse, prior pregnancies fathered, and any difficulty with erection or ejaculation.
- **Exposures:** heat (hot tubs, occupational), radiation, chemotherapy, environmental toxins, tobacco, alcohol, and anabolic steroid use.
- **Medications:** several drugs impair sperm production. One deserves emphasis below.
- **Medical history:** systemic illness, prior infections, and respiratory disease (which can hint at conditions affecting sperm transport).

WARNING: Exogenous testosterone acts as a male contraceptive. It suppresses the pituitary, shuts down the signals that drive sperm production, and can cause azoospermia. Always ask a man with infertility whether he is using testosterone or "low T" therapy, or anabolic steroids from the gym. Stopping it is often the first step, and recovery can take many months.

Exam

Examine the genitalia deliberately:

- **Testis size and consistency:** small, soft testes suggest impaired sperm production, since most of testicular volume is sperm-producing tissue.
- **Varicocele:** palpate with the patient standing and with Valsalva; it is the most common correctable cause of male infertility (Chapter 9).
- **Vas deferens:** confirm the vas is present on both sides; an absent vas is a specific and important finding.
- **Epididymis and penis:** check for fullness suggesting obstruction and for anatomic abnormalities that affect deposition of semen.

Semen Analysis

The semen analysis is the cornerstone test. Technique affects the result, so counsel the patient carefully.

- **Collection:** by masturbation into a sterile container after a short abstinence period (commonly a couple of days), delivered to the lab promptly and kept near body temperature.
- **Confirm abnormalities:** because values fluctuate, an abnormal result is repeated on a second sample separated by several weeks before drawing conclusions.
- **Parameters reported:** semen volume, sperm concentration, total sperm count, motility (especially progressive motility), morphology (shape), pH, and the presence of white blood cells. The WHO 6th edition (2021) lower reference limits are the 5th centile of a fertile population, not a line between fertile and infertile: volume 1.4 mL, concentration 16 million/mL, total sperm number 39 million per ejaculate, total motility 42 percent, progressive motility 30 percent, vitality 54 percent, and normal morphology 4 percent. Labs may still quote the 2010 edition (volume 1.5 mL, concentration 15 million/mL, progressive motility 32 percent), so check which edition the report uses.

A helpful vocabulary set: *oligospermia* means low sperm count, *asthenospermia* means poor motility, *teratospermia* means abnormal morphology, and *azoospermia* means no sperm in the ejaculate.

Obstructive vs Non-Obstructive Azoospermia

Azoospermia (no sperm in the semen) splits into two mechanisms, and telling them apart directs everything after.

Feature	Obstructive	Non-obstructive
Problem	Sperm are made but cannot get out	Sperm are not being made adequately
Testis size	Usually normal	Often small
FSH	Usually normal	Often elevated
Examples	Prior vasectomy, absent vas deferens, ejaculatory duct or epididymal obstruction	Testicular failure, Klinefelter syndrome, Y-chromosome microdeletion, prior chemotherapy or radiation
Outlook for sperm retrieval	Good	Variable, but sperm may still be retrievable from the testis

A congenitally absent vas deferens has a specific association with cystic fibrosis gene mutations, which matters for genetic counseling of the couple.

Initial Hormonal Workup

Hormones localize the problem along the same axis you learned for spermatogenesis.

- **FSH and LH:** high levels with low testosterone indicate primary testicular failure; low or inappropriately normal levels with low testosterone indicate a pituitary or hypothalamic cause (which can be treatable).
- **Total testosterone:** measured in the morning, as in Chapter 11.
- **Prolactin and other tests:** added when the pattern suggests a central cause.

Genetic testing (karyotype and Y-chromosome microdeletion analysis) is considered when sperm counts are very low or absent, to identify conditions like Klinefelter syndrome and to inform counseling.

What Urologists Can Offer

Referral opens several doors:

- **Varicocele repair (varicocelelectomy):** can improve sperm parameters in appropriately selected men with a clinical varicocele and abnormal semen analysis.
- **Correcting obstruction:** microsurgical reconstruction, including reversal of a prior vasectomy.
- **Sperm retrieval:** techniques to recover sperm directly from the epididymis or testis, useful in obstruction and in many cases of non-obstructive azoospermia.
- **Hormonal therapy:** for men with a treatable central (secondary) cause, medications can restart the axis and sperm production.
- **Partnership with assisted reproductive technology (ART):** the urologist works alongside the fertility team, whose tools include intrauterine insemination, in vitro fertilization, and intracytoplasmic sperm injection (ICSI), where a single sperm is injected into an egg. Even very low sperm numbers can achieve pregnancy through these routes.

Lifestyle Counseling That Actually Helps

Evidence is stronger for some measures than others. Focus on what moves the needle:

- **Stop anabolic steroids and exogenous testosterone.** This is often the highest-yield change.
- **Quit smoking** and reduce alcohol.
- **Lose excess weight** and treat metabolic disease.
- **Reduce scrotal heat** exposure where practical.
- **Review and adjust** medications that impair fertility, in partnership with the prescriber.
- Set expectations: because a full sperm cycle takes months, improvements in the semen analysis appear only after several weeks to months of change.

Key Points

- Infertility is failure to conceive after 12 months; a male factor is involved in roughly half of couples, so evaluate both partners together.
- Spermatogenesis takes two to three months, so both insults and improvements show up in the semen analysis weeks to months later.
- Always ask about exogenous testosterone and anabolic steroids; they suppress sperm production and act as contraception.
- The semen analysis is the cornerstone test; confirm abnormal results on a repeat sample, and read the numbers against the WHO 6th edition lower reference limits (concentration 16 million/mL, progressive motility 30 percent, morphology 4 percent).
- Separate azoospermia into obstructive (normal testis size and FSH) and non-obstructive (small testes, high FSH); the distinction guides treatment.
- Interpret FSH, LH, and morning testosterone together to localize the cause, and consider genetic testing when counts are very low.
- Urologists offer varicocele repair, obstruction correction, sperm retrieval, and ART partnership; ICSI can achieve pregnancy even with very few sperm.
- The best-supported lifestyle steps are stopping steroids and testosterone, quitting smoking, and weight loss.

PART 3

The Core Conditions

Chapter 13: Kidney Stones

What It Is and Why You Will See It

A kidney stone (urolithiasis, or nephrolithiasis when in the kidney) is a solid crystal aggregate that forms in the urinary tract when the urine becomes supersaturated with stone-forming salts. Stones are one of the most common reasons a patient lands on the urology service, and renal colic is one of the most memorable presentations you will see in the emergency department. If you understand stones well, you will look sharp on this rotation, because the topic comes up constantly on rounds, in clinic, and in the OR.

Epidemiology and Recurrence (Stated Honestly)

Stones are common. Roughly 1 in 10 people will form a stone at some point in life, and the incidence has been rising. They are more frequent in men, though the gap has narrowed, and peak in adults between about 30 and 60 years of age. Risk climbs with hot climates, low fluid intake, obesity, diabetes, and a family history.

The honest and clinically important point: stones recur. Without any preventive effort, roughly half of stone formers will make another stone within 5 to 10 years. This is why prevention is not an afterthought. It is a core part of management.

Stone Types and What Drives Them

Most stones are calcium-based. The rest are a small but high-yield set worth memorizing, because each points to a specific underlying driver.

Stone type	Approx. frequency	Plain film appearance	Key associations
Calcium oxalate	Most common (majority)	Radiopaque	Low urine volume, hypercalciuria, hyperoxaluria, low citrate; enteric hyperoxaluria (bowel malabsorption, bariatric surgery)
Calcium phosphate	Common	Radiopaque	High urine pH, distal (type 1) renal tubular acidosis, primary hyperparathyroidism
Uric acid	Less common	Radiolucent on X-ray (visible on CT)	Acidic urine (low pH), gout, high purine (meat) intake, metabolic syndrome, tumor lysis
Struvite (magnesium ammonium phosphate)	Less common	Radiopaque	Urease-producing infection (Proteus, Klebsiella), alkaline urine, staghorn shape, more common in women
Cystine	Uncommon	Faintly radiopaque (ground-glass)	Cystinuria (inherited transport defect), presents young, recurrent

PEARL: Uric acid stones are radiolucent on plain X-ray but visible on CT. They are also the one stone type you can sometimes dissolve medically by alkalinizing the urine, so identifying them changes management.

Presentation (Recap)

Classic renal colic is sudden, severe, colicky flank pain that may radiate to the groin, testicle, or labia as the stone moves down the ureter. The patient cannot get comfortable and writhes (unlike peritonitis, where patients lie still). Nausea and vomiting are common, and microscopic or gross hematuria is frequent. Fever is a red flag that suggests infection behind an obstruction. See Chapter 4 for the full flank pain workup.

Diagnosis

Non-contrast CT of the abdomen and pelvis (CT KUB) is the imaging test of choice. It is fast, does not need contrast, detects nearly all stones (including radiolucent uric acid stones), gives the size and location, and shows secondary signs of obstruction such as hydronephrosis and perinephric stranding.

Ultrasound is the go-to when you want to avoid radiation, specifically in **pregnancy** and in **children**. It reliably shows hydronephrosis and larger stones, though it can miss small or mid-ureteral stones.

Plain X-ray (KUB) is not sensitive enough to diagnose stones on its own but is useful for tracking a known radiopaque stone over time.

Always send a urinalysis (looking for blood and signs of infection) and basic bloodwork (renal function, and in the acute setting a white cell count if infection is a concern).

Acute Management

In the acute setting your priorities are pain control, ruling out an emergency, and deciding whether the stone can pass on its own.

- **Analgesia:** NSAIDs are first-line and often work better than opioids for renal colic (they reduce ureteral wall edema and spasm). Add opioids if needed. Use NSAIDs cautiously with renal impairment.
- **Antiemetics** for nausea and vomiting.
- **Medical expulsive therapy (MET):** an alpha-blocker (commonly tamsulosin) can help small distal ureteral stones pass by relaxing ureteral smooth muscle. The benefit is most convincing for larger distal stones (roughly 5 to 10 mm).
- **Screen for the emergency:** fever, signs of sepsis, a solitary or transplant kidney, bilateral obstruction, or acute kidney injury all change the plan. An infected, obstructed kidney is a true emergency (see Chapter 16).

Elective Management and the Size-and-Location Framework

Once the emergency is excluded, the question is: will this stone pass, or does it need to come out? Two factors drive the decision in plain language: **how big** and **where** it is.

- **Small stones (under about 5 mm):** most pass spontaneously. Treat the pain, offer MET, and let it pass with follow-up.
- **Medium stones (about 5 to 10 mm):** passage is less certain. A trial of passage with MET is reasonable, but many will need intervention.
- **Large stones (over about 10 mm):** unlikely to pass. Plan a procedure.

Location matters too. Stones lower in the ureter (closer to the bladder) pass more readily than proximal ones. The choice of procedure depends on stone size, location, composition, and patient factors.

Modality	How it works	Typical stone it suits
Observation with MET	Natural passage, assisted by an alpha-blocker	Small stones, especially distal ureteral
Shockwave lithotripsy (SWL)	External shock waves fragment the stone non-invasively	Smaller kidney or proximal ureteral stones; avoided in pregnancy and bleeding disorders
Ureteroscopy (URS) with laser	Scope passed up the ureter, stone lasered and/or basketed	Ureteral stones at most levels; high stone-free rates
Percutaneous nephrolithotomy (PCNL)	Tract made through the flank into the kidney to remove stone	Large kidney stones (over about 2 cm) and staghorn calculi

PEARL: PCNL is the workhorse for large renal and staghorn stones. SWL is the least invasive but has lower clearance for big or hard stones. Ureteroscopy has become the versatile default for most ureteral stones.

The Infected, Obstructed Stone

This deserves its own flag. A stone that both obstructs the kidney and sits behind an infection creates pus under pressure, which can drive rapid septic deterioration. The treatment is not stone removal first. It is **urgent decompression** (a ureteral stent or a percutaneous nephrostomy tube) plus antibiotics and resuscitation. The definitive stone surgery is deferred until the infection has cleared. This is covered in Chapter 16.

Metabolic Workup: Who Gets One and What It Includes

Not every first-time stone former needs an exhaustive workup, but everyone deserves a **basic evaluation**: serum electrolytes, calcium, creatinine, and urate, a urinalysis, and, when possible, **stone composition analysis** (send the stone to the lab if the patient catches it).

An **extended metabolic workup** is reserved for higher-risk patients:

- Recurrent stone formers

- A solitary functioning kidney
- Children
- Strong family history or systemic conditions
- Nephrocalcinosis or bilateral stones

The extended workup centers on one or two **24-hour urine collections** measuring volume, calcium, oxalate, citrate, uric acid, sodium, pH, and creatinine. If serum calcium is high, check PTH to look for primary hyperparathyroidism.

Prevention That Actually Works

The single most effective and universal intervention is fluid.

1. **Fluid:** aim for enough intake to produce more than 2 to 2.5 litres of urine per day (often around 2.5 to 3 litres of intake). This dilutes stone-forming salts.
2. **Reduce dietary sodium:** high salt drives more calcium into the urine.
3. **Moderate animal protein:** excess raises uric acid and calcium and lowers citrate.
4. **Keep calcium intake normal, do NOT restrict it.** This is a classic teaching point. Low dietary calcium lets more oxalate get absorbed from the gut and can paradoxically increase calcium oxalate stone risk. Normal dietary calcium binds oxalate in the gut.
5. **Potassium citrate:** raises urinary citrate (a natural stone inhibitor) and alkalinizes urine; useful for calcium stones with low citrate and for uric acid stones.
6. **Thiazide diuretics:** reduce urinary calcium in patients with hypercalciuria.
7. **Allopurinol:** lowers uric acid production for uric acid stones or calcium stones driven by high urinary urate.

WARNING: Do not counsel a calcium stone former to cut out dietary calcium. It is intuitive but wrong, and it can make things worse. The target is normal calcium intake with reduced sodium and moderated protein.

Struvite and Staghorn Stones: The Special Case

Struvite stones are **infection stones**. They form when urease-producing bacteria (classically *Proteus*, also *Klebsiella* and others) split urea, alkalinize the urine, and precipitate magnesium ammonium phosphate. They grow fast, fill the collecting system in a branching **staghorn** shape, and act as a permanent reservoir for infection.

The rules are different here. Antibiotics alone will not cure them, and leaving fragments behind guarantees recurrence and ongoing infection. The goal is **complete stone removal**, usually by PCNL (sometimes combined approaches for large staghorns), alongside treatment of the infection. Untreated staghorn stones threaten the kidney itself.

Key Points

- Stones are common (about 1 in 10 lifetime risk) and recur in roughly half of patients within 5 to 10 years without prevention.
- Calcium oxalate is the most common stone. Uric acid stones are radiolucent on X-ray but visible on CT and may be dissolved with urinary alkalinization.
- Non-contrast CT KUB is the diagnostic test of choice. Use ultrasound in pregnancy and children.
- Acute care: NSAIDs first for pain, antiemetics, MET for small distal stones, and always exclude the infected obstructed kidney.
- Size and location drive the plan: small distal stones often pass; large or staghorn stones need PCNL; ureteroscopy handles most ureteral stones.
- An infected, obstructed kidney is an emergency requiring urgent decompression, not stone removal first.
- Prevention that works: high fluid intake, less sodium and animal protein, and normal (not restricted) calcium, with citrate, thiazides, or allopurinol targeted to the metabolic abnormality.

Chapter 14: Urinary Tract Infections and Pyelonephritis

What It Is and Why You Will See It

Urinary tract infections are everywhere, from the clinic to the ward to the ICU. As a student, your value here is not memorizing every antibiotic. It is knowing the definitions that change management, interpreting a urinalysis sensibly, and above all knowing **who not to treat**. Overtreatment of urine is one of the most common errors in medicine, and if you get this right you will stand out.

Definitions That Matter

Cystitis vs pyelonephritis:

- **Cystitis** is a bladder infection: dysuria, frequency, urgency, suprapubic discomfort, sometimes cloudy or bloody urine, and importantly no fever or flank pain.
- **Pyelonephritis** is a kidney infection: fever, chills, flank pain, costovertebral angle tenderness, nausea, and systemic illness, often with or without lower tract symptoms.

Uncomplicated vs complicated:

- **Uncomplicated** UTI occurs in a healthy, non-pregnant woman with a normal urinary tract.
- **Complicated** UTI involves any factor that raises the risk of treatment failure: male sex, pregnancy, a catheter, obstruction, stones, immunosuppression, poorly controlled diabetes, anatomic or functional abnormalities, recent instrumentation, or healthcare association. As a rule of thumb, treat **all male UTIs and all UTIs in pregnancy as complicated**.

Asymptomatic bacteriuria (ASB): a positive urine culture in a patient with **no urinary symptoms**. This is the biggest teaching point of the chapter.

WARNING: Do not treat asymptomatic bacteriuria. Treating it does not help the patient, it breeds resistance, and it causes harm such as *C. difficile* infection. The only routine exceptions are pregnancy and before a urologic procedure expected to cause mucosal bleeding. Pyuria alone (white cells in the urine) is not a reason to treat.

Typical Organisms

E. coli causes the large majority of uncomplicated UTIs. The rest of the common cast:

Organism	Notable feature
<i>Escherichia coli</i>	Most common in essentially all categories
<i>Klebsiella</i>	Common; more prominent in complicated/healthcare settings
<i>Proteus mirabilis</i>	Urease producer, alkaline urine, associated with struvite stones
<i>Staphylococcus saprophyticus</i>	Young, sexually active women
<i>Enterococcus</i>	Complicated UTI, catheters, elderly
<i>Pseudomonas aeruginosa</i>	Catheters, instrumentation, complicated UTI

Diagnosis

Urinalysis is your bedside tool:

- **Leukocyte esterase:** a marker of pyuria (white cells).
- **Nitrites:** produced when Enterobacteriaceae (like *E. coli*) reduce nitrate. A positive nitrite is fairly specific for a UTI, but a negative does not exclude one, because organisms such as *Enterococcus* and *Staph saprophyticus* do not make nitrites.
- **Pyuria** (white cells on microscopy) and **bacteriuria** support the diagnosis.

Sterile pyuria (white cells but no growth on standard culture) should make you think of sexually transmitted urethritis (chlamydia, gonorrhea), tuberculosis, or a stone, among others.

Urine culture: not needed for a straightforward uncomplicated cystitis, which is treated empirically. Send a culture for pyelonephritis, complicated UTI, pregnancy, recurrent infection, treatment failure, male patients, and anyone systemically unwell.

Uncomplicated Cystitis Treatment

The principle is a **short course** of a narrow, urine-concentrated antibiotic, guided by local resistance patterns. Common first-line agents (per local guidelines):

- **Nitrofurantoin** for a short course. It works well in the bladder but does not reach kidney tissue, so it is not used for pyelonephritis, and it is avoided in significant renal impairment.
- **Trimethoprim-sulfamethoxazole** for a short course, when local resistance is low.
- **Fosfomycin** as a single dose.

Fluoroquinolones should generally be spared for uncomplicated cystitis given their side-effect profile and the need to preserve them.

Pyelonephritis: Outpatient vs Inpatient

Many patients with uncomplicated pyelonephritis can be managed as outpatients if they are stable and can keep fluids down. Admit for the following:

Manage as outpatient	Admit for inpatient/IV therapy
Hemodynamically stable	Sepsis or hemodynamic instability
Tolerating oral intake	Vomiting, cannot tolerate oral
Not pregnant	Pregnancy
No obstruction suspected	Suspected obstruction or complication
Reliable follow-up	Immunocompromise, failed outpatient therapy

Outpatient pyelonephritis is treated with an appropriate oral agent that reaches kidney tissue (per local guidelines) for a duration set by the agent chosen. If a patient is not improving within 48 to 72 hours, image to look for obstruction or abscess.

Complicated UTI Framework

For complicated UTI, three things change: always culture, treat longer, and **fix the underlying problem**.

- **Catheter:** remove it if it is not needed; replace a chronically indwelling catheter before treating.
- **Stone or obstruction:** relieve the obstruction (an obstructed infected system is an emergency).
- **Male UTI:** consider prostate involvement. Bacterial prostatitis needs a longer course with an antibiotic that penetrates the prostate.

Recurrent UTI in Women

Recurrent UTI is often defined as two or more infections in 6 months or three or more in a year. The two watchwords are **restraint** in workup and a **tiered** approach to prevention.

Most women with recurrent uncomplicated UTI do **not** need cystoscopy or upper tract imaging. Reserve investigation for red flags: gross hematuria, suspected obstruction, unusual organisms, or failure to respond.

Prevention options, roughly from least to most aggressive:

- **Behavioral:** good hydration and voiding after intercourse (modest evidence, low harm).
- **Vaginal estrogen** in postmenopausal women: restores the protective vaginal flora and lowers recurrence. A high-yield concept.
- **Antibiotic prophylaxis:** either continuous low-dose or a single postcoital dose when infections are clearly linked to intercourse.
- **Non-antibiotic adjuncts:** methenamine, and options such as cranberry or D-mannose (weaker or emerging evidence).

Catheter-Associated UTI (CAUTI)

The catheter is the single biggest risk factor for hospital-acquired UTI. Principles:

- The best prevention is not placing a catheter, and removing it as soon as possible.
- Do not culture or treat a catheterized patient who has no symptoms. Colonization is expected.
- Diagnose CAUTI only with genuine symptoms or systemic signs, and consider replacing a long-standing catheter before treating.

PEARL: Cloudy or malodorous urine in a catheterized patient is not, by itself, an infection. Chasing it with antibiotics is a classic overtreatment trap.

When to Image in UTI

Imaging is not routine for uncomplicated infections. Order it when:

- The patient is not responding within 48 to 72 hours.
- You suspect obstruction, abscess, or another complication.
- There is recurrent pyelonephritis, urosepsis, or a male with pyelonephritis.

CT is the main modality; ultrasound is a quick way to screen for hydronephrosis and obstruction.

Urosepsis

Urosepsis is sepsis arising from the urinary tract, frequently from an obstructed, infected system. Recognize it by the vital signs and mental status: fever or hypothermia, tachycardia, hypotension, tachypnea, and confusion. Act fast with cultures, prompt antibiotics, fluid resuscitation, and, crucially, **source control**, which usually means decompressing an obstructed kidney. This links directly to Chapter 16.

Key Points

- Do not treat asymptomatic bacteriuria except in pregnancy and before urologic procedures with expected mucosal bleeding. This is the highest-yield teaching point in the chapter.
- Cystitis is a bladder infection without fever; pyelonephritis adds fever, flank pain, and systemic illness.
- Treat all male UTIs and all UTIs in pregnancy as complicated.
- *E. coli* is the dominant organism. A positive nitrite is specific but a negative nitrite does not rule out infection.
- Uncomplicated cystitis gets a short empiric course without a culture; pyelonephritis and complicated UTIs get cultures and longer therapy.
- In complicated UTI, always fix the underlying problem (catheter, stone, obstruction).
- For recurrent UTI in women, limit the workup and consider vaginal estrogen in postmenopausal patients before reaching for chronic antibiotics.
- Image when a UTI fails to improve or when you suspect obstruction, abscess, or urosepsis.

Chapter 15: Benign Prostatic Hyperplasia

What It Is and Why You Will See It

Benign prostatic hyperplasia (BPH) is non-cancerous overgrowth of the prostate that can obstruct urine flow and produce bothersome lower urinary tract symptoms (LUTS). It is extraordinarily common in aging men, so you will meet it in nearly every urology clinic. Your job as a student is to understand the symptom evaluation and the logical ladder of treatments, from lifestyle to pills to surgery.

Pathophysiology, Kept Simple

The prostate has zones. BPH arises in the **transition zone**, the part that surrounds the urethra, so even modest growth there can squeeze the channel. Prostate growth is androgen-dependent, driven by dihydrotestosterone (DHT), which is made from testosterone by the enzyme 5-alpha-reductase.

Obstruction has two components, and this framework explains the drugs:

- **Static obstruction:** the physical bulk of the enlarged gland pressing on the urethra.
- **Dynamic obstruction:** smooth muscle tone at the bladder neck and prostate, controlled by alpha-1 adrenergic receptors.

A quick vocabulary note: LUTS are the symptoms, split into **voiding** symptoms (weak stream, hesitancy, intermittency, straining, incomplete emptying) and **storage** symptoms (frequency, urgency, nocturia). BPH is one cause of LUTS, not the only one.

Natural History

BPH tends to be progressive. Over years the gland grows, symptoms and flow can worsen, and the risks of acute urinary retention and eventually needing surgery rise, particularly in men with larger glands and higher PSA values. That said, many men remain stable for a long time, which is why watchful waiting is legitimate for mild, non-bothersome symptoms.

Evaluation

A focused workup answers two questions: how bad are the symptoms, and are there any red flags?

- **Symptom score:** the International Prostate Symptom Score (IPSS) quantifies severity (mild, moderate, severe) and includes a quality-of-life question. It is useful for tracking response.
- **Digital rectal exam (DRE):** estimates size and, importantly, screens for nodules or hardness suggesting cancer.
- **Urinalysis:** to exclude infection and detect hematuria.
- **PSA:** correlates with prostate volume and helps gauge progression risk; discuss cancer screening implications with the patient.
- **Post-void residual (PVR):** how much urine is left after voiding.

- **Uroflowmetry:** measures the strength of the stream.

Cystoscopy is not routine. Use it before surgery, or when there is hematuria or suspected stricture.

Urodynamics is reserved for unclear cases, suspected neurogenic bladder, or when findings do not add up (for example, a young man or discordant tests).

The Management Ladder

Match the intensity of treatment to the severity of symptoms and the patient's bother.

1. Watchful waiting. For mild or non-bothersome symptoms. Reassure, educate, and reassess periodically.

2. Lifestyle measures. Limit evening fluids and caffeine and alcohol, treat constipation, practice bladder habits like timed voiding, and review medications (diuretics and anticholinergics can worsen symptoms).

3. Alpha-blockers (for example tamsulosin, alfuzosin, silodosin, and the older doxazosin and terazosin). These relax prostatic and bladder-neck smooth muscle, targeting the **dynamic** component.

- **Onset:** fast, within days to a few weeks.
- **Side effects:** dizziness and orthostatic hypotension (more with the older non-selective agents, which need dose titration), nasal congestion, and **ejaculatory changes** (reduced or retrograde ejaculation, especially with silodosin and tamsulosin).
- **Eye warning:** they can cause **intraoperative floppy iris syndrome (IFIS)** during cataract surgery. Patients should tell their ophthalmologist they are on (or have taken) one.

4. 5-alpha-reductase inhibitors (5-ARIs) (finasteride, dutasteride). These block DHT and actually **shrink** the gland, targeting the **static** component.

- **Who benefits:** men with larger glands (roughly over 30 to 40 mL) or higher PSA. They reduce the long-term risk of retention and surgery.
- **Onset:** slow, taking 3 to 6 months for full effect.
- **PSA effect:** they lower PSA by about half. To interpret a PSA in a man on a 5-ARI, **double the measured value**. This is a favorite exam point.
- **Side effects:** decreased libido, erectile dysfunction, ejaculatory problems, and sometimes gynecomastia.

5. Combination therapy (alpha-blocker plus 5-ARI). For men with larger glands and higher progression risk, combining fast symptom relief with gland shrinkage gives better long-term outcomes than either drug alone.

6. Overactive bladder agents (anticholinergics or beta-3 agonists) can be added when storage symptoms dominate, with caution if the PVR is high.

7. Daily PDE5 inhibitor (tadalafil 5 mg) improves LUTS and is a good choice when the man also has erectile dysfunction.

PEARL: A man on finasteride whose PSA is 2.0 has an effective PSA of about 4.0. Forgetting to double it can hide a prostate cancer. This is one of the most tested facts in the whole topic.

Surgical Options

When medication fails or complications develop (retention, stones, recurrent infection, renal impairment, refractory bleeding), surgery is the next step.

Procedure	Concept	Best suited for
TURP (transurethral resection of the prostate)	The reference standard; obstructing tissue resected through the urethra	Moderate to large glands; durable outcomes
Laser enucleation (e.g. HoLEP)	Whole adenoma enucleated with a laser	All gland sizes, including very large; low bleeding
Photoselective vaporization (e.g. GreenLight)	Tissue vaporized with a laser	Patients on anticoagulation or bleeding risk (no tissue for pathology)
UroLift (prostatic urethral lift)	Implants retract the lobes to open the channel	Smaller glands without a median lobe; preserves ejaculation
Rezum (water vapor thermal therapy)	Steam ablates prostate tissue	Smaller glands; office-based; preserves sexual function
Simple prostatectomy	Surgical removal of the adenoma (open, laparoscopic, or robotic)	Very large glands (roughly over 80 to 100 mL)

PEARL: TURP is the yardstick every newer procedure is compared against. The minimally invasive options (UroLift, Rezum) trade some efficacy for preserved ejaculation and quicker recovery.

TURP Syndrome

Classic monopolar TURP uses a non-conductive, hypotonic irrigation fluid (glycine). When large venous sinuses are opened during a long resection, this fluid is absorbed systemically and causes **dilutional hyponatremia** and fluid overload. The patient becomes confused, nauseated, bradycardic, and hypertensive, with visual disturbances and, if severe, seizures. Risk is reduced by limiting resection time and, importantly, by **bipolar TURP**, which uses normal saline irrigation and has largely displaced the monopolar technique for this reason.

Complications of Untreated Severe BPH

Ignored, severe obstruction damages the bladder and eventually the kidneys.

- **Acute urinary retention:** a sudden, painful inability to void.
- **Chronic retention** with a large residual and, sometimes, **overflow incontinence**.
- **Bladder stones** and **recurrent UTIs** from stasis.

- **Hematuria** from engorged prostatic vessels.
- **Bladder decompensation:** the detrusor muscle fails after chronic strain.
- **High-pressure chronic retention** transmitting back to the kidneys, causing **bilateral hydronephrosis** and eventually **obstructive renal failure**, which can present with a dramatically elevated creatinine.

WARNING: A man with painless chronic retention can quietly develop bilateral hydronephrosis and renal failure. Do not assume that the absence of pain means the absence of danger. Check a PVR and renal function.

Key Points

- BPH is transition-zone overgrowth causing obstruction through a static component (gland bulk) and a dynamic component (alpha-1-mediated smooth muscle tone).
- Evaluate with IPSS, DRE, urinalysis, PSA, and PVR; reserve cystoscopy and urodynamics for specific indications.
- Alpha-blockers act fast, help all gland sizes, and cause ejaculatory changes and floppy iris syndrome.
- 5-ARIs shrink larger glands slowly, lower PSA by about half (double the value to interpret), and reduce long-term retention and surgery.
- Combination therapy suits larger glands at higher risk of progression; daily tadalafil is an option, especially with concurrent ED.
- TURP is the surgical reference standard; enucleation (HoLEP) handles very large glands, and UroLift and Rezum preserve ejaculation.
- TURP syndrome is dilutional hyponatremia from absorbed hypotonic irrigation, largely avoided by bipolar (saline) technique.
- Untreated severe BPH can progress to retention, bladder stones, infection, hydronephrosis, and renal failure.

Chapter 16: Urologic Emergencies

The Framing

Most of urology is not an emergency. This chapter is about the short list of situations where minutes matter, where a delay costs a testicle, a kidney, erectile function, or a life. As a student, you will rarely be the one performing the definitive fix. Your job is **recognition and escalation**: spot the red flags, start the immediate actions, and get the right person on the phone fast. Learn this list cold.

Testicular Torsion

Recognition: sudden, severe, unilateral scrotal pain, often with nausea and vomiting, in an adolescent or young man. The testis may sit high and horizontal, the cremasteric reflex is usually absent, and elevating the testis does not relieve pain (negative Prehn sign).

Immediate actions: call urology immediately. This is a clinical diagnosis. Do not let imaging delay exploration if the picture is convincing. The salvage rate is best within roughly 6 hours.

Definitive management: urgent surgical exploration with detorsion and, if the testis is viable, **bilateral orchiopexy** (fixing both sides, because the anatomic predisposition is bilateral). A non-viable testis is removed. See Chapter 8 for the full acute scrotum workup.

Obstructed, Infected Kidney

Recognition: the triad of **fever, hydronephrosis, and an obstructing stone**. The patient looks septic: high fever, rigors, flank pain, tachycardia, and possibly hypotension.

Immediate actions: resuscitate (IV fluids, sepsis management), draw blood and urine cultures, and start broad-spectrum IV antibiotics promptly.

Definitive management: **urgent decompression** of the obstructed system, either a retrograde ureteral stent or a percutaneous nephrostomy tube. Definitive stone treatment is **deferred** until the infection resolves. The principle is pus under pressure must be drained.

WARNING: In an infected, obstructed kidney, antibiotics alone are not enough. Without drainage the patient can deteriorate into septic shock. Decompression is the source control that saves the kidney and the patient.

Ischemic Priapism

Recognition: a painful, rigid erection lasting more than 4 hours, unrelated to ongoing sexual desire. Ischemic (low-flow) priapism is effectively a **compartment syndrome of the penis**: trapped, deoxygenated blood starves the tissue. A corporal blood gas shows dark, hypoxic, acidotic blood.

Immediate actions: treat urgently. Analgesia, then **aspiration of blood from the corpora**, followed by irrigation and intracavernosal injection of a diluted sympathomimetic (**phenylephrine**) to induce detumescence.

Definitive management: if aspiration and phenylephrine fail, a surgical shunt is created.

Distinguish high-flow (non-ischemic) priapism: this follows perineal or genital trauma that creates an arterial fistula. It is typically **not painful**, the penis is not fully rigid, and it is **not an emergency**. It is managed with observation or selective embolization, not aspiration.

WARNING: Ischemic priapism beyond 4 hours risks permanent fibrosis and erectile dysfunction. Treat it like the time-critical emergency it is, and do not confuse it with the benign, painless high-flow type.

Paraphimosis

Recognition: the foreskin is retracted behind the glans and cannot be pulled back forward, so it forms a tight band that causes progressive swelling of the glans and foreskin. It is painful and, if left, threatens ischemia of the glans.

Immediate actions: reduce it. Apply steady compression to squeeze out the edema, then push the glans back while drawing the foreskin forward. A local block, ice, or an osmotic agent (such as wrapping in sugar-soaked gauze) can help shrink the swelling first.

Definitive management: if manual reduction fails, a **dorsal slit** relieves the constricting ring, with formal circumcision later if needed.

Prevention: the most common cause is iatrogenic. **Always reduce the foreskin after catheterizing or examining an uncircumcised patient.** Do not leave it retracted. Contrast this with phimosis (a foreskin that cannot be retracted), which is usually not an emergency.

Fournier Gangrene

Recognition: a **necrotizing infection** of the perineum, genitalia, and perineal region. Suspect it with **pain out of proportion** to the exam, systemic toxicity, and skin that looks dusky, blistered, or necrotic. **Crepitus** (gas in the tissues) is a classic sign. Risk factors include diabetes, immunocompromise, obesity, alcohol use, and local trauma.

Immediate actions: resuscitate, and start broad-spectrum antibiotics with anaerobic coverage immediately. Do not wait for imaging if the clinical picture is clear.

Definitive management: **emergent, extensive surgical debridement** of all dead tissue, repeated as often as needed. This is often polymicrobial, spreads fast, and carries a high mortality, so speed is everything.

Clot Retention

Recognition: a patient with gross hematuria who cannot pass urine because the bladder is full of clots, with a painful, distended bladder.

Immediate actions and management: place a large-bore **three-way catheter**, manually irrigate (wash out) the clots with a syringe until the outflow clears, then run **continuous bladder irrigation** to keep the catheter from re-clotting. Then investigate and treat the source of the bleeding.

Genitourinary Trauma (Student Overview)

You are not expected to manage these, but you should know the principles and the traps.

Renal trauma. Most kidney injuries follow blunt trauma and are graded on a standardized scale (grades I to V by severity). The key teaching point: **most renal injuries, even higher grades, are managed conservatively** in the hemodynamically stable patient (bed rest, monitoring, serial imaging). Intervention (angioembolization or surgery) is reserved for instability or specific complications. The imaging test in a stable trauma patient is a CT with contrast, including delayed images to assess the collecting system.

Bladder rupture. Associated with pelvic fractures and gross hematuria; diagnosed with CT cystography. The distinction that matters:

- **Intraperitoneal rupture** (typically a burst at the dome from blunt trauma to a full bladder) needs **surgical repair**.
- **Extraperitoneal rupture** is usually managed with **catheter drainage alone**.

Urethral injury. The single most important rule in this whole chapter for a student: **blood at the urethral meatus means do NOT attempt a blind catheterization**. Other clues are inability to void and a high-riding or boggy prostate. Posterior urethral injuries associate with pelvic fractures; anterior (bulbar) injuries with straddle trauma. The correct first step is a **retrograde urethrogram** to define the injury before any catheter goes in.

WARNING: Blood at the meatus plus a blind catheter attempt can convert a partial urethral tear into a complete one. When you see blood at the meatus, stop and call urology for a retrograde urethrogram.

Spinal cord issues. Cauda equina syndrome is a neurosurgical emergency whose most consistent urologic sign is **urinary retention**, alongside saddle anesthesia, bilateral leg symptoms, and bowel dysfunction. New retention with these features needs urgent imaging and decompression. Keep spinal causes on your differential for unexplained retention.

Master Table: The Urologic Emergencies

Emergency	Red flags	First actions	Definitive treatment
Testicular torsion	Sudden severe scrotal pain, high-riding testis, absent cremasteric reflex	Call urology now; do not delay for imaging	Urgent exploration, detorsion, bilateral orchiopexy (or orchiectomy)
Obstructed infected kidney	Fever plus hydronephrosis plus obstructing stone; sepsis	Resuscitate, cultures, IV antibiotics	Urgent decompression (stent or nephrostomy); stone surgery deferred
Ischemic priapism	Painful rigid erection over 4 hours; dark corporal blood	Analgesia, corporal aspiration, phenylephrine irrigation	Repeat measures, then surgical shunt if refractory
Paraphimosis	Retracted foreskin stuck behind swollen glans	Manual reduction with compression	Dorsal slit if reduction fails; later circumcision
Fournier gangrene	Perineal pain out of proportion, crepitus, systemic toxicity	Resuscitate, broad-spectrum antibiotics with anaerobic cover	Emergent, repeated surgical debridement
Clot retention	Gross hematuria, distended painful bladder, cannot void	Large three-way catheter, manual washout	Continuous bladder irrigation; treat bleeding source
Bladder rupture	Pelvic fracture, gross hematuria	CT cystogram	Surgery if intraperitoneal; catheter drainage if extraperitoneal
Urethral injury	Blood at meatus, high-riding prostate	No blind catheter; retrograde urethrogram	Suprapubic catheter or specialist-directed repair
Cauda equina	New urinary retention, saddle anesthesia, bilateral leg signs	Urgent imaging, neurosurgery referral	Surgical decompression

Key Points

- The student's role in a urologic emergency is recognition and fast escalation, not the definitive fix.
- Testicular torsion is a clinical diagnosis; explore urgently and do not let imaging delay treatment.
- An infected, obstructed kidney needs decompression plus antibiotics; drainage is the life-saving step.
- Ischemic priapism over 4 hours is a penile compartment syndrome treated by aspiration and phenylephrine; painless high-flow priapism is not an emergency.
- Always reduce the foreskin after catheterizing an uncircumcised patient to prevent paraphimosis.
- Fournier gangrene demands immediate broad antibiotics and emergent surgical debridement; do not wait for imaging.
- Blood at the urethral meatus means no blind catheter and a retrograde urethrogram first.
- Most renal trauma is managed conservatively; intraperitoneal bladder rupture needs surgery while extraperitoneal is usually drained; new retention with saddle anesthesia signals cauda equina.

Chapter 17: Prostate Cancer

The Big Picture

Prostate cancer is the most common non-skin cancer in men and one of the leading causes of cancer death in men, yet most men who have it will die *with* it rather than *of* it. Both statements are true at once, and holding both in your head is the key to understanding this disease.

Here is the tension. The prostate makes a protein called PSA (prostate-specific antigen) that we can measure in blood. Screening with PSA finds a lot of cancer, but much of that cancer is slow enough that it would never have shortened the man's life. Treating those cancers can cause real harm (incontinence, erectile dysfunction) for no benefit. At the same time, some prostate cancers are genuinely lethal, and catching those early saves lives. Modern practice is a constant effort to treat the dangerous cancers aggressively while leaving the harmless ones alone. When you hear the word "overdiagnosis," this is what it means: finding disease that was never going to hurt the patient.

Who Gets It

Risk climbs steeply with age; it is uncommon before 50 and increasingly common with each decade after. Beyond age, the factors that matter most are:

Risk factor	Why it matters
Age	Strongest driver; incidence rises with each decade
Family history	A first-degree relative roughly doubles risk; more relatives, higher risk
Ancestry	Men of African ancestry have higher incidence and more aggressive disease
BRCA2 (and BRCA1)	Inherited mutations raise risk and are linked to more aggressive cancer

Family history and known BRCA mutations shift the conversation toward starting screening earlier.

How It Presents

Most prostate cancer today is found because a screening PSA came back elevated, in a man with no symptoms at all. That is the typical story: asymptomatic, picked up on a blood test.

Do not fall into the trap of thinking urinary symptoms mean prostate cancer. Trouble with the stream, frequency, and getting up at night are usually benign prostatic hyperplasia (see Chapter 15), because BPH grows in the central prostate near the urethra while cancer tends to grow in the peripheral zone away from it.

When prostate cancer does cause symptoms, it usually means advanced disease. Bone pain (the prostate loves to spread to bone), unexplained weight loss, or new back pain with neurologic signs (a possible spinal cord compression) are the red flags of metastatic spread.

The Diagnosis Pathway

1. **PSA and digital rectal exam.** An elevated or rising PSA prompts further workup (the full interpretation of PSA lives in Chapter 7). A hard nodule on rectal exam is suspicious regardless of the PSA number.
2. **MRI-informed biopsy.** Before biopsy, many men now get a prostate MRI. MRI can flag suspicious areas and let the urologist target them, which improves detection of significant cancer and reduces sampling of trivial disease. Biopsy is the only way to confirm cancer, done with ultrasound guidance through the rectum or perineum.
3. **Pathology.** The pathologist assigns a grade, and this drives everything.

Gleason Score and Grade Groups (Read This Twice)

Prostate cancer grade describes how abnormal the cells look under the microscope. Each area of tumor is graded from 3 to 5 (higher is worse and more disorganized). The pathologist reports the two patterns that make up most of the tumor and adds them into the **Gleason score**.

The order of the two numbers matters because the first number is the *dominant* pattern.

- **3 + 4 = 7:** mostly the better-behaved pattern 3, with less pattern 4. Lower risk.
- **4 + 3 = 7:** mostly the worse pattern 4. Higher risk, even though the sum is the same 7.

Because "two different 7s" confuses everyone, we now also use **Grade Groups** from 1 to 5:

Grade Group	Gleason	Plain meaning
1	6 (3+3)	Least aggressive; often safe to watch
2	7 (3+4)	Favorable intermediate
3	7 (4+3)	Unfavorable intermediate
4	8	High grade
5	9 to 10	Most aggressive

PEARL: Gleason 6 (Grade Group 1) is the lowest grade you will ever see reported, because patterns 1 and 2 are no longer used. A patient told he has "a 6 out of 10" understandably panics. Reassure him: on this scale, 6 is the floor, not the middle.

Risk Stratification

Grade, PSA, and clinical stage combine into a risk category that guides treatment. Conceptually:

Risk group	Rough picture
Low	Low PSA, Grade Group 1, cancer confined and small
Intermediate	Moderate PSA, Grade Group 2 to 3
High	High PSA, Grade Group 4 to 5, or more advanced local stage

Management by Risk

Active surveillance (low risk, and selected favorable intermediate risk). This is *not* ignoring the cancer. It is a structured program of periodic PSA checks, repeat MRI, and repeat biopsies, with a plan to switch to curative treatment if the cancer shows signs of becoming more aggressive. For low-grade disease this is safe, and it spares men the side effects of treatment they may never need. Explaining this to a nervous patient is a core skill: he is being watched carefully, not abandoned.

Radical prostatectomy. Surgical removal of the whole prostate, often robot-assisted. It is a curative option for localized disease. The signature side effects are urinary incontinence (usually stress leakage that improves over months) and erectile dysfunction (nerve-sparing technique helps but recovery varies and is not guaranteed).

Radiation therapy. External beam or implanted seeds (brachytherapy), also curative for localized disease and often paired with hormone therapy in higher-risk cases. Its signature side effects differ from surgery: bowel and rectal irritation (proctitis), urinary irritation, and erectile dysfunction that tends to develop gradually over the following years rather than immediately.

PEARL: Surgery and radiation give similar cancer control for localized disease, so the choice often comes down to the side effect profile a given man is most willing to accept. Incontinence and immediate ED lean against surgery; bowel symptoms and delayed ED lean against radiation.

Androgen deprivation therapy (ADT). Prostate cancer feeds on testosterone, so ADT starves it by dropping testosterone to very low levels, using injectable medications or, rarely now, surgical removal of the testes. ADT is used with radiation in higher-risk disease and is the backbone of treatment for advanced disease. It is not a cure by itself. Its side effects are essentially those of low testosterone: hot flashes, low libido, erectile dysfunction, fatigue, muscle loss, weight gain, bone thinning, and cardiovascular and metabolic effects.

Advanced and Metastatic Disease

When prostate cancer spreads, it goes preferentially to bone, producing bone-forming (osteoblastic) lesions that light up on bone scan. Metastatic disease is treated, not cured, but men can live for years with good quality of life. ADT is the foundation, and it is now standard to add another agent up front (an androgen receptor pathway inhibitor, or chemotherapy) rather than saving those drugs for later.

Over time, cancer that once responded to hormone suppression finds ways to grow despite castrate testosterone levels. This is called castration-resistant prostate cancer. At this stage the toolbox includes

further hormonal agents, chemotherapy, bone-protective medications, and, in specific cases, targeted radioligand therapy and treatments matched to genetic mutations such as BRCA. The direction of travel in this field is toward personalizing therapy to the tumor's biology.

What to Say to Patients

- For a man with low-risk cancer on surveillance: "This kind of prostate cancer usually grows very slowly. Watching it closely lets us treat it if it ever changes, while sparing you side effects you may never need."
- Before treatment choices: "Both surgery and radiation can cure this. They have different side effects, so the right choice depends on what matters most to you."
- On survivorship: acknowledge that incontinence and erectile function are legitimate quality-of-life issues, that pelvic floor exercises and ED treatments help, and that recovery takes time.

Key Points

- Prostate cancer is the most common non-skin cancer in men, but many cases are slow enough that men die with it, not of it; overdiagnosis is a real harm to weigh against real benefit.
- Key risk factors are age, family history, African ancestry, and BRCA mutations.
- Most cases are found by an elevated PSA in an asymptomatic man; urinary symptoms usually mean BPH, and bone pain usually means advanced disease.
- Grade Group 1 (Gleason 6) is the least aggressive; 4+3 is worse than 3+4 despite both summing to 7 because the first number is the dominant pattern.
- Active surveillance is a safe, structured plan for low-risk disease, not neglect.
- Surgery and radiation both cure localized disease; the choice hinges on their different side effect profiles (incontinence and immediate ED versus bowel symptoms and delayed ED).
- ADT starves the cancer of testosterone; it controls but does not cure advanced disease and causes low-testosterone side effects.

Chapter 18: Bladder Cancer

The Smoking Connection

If you remember one thing about bladder cancer, remember that smoking is the single biggest modifiable risk factor, responsible for a large share of cases. Carcinogens from tobacco are filtered by the kidneys, concentrated in urine, and bathe the bladder lining for hours. The other classic exposures are occupational aromatic amines, historically in the dye, rubber, leather, and paint industries. Chronic bladder irritation matters too: long-standing infection with the parasite *Schistosoma*, common in parts of Africa and the Middle East, is linked to a different cell type (squamous cell carcinoma). Prior pelvic radiation and the chemotherapy drug cyclophosphamide also raise risk.

Most bladder cancer in North America is urothelial carcinoma (formerly called transitional cell carcinoma), arising from the lining that covers the entire urinary tract from the renal pelvis to the urethra.

How It Presents

Painless gross hematuria is bladder cancer until proven otherwise. Blood in the urine that you can see, with no pain and no infection, especially in an older adult with a smoking history, demands a full workup (the general approach to hematuria is in Chapter 3). Some patients instead have microscopic hematuria found on a urinalysis, or irritative symptoms (urgency, frequency, painful urination) that mimic a UTI but do not clear, a pattern that can signal carcinoma in situ.

WARNING: Do not write off painless visible hematuria as "probably a UTI" or "just the blood thinner." Painless gross hematuria in an adult must be worked up for cancer even if it happens only once and then stops.

Making the Diagnosis

The workup has two halves, because the whole urinary tract is at risk:

1. **Cystoscopy.** A camera passed into the bladder through the urethra to directly inspect the lining. This is the gold standard for the bladder itself.
2. **Upper tract imaging.** A CT urogram images the kidneys and ureters to look for tumors higher up.

Urine cytology examines cells shed into the urine. It is useful because it is good at catching high-grade cancer and carcinoma in situ, but it is unreliable for low-grade tumors, so a negative cytology never rules out cancer.

TURBT: Diagnosis and Treatment at Once

When a bladder tumor is seen, the next step is **transurethral resection of bladder tumor (TURBT)**: the surgeon resects the tumor through the urethra using a scope. TURBT does two jobs at once. It removes the visible tumor (treatment) and provides tissue for the pathologist (diagnosis). Crucially, the resection

must include the muscle layer beneath the tumor, because whether cancer has invaded muscle is the single most important question in bladder cancer.

The Central Split: NMIBC vs MIBC

Everything downstream depends on how deep the tumor has invaded the bladder wall. Picture the wall in layers from inside out: the surface lining (urothelium), then the lamina propria (a thin connective tissue layer), then the muscularis propria (the detrusor muscle), then fat.

Category	Depth	Meaning
NMIBC (non-muscle-invasive)	Confined to urothelium or lamina propria	Has not reached the detrusor muscle
MIBC (muscle-invasive)	Invades the muscularis propria (detrusor) or beyond	More dangerous; higher risk of spread

That one boundary, the detrusor muscle, separates two very different diseases with very different treatments.

Managing NMIBC

Non-muscle-invasive disease is treated by TURBT, then risk-adapted intravesical therapy (medication instilled directly into the bladder through a catheter) to lower the chance of recurrence and progression.

- **Lower-risk tumors:** may get a single dose of intravesical chemotherapy shortly after TURBT.
- **Higher-risk tumors and carcinoma in situ:** get **BCG** (Bacillus Calmette-Guerin), a live attenuated form of the bacterium used in the tuberculosis vaccine. Instilled into the bladder, it provokes a local immune response that attacks the tumor cells. BCG is given as an induction course followed by maintenance instillations over time to keep the effect going.

Even after successful treatment, NMIBC recurs often, which is why surveillance is intensive.

Managing MIBC

Muscle-invasive disease is aggressive and needs aggressive treatment.

The standard curative path is **neoadjuvant (before surgery) cisplatin-based chemotherapy, followed by radical cystectomy**: removal of the bladder (and prostate in men, or reproductive organs in women as indicated) along with a pelvic lymph node dissection. Because the bladder is removed, the surgeon must create a new way for urine to leave the body, called a urinary diversion.

Diversion	What it is	Student-level pros	Student-level cons
Ileal conduit	A piece of small bowel channels urine to a stoma on the abdomen into an external bag	Simpler, reliable, fewer complications	External appliance; body image concerns
Neobladder	A reservoir built from bowel and connected to the urethra	No external bag; more natural voiding	Must relearn voiding; risk of leakage or needing self-catheterization

An alternative for selected patients who want to keep their bladder is **trimodal therapy**: maximal TURBT plus combined chemotherapy and radiation. It offers bladder preservation but requires close surveillance and is not right for everyone.

PEARL: Bladder cancer is one of the most expensive cancers to manage over a lifetime, and the reason is surveillance. Because it recurs so often, patients need repeated cystoscopies for years, and each look, each imaging study, and each repeat resection adds up.

When to Suspect the Upper Tract

Urothelial cancer can grow anywhere the lining exists, including the renal pelvis and ureter (upper tract urothelial carcinoma). Suspect it when cytology is positive but cystoscopy is clean, when imaging shows a filling defect in the ureter or renal pelvis, or when bleeding clearly comes from one side. A patient with a bladder tumor has field-wide risk, so the kidneys and ureters must always be checked.

Key Points

- Smoking is the biggest modifiable risk factor for bladder cancer; occupational aromatic amines are the classic second.
- Painless gross hematuria is bladder cancer until proven otherwise and always deserves a full workup.
- Diagnosis requires cystoscopy plus upper tract imaging; cytology helps for high-grade disease but misses low-grade tumors.
- TURBT is both diagnostic and therapeutic and must sample muscle to judge invasion.
- The muscle-invasion boundary splits the disease: NMIBC (lining or lamina propria) versus MIBC (detrusor or deeper).
- NMIBC is managed with risk-adapted intravesical therapy; BCG uses an immune reaction to treat high-risk disease and is given with maintenance.
- MIBC is treated with neoadjuvant chemotherapy then radical cystectomy with a urinary diversion (ileal conduit or neobladder); trimodal therapy can preserve the bladder in selected patients.
- Lifelong surveillance makes bladder cancer among the most expensive cancers to follow.

Chapter 19: Kidney Cancer

The Incidentaloma Era

Kidney cancer today is largely a disease found by accident. A patient gets a CT or ultrasound for abdominal pain, an injury, or something unrelated, and a renal mass turns up. These incidentally discovered tumors are usually small and confined, which is good news, because they are far more curable than the advanced cancers of the past.

The **classic triad** you may have memorized, flank pain plus a palpable mass plus hematuria, is now rare and, when present, signals late, advanced disease. Do not expect to see it. Expect to see a mass on a scan ordered for another reason.

Who Gets It and Why

The main type is renal cell carcinoma (RCC), which arises from the kidney's tubule cells. Risk factors:

- **Smoking** (yes, again).
- **Obesity.**
- **Hypertension.**
- **Acquired cystic disease** in patients on long-term dialysis.
- **Hereditary syndromes**, each worth one line:
 - *Von Hippel-Lindau (VHL)*: clear cell RCC plus pheochromocytoma, retinal and CNS hemangioblastomas.
 - *Hereditary papillary RCC*: multiple papillary tumors.
 - *Birt-Hogg-Dube*: skin lesions and various renal tumors.
 - *Hereditary leiomyomatosis and RCC*: aggressive tumors with skin and uterine leiomyomas.

The Small Renal Mass Framework

A small renal mass (roughly 4 cm or less) does not always need immediate surgery. This is a modern shift worth understanding. Options include:

- **Renal mass biopsy** to characterize the tumor before deciding, useful when the result would change management.
- **Active surveillance** for small masses, especially in elderly or comorbid patients for whom surgery carries more risk than a slow-growing tumor does.
- **Surgery or ablation** for masses that grow, look aggressive, or occur in surgical candidates.

The point is that not every spot on the kidney is an emergency, and treating a frail patient can do more harm than the tumor would.

Subtypes

Subtype	Rough frequency	Note
Clear cell	Most common (the majority)	Linked to the VHL pathway
Papillary	Second most common	Can be multifocal
Chromophobe	Less common	Generally better prognosis
Collecting duct	Rare	Aggressive

Staging, Conceptually

Staging asks how far the tumor has spread. Conceptually: confined and small, versus confined and large, versus growing into the renal vein or the fat around the kidney, versus reaching beyond the kidney's surrounding fascia or to distant organs. Larger size and spread outside the kidney mean higher stage and worse prognosis.

Management of Localized Disease

The guiding principle is **nephron-sparing**: keep as much working kidney as safely possible.

- **Partial nephrectomy** removes the tumor while preserving the rest of the kidney. It is preferred when feasible, because keeping renal function lowers the patient's long-term risk of chronic kidney disease and cardiovascular problems.
- **Radical nephrectomy** removes the whole kidney and is used for larger or more complex tumors.
- **Ablation** (freezing with cryotherapy or heating with radiofrequency) is an option for smaller masses in patients who are poor surgical candidates.

PEARL: Every nephron you save counts. A patient who loses a whole kidney to a small tumor may end up with chronic kidney disease that harms him more than the cancer would have. This is why partial nephrectomy, not automatic removal of the kidney, is the goal for small masses.

Paraneoplastic Syndromes

RCC is famous for producing hormones and factors that cause distant effects. These are high-yield.

Syndrome	Mechanism
Anemia	Chronic disease effect (common)
Polycythemia	Tumor makes erythropoietin
Hypercalcemia	Tumor makes PTH-related peptide
Hypertension	Tumor makes renin
Stauffer syndrome	Liver dysfunction <i>without</i> liver metastasis, reversible after tumor removal

The Renal Vein and IVC Thrombus

RCC has an unusual habit: it can grow as a solid column of tumor into the renal vein and up the inferior vena cava, sometimes reaching the heart. This is called a tumor thrombus. It matters enormously for surgical planning, because the surgeon must know how high the thrombus extends before operating. This is exactly why good cross-sectional staging imaging (CT or MRI) is essential before surgery.

WARNING: A renal tumor thrombus in the IVC is not the same as a blood clot. It is living tumor extending up the vein, and it changes the entire surgical plan. Never assume a renal mass is a simple local problem until the veins have been imaged.

Metastatic Disease

RCC is classically resistant to standard chemotherapy and to radiation, which historically made advanced disease hard to treat. That changed with two classes of drugs. **Targeted therapies (tyrosine kinase inhibitors, or TKIs)** block the blood-vessel-growth signals that these vascular tumors depend on. **Immunotherapy** with checkpoint inhibitors unleashes the immune system against the cancer.

Modern first-line treatment for advanced RCC combines these approaches, either two immunotherapy drugs together or an immunotherapy drug paired with a TKI. In selected patients, removing the primary kidney tumor (cytoreductive nephrectomy) still has a role alongside systemic therapy. Outcomes for metastatic RCC have improved substantially in this era.

The Benign Masses to Recognize by Name

Not every renal mass is cancer. Two benign tumors deserve name recognition:

- **Angiomyolipoma (AML):** contains fat, which CT can often detect (fat has characteristic low density). Associated with tuberous sclerosis when multiple. Large ones can bleed dramatically (a bleed into the retroperitoneum is called Wunderlich syndrome).
- **Oncocytoma:** benign, but frustratingly it can look just like RCC on imaging (a central scar is a classic but unreliable clue), so it often cannot be confidently distinguished before surgery.

Key Points

- Most kidney cancer is found incidentally on imaging done for another reason; the classic flank pain, mass, and hematuria triad is now rare and signals late disease.
- Risk factors include smoking, obesity, and hypertension, plus hereditary syndromes such as VHL.
- A small renal mass does not always need immediate surgery; biopsy and active surveillance are legitimate options, especially in comorbid patients.
- Clear cell is the dominant RCC subtype.
- Nephron-sparing partial nephrectomy is preferred when feasible to protect long-term kidney function.
- Know the paraneoplastic syndromes: anemia, polycythemia (EPO), hypercalcemia (PTHrP), hypertension (renin), and Stauffer syndrome (reversible liver dysfunction without metastasis).

- RCC can extend as tumor thrombus into the renal vein and IVC, so staging imaging is essential before surgery.
- Advanced RCC resists chemotherapy and radiation but responds to immunotherapy and TKIs; angiomyolipoma (fat-containing) and oncocytoma are the benign masses to recognize.

Chapter 20: Testicular Cancer

A Young Man's Cancer

Testicular cancer is the classic malignancy of young men, most common between roughly 15 and 40 years old. This age skew makes it unusual among cancers and shapes everything about how we approach it, because these are patients with decades of life ahead and, often, plans to have children. The headline, which you should keep front and center, is that testicular cancer is one of the most curable solid cancers in all of medicine, with excellent survival even when it has spread.

Who Gets It

The strongest risk factor is a history of **cryptorchidism** (an undescended testis). Bringing the testis down surgically (orchidopexy) reduces but does not eliminate the risk, and notably the risk applies to both testes, not just the one that was undescended. Other risk factors:

- A **prior germ cell tumor** in the other testis.
- **Family history** of testicular cancer.
- A personal history of the precursor lesion (intratubular germ cell neoplasia).

How It Presents

The typical presentation is a **painless, firm mass or nodule** on the testis, often found by the patient himself (the general approach to scrotal masses is in Chapter 9). Some men notice a dull ache or a heavy sensation. A minority present with symptoms of spread, such as back pain from enlarged lymph nodes deep in the abdomen, or breast tenderness and enlargement (gynecomastia) from hormone production by the tumor.

Any solid, firm mass arising from the testis itself should be treated as cancer until proven otherwise.

The Workup Discipline

There is a strict order of operations here, and getting it right is a marker of a good student.

1. **Scrotal ultrasound** first, to confirm the mass is within the testis and solid.
2. **Serum tumor markers before any surgery.** You must draw these before the testis is removed, because they carry diagnostic and prognostic information and provide a baseline to track response afterward.

The three markers:

Marker	What it tells you
AFP (alpha-fetoprotein)	Elevated only in nonseminoma; seminoma never makes AFP
beta-hCG	Can be elevated in either seminoma or nonseminoma
LDH	Reflects overall tumor burden, not specific to type

PEARL: Seminoma never produces AFP. So if the pathology says "pure seminoma" but the AFP is elevated, believe the AFP: there is nonseminoma somewhere, and the patient must be treated as having a nonseminoma. This single rule catches a classic exam question and a real clinical trap.

The Cardinal Surgical Rule

The treatment for the primary tumor is **radical inguinal orchiectomy**: removal of the testis and its cord through an incision in the groin.

Never approach a suspected testicular cancer through the scrotum. The reason is anatomy and lymphatic drainage. The testis drains to lymph nodes deep in the retroperitoneum (following the path it took during fetal descent), while the scrotal skin drains to the groin (inguinal) nodes. Cutting through the scrotum can seed tumor into a new lymphatic territory and change how the cancer spreads, complicating treatment.

WARNING: Do not biopsy a suspicious testicular mass through the scrotum, and do not perform trans-scrotal surgery. The correct operation is a radical *inguinal* orchiectomy. A trans-scrotal approach can alter lymphatic spread and worsen the patient's situation.

Seminoma vs Nonseminoma

Germ cell tumors make up the vast majority of testicular cancers and divide into two families that behave differently.

Feature	Seminoma	Nonseminoma (NSGCT)
Typical age	Slightly older	Slightly younger
AFP	Never elevated	Often elevated
Behavior	More predictable spread	Can be more aggressive
Radiosensitivity	High	Lower

Nonseminomas include embryonal carcinoma, yolk sac tumor, choriocarcinoma, teratoma, and mixed tumors. If any nonseminoma component is present, the tumor is managed as a nonseminoma.

Staging

Staging is straightforward conceptually and follows the lymphatic road map:

- **Stage I:** confined to the testis.
- **Stage II:** spread to retroperitoneal lymph nodes (the *first stop*, because that is where the testis drains).
- **Stage III:** distant spread (most often the lungs).

Because the retroperitoneum is the first landing site, staging always includes cross-sectional imaging of the abdomen and pelvis, plus a chest evaluation.

Treatment Principles by Stage

The theme throughout is that this cancer is extraordinarily curable, so treatment is often calibrated to avoid overtreatment.

- **Stage I:** After orchiectomy, active **surveillance** is a real and often preferred option, because many patients are already cured by the surgery alone and can be watched closely rather than treated further. Depending on the tumor, other options include a short course of chemotherapy, radiation (for seminoma), or, for nonseminoma, retroperitoneal lymph node dissection (RPLND).
- **More advanced disease:** cisplatin-based combination **chemotherapy** is highly effective, and even widely metastatic testicular cancer is frequently cured.
- **RPLND**, a demanding operation to remove the retroperitoneal nodes, has specific roles, including removing residual masses after chemotherapy in nonseminoma.

The bottom line to tell patients honestly: cure rates are excellent, well above ninety percent overall.

Fertility and Self-Exam

Because these are young men and the treatments (chemotherapy, radiation, and RPLND, which can affect ejaculation) can impair fertility, **sperm banking must be offered before treatment begins**, ideally before the orchiectomy. Raising this early is a mark of good care and something a student can flag on rounds.

Counsel on **testicular self-examination**: a monthly check, feeling each testis for any new firm lump, so that a future tumor (including in the remaining testis) is caught early.

Survivorship

Cure comes with a long tail of survivorship for men who will live for decades. Late effects of platinum-based chemotherapy can include cardiovascular disease, second cancers, peripheral neuropathy, hearing loss, kidney effects, and, from one specific agent, lung effects. Long-term follow-up therefore focuses not only on cancer recurrence but on the health consequences of successful treatment.

Key Points

- Testicular cancer is the classic cancer of men aged roughly 15 to 40 and is one of the most curable solid cancers, even when metastatic.

- The strongest risk factor is cryptorchidism (affecting both testes), along with prior germ cell tumor and family history.
- Presentation is a painless, firm testicular mass; treat any solid intratesticular mass as cancer until proven otherwise.
- Order ultrasound and draw tumor markers (AFP, hCG, LDH) *before* orchiectomy; seminoma never makes AFP.
- The correct operation is radical *inguinal* orchiectomy; never a trans-scrotal approach, because of lymphatic drainage.
- Retroperitoneal lymph nodes are the first site of spread, so they anchor staging.
- Stage I disease can often be managed with surveillance; advanced disease responds dramatically to cisplatin-based chemotherapy.
- Offer sperm banking before treatment, teach self-exam, and follow survivors for the late effects of chemotherapy.

Chapter 21: Pediatric Urology Basics

This chapter covers only what a clerkship student needs to recognize and reason through. The unifying theme in pediatric urology is that many findings are normal variations that resolve on their own, while a few are true problems that must not be missed.

Febrile UTI in Children

A urinary tract infection with fever in a young child suggests the kidney is involved (pyelonephritis) and raises the question of an underlying anatomic problem. The imaging approach is stepwise:

- **Renal and bladder ultrasound** is the first-line study after a first febrile UTI. It is noninvasive and looks for structural abnormalities and hydronephrosis.
- **Voiding cystourethrogram (VCUG)** is used selectively, not routinely, for example when the ultrasound is abnormal, when febrile UTIs recur, or when the presentation is atypical. A VCUG detects **vesicoureteral reflux (VUR)**, the backward flow of urine from the bladder up the ureters, which is graded from I to V by severity.

Whether to give continuous low-dose antibiotics to prevent further infections in children with reflux remains a genuinely debated question rather than a settled rule.

Cryptorchidism

Cryptorchidism means the testis has not descended into the scrotum. It matters for two reasons: **fertility** (a testis that stays in the warm abdomen makes fewer healthy sperm) and **cancer risk** (undescended testes carry a higher lifetime risk of testicular cancer, and a scrotal position at least allows the testis to be examined).

Practical points for a student:

- Examine the scrotum and distinguish a truly **undescended** testis from a **retractile** one. A retractile testis has been pulled up by a brisk cremasteric reflex but can be gently coaxed into the scrotum and sits there; it is a normal variant.
- If a testis is not descended by about 6 months of age (corrected for prematurity), refer, because spontaneous descent after that point is unlikely.
- The corrective operation, **orchidopexy**, is recommended between 6 and 18 months of corrected age (Canadian Urological Association and Pediatric Urologists of Canada guideline), because descent after 6 months is unlikely in a full-term infant.

Hypospadias

Hypospadias is a congenital condition where the urethral opening is on the underside (ventral surface) of the penis rather than at the tip. It is often accompanied by a downward curvature (chordee) and a foreskin that is incomplete, hooded on the top.

WARNING: Do not circumcise a newborn with hypospadias before a urologic evaluation. The foreskin is often used as tissue for surgical repair, and removing it can complicate the reconstruction. Recognizing hypospadias on the newborn exam and holding off on circumcision is exactly the kind of catch expected of an attentive student.

Antenatal Hydronephrosis

Prenatal ultrasound frequently shows dilation of the kidney's collecting system, called antenatal hydronephrosis. In plain language: the plumbing looks a little swollen before birth. The reassuring reality is that most cases, especially mild ones, resolve on their own after birth. Severity is graded, and the grade guides how closely to follow.

A timing point worth knowing: the confirmatory **postnatal ultrasound** should not be done in the very first day or two of life, because a newborn is relatively dehydrated then and the dilation can look falsely mild. It is usually done after the first couple of days, with more severe or bilateral cases evaluated sooner.

Nocturnal Enuresis

Nighttime bedwetting is common and is developmentally normal up to a point; children gain reliable nighttime dryness at different ages, and isolated bedwetting in a young child is usually not a disease. When a child is old enough that it warrants attention and it has been present since birth without a dry interval (primary enuresis), the mainstays are:

- **Reassurance and behavioral measures.**
- The **enuresis alarm**, which wakes the child to the sensation of a full bladder and tends to give the most durable results.
- **Desmopressin**, a medication that reduces nighttime urine production; it works while taken but bedwetting often returns when it is stopped.

Watch for **red flags that suggest a secondary cause**: daytime wetting or urgency, new bedwetting after a period of dryness, heavy thirst and urination (which could signal diabetes), significant snoring (possible sleep apnea), constipation, or any neurologic sign.

PEARL: New bedwetting in a child who was previously reliably dry is a different problem from a child who has never been dry. The new onset (secondary enuresis) points you toward looking for a cause such as diabetes, a urinary infection, constipation, or psychosocial stress, rather than simply reassuring the family.

Phimosis in Boys

Phimosis means the foreskin cannot be retracted over the head of the penis. The key distinction is physiologic versus pathologic:

- **Physiologic phimosis** is normal in infants and young boys. The foreskin is naturally adherent at birth and separates gradually over years. It needs no treatment, and the foreskin should never be forcibly retracted.
- **Pathologic phimosis** involves true scarring (for example from a skin condition called lichen sclerosis) and is abnormal at any age.

First-line treatment when intervention is warranted is a **topical steroid cream**, which often loosens the foreskin and avoids surgery. **Circumcision** is reserved for pathologic phimosis, recurrent infections of the foreskin and glans (balanitis), or select cases of recurrent UTI.

Acute Scrotum in Children

The painful scrotum in a child is covered in detail in Chapter 8, and the same overriding rule applies: **testicular torsion is a surgical emergency** and must be excluded first. One age-related nuance: in prepubertal boys, torsion of the appendix testis (a small vestigial structure on the testis) is a common cause of scrotal pain. It can produce a tender "blue dot" visible through the scrotal skin and is managed conservatively, but it is a diagnosis made only after true testicular torsion has been ruled out.

Posterior Urethral Valves

Posterior urethral valves (PUV) are the classic congenital obstruction of the male newborn urinary tract, and they occur only in boys. Abnormal tissue in the posterior urethra blocks the outflow of urine, and the effects ripple backward up the whole system.

Recognize the picture:

- A **poor or dribbling urinary stream** in a newborn boy.
- A **distended, palpable bladder**.
- An **abnormal antenatal scan**, classically bilateral hydronephrosis with a thick-walled bladder, and low amniotic fluid (oligohydramnios) because the fetus is not putting out enough urine.

Because low amniotic fluid impairs lung development, severe cases can have underdeveloped lungs, and the back-pressure can damage the kidneys. The diagnosis is confirmed with a VCUG, and the obstruction needs prompt relief. This is the one neonatal diagnosis in this chapter you truly cannot afford to miss.

Key Points

- After a first febrile UTI in a child, get a renal and bladder ultrasound first; use VCUG selectively to look for vesicoureteral reflux, which is graded I to V.
- Cryptorchidism matters for fertility and cancer risk; distinguish a retractile testis (normal) from a true undescended testis, refer if not descended by 6 months of corrected age, and orchidopexy is done between 6 and 18 months.
- Recognize hypospadias and do not allow circumcision before urologic evaluation, because the foreskin may be needed for repair.

- Most antenatal hydronephrosis resolves; confirm with a postnatal ultrasound done after the first day or two of life, sooner if severe.
- Primary nocturnal enuresis is often developmentally normal; the alarm gives the most durable results and desmopressin works while taken; new-onset (secondary) enuresis needs a search for a cause.
- Physiologic phimosis is normal in young boys and is treated first with a topical steroid; never force retraction, and reserve circumcision for pathologic phimosis and specific indications.
- Testicular torsion is always the first concern in the acute pediatric scrotum; torsion of the appendix testis is common before puberty and managed conservatively (see Chapter 8).
- Posterior urethral valves are the classic male neonatal obstruction: suspect it with a poor stream, a distended bladder, and an abnormal antenatal scan, and act promptly.

PART 4

The Practical Toolkit

Chapter 22: Urine Tests and Imaging Made Simple

Reading a Urinalysis

The urinalysis (UA) is the single most useful test in urology and the one students misread most. It comes in two layers: the dipstick (a chemical strip) and the microscopy (someone actually looks at the sediment under a microscope). They answer different questions. The dipstick is fast, chemical, and screening. Microscopy confirms what the dipstick suggests.

Leukocyte esterase and nitrites

Leukocyte esterase (LE) is an enzyme released by white blood cells. A positive LE means white cells are present or have broken down, which points to inflammation, usually infection. It is sensitive but not specific: it catches most UTIs but also lights up with any inflammation (stones, a recent catheter, and so on).

Nitrites work differently. Many gram-negative bacteria (*E. coli* especially) convert dietary nitrates into nitrites. A positive nitrite is fairly specific for infection (if it is positive, bacteria are likely there) but not sensitive (a negative does not rule out UTI, because some bugs like *Enterococcus* and *Staphylococcus* do not make nitrites, and the urine has to sit in the bladder a few hours for the reaction to happen).

Rule of thumb: nitrite positive means trust it, nitrite negative does not clear them. LE positive means look harder. Both positive in a symptomatic patient means treat.

PEARL: Nitrites are specific, leukocyte esterase is sensitive. A positive nitrite in a symptomatic patient is close to a diagnosis of UTI; a negative nitrite never rules one out.

Blood on the dipstick versus blood under the microscope

This is the classic trap. The dipstick detects heme, the iron-containing part of hemoglobin. It cannot tell the difference between red blood cells (true hematuria), free hemoglobin (hemolysis), and myoglobin (muscle breakdown, meaning rhabdomyolysis).

So a dipstick positive for blood with NO red cells on microscopy should make you think myoglobin or hemoglobin, not bleeding. In a patient after a crush injury, a seizure, or a brutal workout with dark urine, dipstick-positive but microscopy-negative screams rhabdomyolysis, and you check a CK.

True microscopic hematuria is defined by red cells actually seen under the microscope (commonly 3 or more RBCs per high-power field on a properly collected specimen). That number triggers a hematuria workup (see Chapter 3).

PEARL: Dipstick blood positive but microscopy shows no red cells means think myoglobin (rhabdomyolysis) or hemoglobin, not the urinary tract. Always confirm dipstick hematuria with microscopy before launching a workup.

Casts and crystals worth knowing

You do not need to memorize every crystal, but a few are high-yield.

Finding	What it suggests
RBC casts	Glomerular bleeding (nephritis); a nephrology problem, not stones or tumor
WBC casts	Pyelonephritis or interstitial nephritis (upper-tract inflammation)
Granular ("muddy brown") casts	Acute tubular necrosis
Hyaline casts	Nonspecific; dehydration or exercise
Calcium oxalate crystals	Envelope or dumbbell shaped; the most common stone crystal
Uric acid crystals	Form in acidic urine; radiolucent stones
Struvite crystals	"Coffin-lid" shaped; infection stones (urease-producing bacteria)
Cystine crystals	Hexagonal; always pathologic, means cystinuria

The single most useful concept: casts point you toward the kidney's filtering units (a medical or nephrology issue), while crystals point toward stone chemistry.

Urine culture

Dipstick and microscopy suggest infection; culture proves it and names the bug. Key numbers and clues:

- A clean-catch midstream specimen growing 100,000 CFU/mL (10^5) of a single organism is the traditional threshold for a true UTI. Lower counts can still matter in symptomatic patients or catheterized specimens.
- Three or more organisms growing usually means contamination (skin or genital flora), not infection. Recollect.
- Squamous epithelial cells on microscopy also flag a contaminated, poorly collected sample.

Asymptomatic bacteriuria (positive culture, no symptoms) is generally NOT treated, with two big exceptions: pregnancy, and before urologic procedures that break the mucosa. See Chapter 14 for the full story.

WARNING: Do not treat a positive urine culture in a patient with no symptoms. The main exceptions are pregnancy and the pre-operative urologic patient. Treating everyone else breeds resistance and does not help.

Urine cytology

Cytology means looking for cancer cells shed into the urine. Its job is detecting urothelial (bladder and upper-tract) cancer, especially high-grade disease and carcinoma in situ (CIS). It is very good at catching high-grade cancer but misses low-grade tumors (they shed bland-looking cells). So a negative cytology never rules out bladder cancer; cystoscopy remains the gold standard. Cytology is an add-on, most useful when you suspect aggressive disease.

PSA in one line

PSA is a blood test, not a urine test, and it is covered in depth in Chapter 7. Just remember it is prostate-specific, not cancer-specific: BPH, prostatitis, recent catheterization, ejaculation, and DRE can all nudge it up.

Creatinine and the hidden obstruction

Creatinine estimates kidney function, but it hides a dangerous scenario. You have two kidneys. If one is completely obstructed (say, a stone blocking one ureter), the other healthy kidney compensates and your creatinine can stay perfectly normal while the blocked kidney is being damaged.

The lesson: a normal creatinine does NOT rule out obstruction of a single kidney. You need imaging to see hydronephrosis. Creatinine reliably rises only when both kidneys are affected, or the patient has a single functioning kidney.

PEARL: With two working kidneys, one can be silently obstructed while creatinine stays normal. Never use a normal creatinine to exclude obstruction; image the kidney.

Imaging: What Each Test Actually Shows

Renal and bladder ultrasound

Ultrasound is cheap, fast, radiation-free, and the first-line look at the kidneys. It shows well: hydronephrosis (a dilated collecting system, the fingerprint of obstruction), kidney size, cysts versus solid masses, and the bladder wall and post-void residual (how much urine is left after voiding).

It misses small and mid-ureteral stones (bowel gas blocks the view) and the fine detail a CT gives. It is operator-dependent. Great for "is there hydro?" and "is this a cyst?", weaker for "where exactly is the stone?"

CT KUB (non-contrast CT of kidneys, ureters, bladder)

This is the stone study. It is done WITHOUT contrast on purpose: stones are dense and bright on their own, and IV contrast (also bright) would hide a stone sitting in the ureter. Non-contrast CT catches essentially all stones regardless of composition (even the radiolucent ones invisible on plain X-ray) and reports size, location, and degree of obstruction. It is the gold standard for acute flank pain from stones (Chapters 4 and 13).

CT urogram

This is the upper-tract and hematuria study: a multiphase CT with contrast designed to see the entire lining of the urinary tract. The phases, one line each:

- Non-contrast phase: finds stones and calcifications.
- Nephrographic (parenchymal) phase: contrast fills the kidney tissue and shows renal masses.
- Excretory (delayed) phase: contrast is peed out into the collecting system and ureters, outlining the lining to catch urothelial tumors.

CT urogram is the standard imaging in the workup of gross hematuria (Chapter 3).

MRI prostate

Multiparametric MRI of the prostate is used to find and stage prostate cancer and to target biopsies. Findings are graded on the PI-RADS scale, roughly 1 to 5, where 1 means very unlikely to be significant cancer and 5 means very likely. A high PI-RADS lesion can be targeted during biopsy, improving the hit rate on meaningful cancer. Think of PI-RADS as a suspicion score for a prostate spot (Chapters 7 and 17).

VCUG and retrograde urethrogram

Both use contrast and X-ray to study the lower tract, but in opposite directions.

- Voiding cystourethrogram (VCUG): fill the bladder with contrast through a catheter, then image while the patient voids. It shows vesicoureteral reflux (contrast running backward up the ureters) and the posterior urethra. It is the key pediatric test for reflux and posterior urethral valves (Chapter 21).
- Retrograde urethrogram (RUG): inject contrast up the urethra from the meatus. It maps urethral strictures and is the test for suspected urethral injury (blood at the meatus after trauma, Chapter 16). You do a RUG before placing a catheter in trauma.

Nuclear renography

A nuclear renal scan (for example MAG3) uses a radiotracer to measure two things: split function (what percent of total kidney work each kidney does) and drainage (whether an apparent blockage is truly obstructing). It answers "is this hydronephrosis actually obstructing, and is this kidney worth saving?"

Master table: clinical question to best first test

Clinical question	Best first test
Acute flank pain, possible stone	Non-contrast CT KUB
Gross hematuria, upper-tract evaluation	CT urogram (plus cystoscopy and cytology)
Is there hydronephrosis or obstruction?	Renal ultrasound
Post-void residual or retention	Bladder ultrasound (bladder scan)
Characterize a renal mass	CT or MRI with contrast
Suspicious prostate before biopsy	Multiparametric MRI prostate (PI-RADS)
Suspected bladder tumor	Cystoscopy (plus cytology)
Vesicoureteral reflux (child)	VCUG
Suspected urethral injury (trauma)	Retrograde urethrogram
Split kidney function or true obstruction	Nuclear renography (MAG3)
Scrotal pain or mass, possible torsion	Scrotal Doppler ultrasound

Key Points

- Dipstick screens chemically; microscopy confirms. Always confirm dipstick hematuria with microscopy.
- Nitrites are specific, leukocyte esterase is sensitive.
- Dipstick blood with no red cells on microscopy means myoglobin or hemoglobin; think rhabdomyolysis.
- Do not treat asymptomatic bacteriuria except in pregnancy or before urologic surgery.
- Cytology catches high-grade urothelial cancer but misses low-grade; cystoscopy is the gold standard.
- A normal creatinine does not rule out obstruction of one kidney.
- CT KUB is non-contrast on purpose (contrast hides stones); CT urogram is the hematuria and upper-tract study.
- Ultrasound answers "is there hydro?"; nuclear renography answers "is it truly obstructing and is the kidney working?"

Chapter 23: Catheters, Scopes, and Common Procedures

Urethral Catheterization Done Properly

Placing a Foley is the most common urologic procedure and the one students are handed first. Done right, it is smooth and clean. Done wrong, it causes trauma, infection, and pain.

Male catheterization, step by step

1. Gather everything first: catheter kit, an appropriate-size Foley (16 Fr is a good adult default), sterile lubricant (ideally lidocaine jelly), a syringe of sterile water for the balloon, and a drainage bag.
2. Position the patient supine. Open the kit and set up your sterile field.
3. Put on sterile gloves and drape.
4. Hold the penis with your non-dominant hand (now "dirty," it stays put). Retract the foreskin if present.
5. Clean the glans in circles from the meatus outward with antiseptic, using the dominant "clean" hand.
6. Instill lidocaine lubricant generously into the urethra and give it a minute. Lubrication is not optional.
7. Hold the penis upward at about 90 degrees to straighten the urethra. Insert the catheter with steady, gentle pressure all the way to the hub (the Y bifurcation).
8. Wait for urine return BEFORE inflating the balloon.
9. Inflate the balloon with the stated volume of sterile water (usually 10 mL).
10. Gently pull back until the balloon seats at the bladder neck. Connect the bag.
11. REDUCE THE FORESKIN back over the glans.

Female catheterization

Same sterile principles. The challenge is anatomy: the female urethra is short and the meatus can be hard to see. Position with knees flexed and apart. Spread the labia with the non-dominant hand and keep them spread (that hand is now dirty). Identify the meatus above the vaginal opening. If the catheter goes into the vagina by mistake, leave it there as a landmark, place a fresh catheter into the urethra just above it, then remove the misplaced one.

Common errors

- Inflating the balloon before seeing urine (a balloon in the urethra means injury).
- Skimping on lubricant or numbing jelly.
- Not advancing far enough in men (urine can return before the balloon is safely in the bladder; always advance to the hub).
- Forgetting to reduce the foreskin.

WARNING: In an uncircumcised man, always pull the foreskin back over the glans after the catheter is in. A foreskin left retracted can swell into a paraphimosis, a painful emergency that can cut off blood flow to the glans.

Catheter types and sizes

French (Fr) sizing measures the outer circumference: 1 Fr equals one-third of a millimeter in diameter. Bigger number means bigger catheter.

Type	What it is	When to use
Standard Foley (2-way)	One channel to drain, one to inflate the balloon	Routine drainage
Coudé	Foley with a curved, firmer tip	Difficulty passing, especially BPH (the curve rides over the prostate); point the tip up
3-way	Extra channel for continuous bladder irrigation (CBI)	Gross hematuria or clots, post-TURP; larger (20 to 24 Fr)
Straight (in-and-out)	No balloon, single use	Intermittent catheterization, one-time drainage or sample
Suprapubic	Placed through the abdominal wall into the bladder	Long-term drainage, urethral injury or blockage

Typical adult sizes are 14 to 16 Fr for routine drainage and 18 to 24 Fr three-way when you need to flush out clots (a bigger channel clears clots better).

PEARL: Bleeding and clots call for a BIGGER catheter, not a smaller one. A three-way 20 to 24 Fr lets you run irrigation and evacuate clots; a tiny catheter just clogs.

The difficult catheter: what to try, what never to force

When a routine catheter will not pass:

1. Stop and reassess. Do not force. Forcing creates false passages and bleeding.
2. Add more lubricant and lidocaine jelly, give more time, and improve penile stretch and angle.
3. Try a coudé catheter with the tip pointing up (toward 12 o'clock) in a man with a big prostate.
4. Consider a slightly larger, firmer catheter (a firm catheter sometimes passes a floppy bladder neck better than a small soft one). Do not jump straight to tiny sizes.
5. If it still will not pass, call urology. They may use a guidewire, a filiform and follower, or place it under cystoscopic guidance.

Absolute rules:

- NEVER inflate the balloon unless you have free urine flow or are certain the catheter is in the bladder. Inflating in the urethra tears it.

- NEVER force against firm resistance.
- If there is blood at the urethral meatus after trauma, do NOT attempt a catheter. Get a retrograde urethrogram first to rule out urethral injury (Chapter 16).

WARNING: Blood at the meatus after trauma, a high-riding prostate, or scrotal and perineal bruising means possible urethral injury. Do not pass a catheter. Get a retrograde urethrogram first.

Suprapubic catheters

A suprapubic catheter (SPC) drains the bladder through a small tube placed through the lower abdominal wall, above the pubic bone, straight into the bladder. It is used when the urethral route is impossible or undesirable: urethral stricture or injury, long-term catheter needs (more comfortable, less urethral erosion), or after certain surgeries. The bladder must be full and visible on ultrasound before puncture so you do not hit bowel.

Living with a catheter: leg bags and flip valves

Patients going home with a catheter need basic counseling:

- A leg bag straps to the thigh under clothing for daytime; a larger night bag hangs by the bed and holds more.
- Keep the bag **BELOW** the level of the bladder so urine drains downhill and does not flow back.
- A flip-flow valve is a tap that replaces the bag; the patient opens it to drain periodically, which keeps the bladder cycling (filling and emptying). Not for everyone, but useful.
- Secure the catheter to the leg to avoid tugging, drink normally, and watch for no drainage, pain, or fever.

Scopes and Stents

Cystoscopy

Cystoscopy is looking inside the urethra and bladder with a camera. Two flavors:

- Flexible: a bendable scope, done awake in clinic with local lidocaine jelly. Used for surveillance and diagnosis. Patients feel pressure, an urge to void, and brief stinging, not usually severe pain.
- Rigid: a straight scope, done under anesthesia, which lets bigger instruments pass (biopsy, resection, stent placement). Used for procedures.

Afterward, patients feel some burning, a little blood in the urine, and frequency for a day or two. They should push fluids.

Ureteral stents

A ureteral stent (double-J or "JJ") is a soft hollow tube that sits with one curled end in the kidney and the other in the bladder, keeping the ureter open and draining. It is placed to relieve obstruction (stone, tumor, swelling after ureteroscopy) or to protect a ureter after surgery.

Why they hurt: the bladder end irritates the bladder wall, and the stent can let urine reflux up to the kidney with each void. Classic stent symptoms to counsel about are flank pain when voiding (reflux up the stent), urinary frequency, urgency and burning, blood-tinged urine, and pelvic discomfort. These are expected, not necessarily a complication, and they resolve when the stent comes out. Alpha-blockers and anticholinergics can ease them.

WARNING: A forgotten stent is a real and serious problem. Left in too long, a stent encrusts with stone, blocks, and can be very hard to remove or can damage the kidney. Every stent needs a documented removal or exchange plan, and the patient must be told they have one.

The OR Menu: What You Are Watching

Students often stand in the OR unsure what is happening. Here is the common menu in plain language: what it is, why it is done, and what you will see.

Bladder and prostate

TURBT (transurethral resection of bladder tumor). A scope goes through the urethra and a wire loop shaves out a bladder tumor. It both diagnoses (giving tissue and depth) and treats non-muscle-invasive bladder cancer. You will see the surgeon working entirely off a video screen, with chips of tumor collected for pathology.

TURP (transurethral resection of the prostate). The classic BPH operation: a loop resects obstructing prostate tissue from the inside to open the channel. You will see continuous irrigation and, afterward, a three-way catheter running CBI to keep the pink drainage clear.

HoLEP (holmium laser enucleation of the prostate). A laser shells the whole obstructing adenoma off its capsule (like scooping the flesh out of an orange rind), then a morcellator chops and removes it. Same goal as TURP, works well for very large glands, with less bleeding. You will see two steps: enucleation, then morcellation.

Prostate vaporization (for example GreenLight laser). Instead of removing tissue in chips, a laser vaporizes the obstructing prostate. Good for patients on blood thinners because bleeding is minimal, but it leaves little tissue for pathology.

Stones

Ureteroscopy (URS) with laser lithotripsy. A thin scope passes up the urethra, bladder, and ureter to the stone; a holmium laser fragments or dusts it, and a basket may retrieve pieces. Very common for ureteral and smaller kidney stones. A stent is often left afterward. You will watch it all on screen.

PCNL (percutaneous nephrolithotomy). For large kidney stones (roughly over 2 cm, or staghorn). A tract is made through the flank directly into the kidney and stones are broken and removed through it. The patient is often prone. You will see fluoroscopy (live X-ray) and possibly a nephrostomy tube left afterward.

ESWL (extracorporeal shock wave lithotripsy). Non-invasive: focused shock waves from outside the body break a stone so the fragments pass in the urine. No incision. Best for smaller, favorably located stones. You may not even be in an OR for this.

Kidney

Radical nephrectomy. Remove the whole kidney (with surrounding fat, sometimes the adrenal) for larger or central kidney cancers. Robotic and laparoscopic approaches are minimally invasive with small ports; open uses a larger incision for big or complex tumors.

Partial nephrectomy. Remove just the tumor and spare the rest of the kidney, preferred for small renal masses to preserve function. Often robotic. You may see the renal artery clamped ("warm ischemia") during the excision and repair.

Prostate and bladder cancer surgery

Radical prostatectomy. Remove the entire prostate and seminal vesicles, then reconnect bladder to urethra, for localized prostate cancer. Usually robotic today. Key counseling themes are continence and erectile function recovery.

Radical cystectomy with urinary diversion. Remove the bladder for muscle-invasive bladder cancer, then reroute urine, either to a stoma (ileal conduit) or a neobladder built from bowel. A big operation. See Chapter 18 for the diversion options.

Scrotum, penis, and office procedures

Prostate biopsy. Needle samples of the prostate, guided by ultrasound. Traditionally transrectal (through the rectal wall), increasingly transperineal (through the skin between scrotum and anus) because it lowers infection risk. Often MRI-targeted now.

Vasectomy. Divide and seal the vas deferens on each side for permanent male contraception. A quick office procedure under local. Not effective immediately: a follow-up semen sample must confirm no sperm.

Circumcision. Remove the foreskin. Indications include phimosis, recurrent infection, or elective and cultural reasons.

Hydrocelectomy. Drain and repair a hydrocele (fluid around the testis) when it is large or symptomatic.

Orchidopexy. Fix a testis into the scrotum: electively for an undescended testis (Chapter 21), or urgently on both sides in testicular torsion to prevent future twisting (Chapter 8).

Procedure-to-indication table

Procedure	Main indication
TURBT	Non-muscle-invasive bladder tumor (diagnose and treat)
TURP / HoLEP / vaporization	Obstructing BPH
Ureteroscopy plus laser	Ureteral and smaller kidney stones
PCNL	Large or staghorn kidney stones
ESWL	Small, favorably located stones
Radical nephrectomy	Larger or central kidney cancer
Partial nephrectomy	Small renal mass (spare the kidney)
Radical prostatectomy	Localized prostate cancer
Radical cystectomy plus diversion	Muscle-invasive bladder cancer
Prostate biopsy	Elevated PSA, abnormal DRE, or MRI lesion
Vasectomy	Permanent contraception
Circumcision	Phimosis, recurrent infection, elective
Hydrocelectomy	Symptomatic hydrocele
Orchidopexy	Undescended testis; testicular torsion

Key Points

- Always wait for urine before inflating a catheter balloon, and always reduce the foreskin afterward.
- Blood at the meatus after trauma means retrograde urethrogram first, no catheter.
- Bleeding and clots need a bigger three-way catheter for irrigation, not a smaller one.
- Never force a catheter; if it will not pass, escalate to a coudé, then call urology.
- Stents cause flank pain on voiding, urgency, and hematuria; these are expected and reversible, but never forget a stent.
- TURP, HoLEP, and vaporization treat BPH; TURBT treats bladder tumors; know which scope does what.
- Stone surgery scales with size: ESWL and ureteroscopy for smaller stones, PCNL for large or staghorn.
- Kidney cancer: partial nephrectomy spares the kidney for small masses, radical for larger tumors.

Chapter 24: Fifty Questions You Will Actually Get Asked

Q1. Where does the ureter narrow, and why does it matter? At three points: the ureteropelvic junction (UPJ), where it crosses the iliac vessels at the pelvic brim, and the ureterovesical junction (UVJ). Stones tend to lodge at these spots.

Q2. Name the layers of the spermatic cord and where they come from. External spermatic fascia (from the external oblique aponeurosis), the cremasteric muscle and fascia (from the internal oblique), and internal spermatic fascia (from the transversalis fascia). They are picked up as the testis descends through the abdominal wall.

Q3. What are the zones of the prostate and what happens in each? The peripheral zone is where most cancers arise and what you feel on DRE. The transition zone surrounds the urethra and is where BPH grows. The central zone surrounds the ejaculatory ducts.

Q4. Why are varicoceles more common on the left? The left gonadal vein drains into the left renal vein at a right angle, while the right drains directly into the IVC. The left side has higher back-pressure, so varicoceles are usually left-sided.

Q5. What is the trigone? The smooth triangular area at the bladder base bounded by the two ureteral orifices and the internal urethral opening. It is a useful landmark on cystoscopy.

Q6. What is the most common stone composition? Calcium oxalate. Calcium-based stones overall are by far the most common.

Q7. Which stones are radiolucent, and how do you see them? Uric acid stones are the classic radiolucent stones (invisible on plain X-ray). You see them on non-contrast CT, which detects essentially all stones.

Q8. What stone size usually passes on its own? Stones under 5 mm frequently pass spontaneously. Stones over 10 mm rarely pass and usually need intervention. The 5 to 10 mm range is variable.

Q9. A patient has an obstructing stone plus fever and looks septic. What is this and what do you do? An infected, obstructed kidney, a urologic emergency. Antibiotics alone are not enough; the system must be decompressed urgently with a ureteral stent or a percutaneous nephrostomy.

Q10. Which stones are linked to infection, and by which bacteria? Struvite (magnesium ammonium phosphate) stones, driven by urease-producing bacteria such as *Proteus*. They can grow into staghorn stones.

Q11. What is the time window to save a torsed testis? Generally within about 6 hours of onset. Salvage rates fall sharply after that, so torsion is a clinical diagnosis and imaging must not delay the OR.

Q12. What exam findings suggest testicular torsion? A high-riding testis, often with a horizontal (transverse) lie, an absent cremasteric reflex, and no relief with elevation (a negative Prehn sign).

Q13. Why use an inguinal approach for a suspected testicular tumor rather than a scrotal one? To avoid seeding tumor into the scrotum and disrupting the normal lymphatic drainage. A radical inguinal orchiectomy removes the testis and cord together; you never biopsy a suspected tumor through the scrotum.

Q14. What is the bell-clapper deformity? A congenital defect where the tunica vaginalis attaches too high, leaving the testis hanging free like a bell clapper. It predisposes to torsion and is usually bilateral, which is why the other side is also fixed.

Q15. How do you tell torsion from epididymitis at the bedside? Torsion is sudden, severe, with a high-riding testis and absent cremasteric reflex. Epididymitis comes on more gradually with tenderness localized to the epididymis, often with urinary symptoms, and pain may ease with elevation.

Q16. A patient has painless gross hematuria. What is your leading concern? Bladder cancer (urothelial carcinoma) until proven otherwise. Painless visible hematuria demands cystoscopy and upper-tract imaging.

Q17. What are the testicular tumor markers and how do they differ by type? AFP, beta-hCG, and LDH. AFP is never elevated in pure seminoma, so a raised AFP means a non-seminomatous element. Beta-hCG can rise in either, and LDH reflects tumor burden.

Q18. What does the Gleason score mean? It grades prostate cancer by adding the two most common architectural patterns (each scored 1 to 5), reported as, for example, 3+4=7. Higher scores mean more aggressive cancer.

Q19. What is BCG and what is it used for? Bacillus Calmette-Guerin, a live attenuated form of the TB organism, given intravesically as immunotherapy for high-risk non-muscle-invasive bladder cancer and carcinoma in situ.

Q20. What are the management options for a small renal mass? Active surveillance, partial nephrectomy (the preferred treatment when intervention is needed), and thermal ablation. The goal is cancer control while preserving kidney function.

Q21. What is the most common type of kidney cancer? Clear cell renal cell carcinoma.

Q22. What is the classic triad of renal cell carcinoma, and how often do you see it? Flank pain, hematuria, and a palpable mass. It is classic but uncommon and a sign of advanced disease; most RCCs today are found incidentally on imaging.

Q23. What is the biggest modifiable risk factor for bladder cancer? Cigarette smoking. Occupational aromatic amine exposure is another.

Q24. What is the most common testicular cancer? Germ cell tumors account for the vast majority, and seminoma is the most common single subtype.

Q25. Where do most prostate cancers arise, and how are they usually detected? In the peripheral zone. They are usually detected through an elevated PSA or an abnormal DRE, then confirmed by biopsy.

Q26. How do alpha-blockers work for BPH, and what are their side effects? They relax smooth muscle at the bladder neck and prostate, easing outflow within days. Side effects include orthostatic hypotension, dizziness, retrograde ejaculation, and intraoperative floppy iris syndrome during cataract surgery.

Q27. How do 5-alpha-reductase inhibitors work, and how fast? They block conversion of testosterone to DHT, shrinking the prostate over months (not days). They lower PSA by roughly half and can cause decreased libido, erectile dysfunction, and gynecomastia.

Q28. Which BPH drug helps most with a very large prostate? A 5-alpha-reductase inhibitor, because it actually shrinks glandular tissue. It is often combined with an alpha-blocker for both fast and durable relief.

Q29. Which erectile dysfunction drug also treats BPH symptoms? Tadalafil, a PDE5 inhibitor, is used for lower urinary tract symptoms from BPH.

Q30. Why be cautious giving anticholinergics to a man with BPH? They can worsen bladder emptying and precipitate acute urinary retention when there is bladder outlet obstruction. Check that he empties adequately first.

Q31. What is post-obstructive diuresis? After relieving a chronically obstructed, high-volume bladder or kidney, the patient can pour out large volumes of urine and lose fluid and electrolytes. Monitor urine output and replace as needed.

Q32. When you decompress a very full obstructed bladder, do you drain it slowly or fully? Drain it fully. The old teaching to clamp intermittently is not necessary; just watch for post-obstructive diuresis and some transient hematuria.

Q33. How do acute and chronic urinary retention differ? Acute retention is sudden, painful, and usually a smaller volume. Chronic retention builds up painlessly to large volumes and carries a higher risk of post-obstructive diuresis and upper-tract damage.

Q34. There is blood at the meatus after a pelvic injury. Can you place a catheter? No. Blood at the meatus suggests urethral injury. Get a retrograde urethrogram first; a catheter could worsen a partial tear into a complete one.

Q35. What is paraphimosis and why is it an emergency? It is a retracted foreskin trapped behind the glans that swells and cannot be reduced, which can choke off blood flow to the glans. It needs prompt manual reduction.

Q36. How is phimosis different from paraphimosis? Phimosis is a foreskin that cannot be retracted over the glans; it is usually chronic and not an emergency. Paraphimosis is a retracted foreskin stuck behind the glans and is an emergency.

Q37. What is continuous bladder irrigation for? Running fluid through a three-way catheter to flush out blood and prevent clot formation, commonly after TURP or with significant gross hematuria.

Q38. Do you treat asymptomatic bacteriuria in a pregnant woman? Yes. In pregnancy it raises the risk of pyelonephritis and preterm birth, so it is screened for and treated.

Q39. Do you treat asymptomatic bacteriuria in an elderly or catheterized patient? No. In elderly or chronically catheterized patients without symptoms, treating it does not help and drives resistance.

Q40. What is the most common organism in a urinary tract infection? E. coli.

Q41. What makes a UTI complicated rather than uncomplicated? Features like male sex, pregnancy, a structural or functional abnormality, a catheter, immunocompromise, or a UTI involving the kidney. Uncomplicated means an otherwise healthy, non-pregnant woman with a lower-tract infection.

Q42. Which patients get emphysematous pyelonephritis and why does it matter? Poorly controlled diabetics. It is a gas-forming, necrotizing kidney infection that is a surgical emergency, not something antibiotics alone will fix.

Q43. What are the long-term risks of an undescended testis? Reduced fertility and an increased risk of testicular cancer, plus higher torsion and hernia risk. Orchidopexy allows the testis to be examined and helps fertility but does not fully erase the cancer risk.

Q44. What causes bladder outlet obstruction in a newborn boy, and how is it diagnosed? Posterior urethral valves, the most common cause in male infants. A voiding cystourethrogram is the key diagnostic test.

Q45. By what age should an undescended testis be brought down? Orchidopexy is generally done by 6 to 12 months of age and before about 18 months, since spontaneous descent is unlikely after the first few months.

Q46. What test do you order to look for vesicoureteral reflux? A voiding cystourethrogram (VCUG), which shows contrast refluxing up the ureters during voiding.

Q47. What is the most common pathologic cause of antenatal hydronephrosis? Ureteropelvic junction (UPJ) obstruction.

Q48. What benign things can raise the PSA? BPH, prostatitis, a UTI, urinary retention, recent catheterization or instrumentation, recent ejaculation, and to a small degree a DRE. This is why PSA is prostate-specific, not cancer-specific.

Q49. What does a low percent-free PSA suggest? A lower proportion of free PSA (relative to total) is associated with a higher likelihood of prostate cancer, which helps decide on biopsy in the borderline range.

Q50. How does a 5-alpha-reductase inhibitor change PSA interpretation? It roughly halves the PSA after several months. To interpret a value on one of these drugs, double it, and treat a rising PSA as a warning sign.

Chapter 25: Quick Reference

1. Catheter Sizing Quick Table

Situation	Typical size	Note
Adult male, routine	14 to 16 Fr	Start here for most men
Adult female, routine	14 to 16 Fr	Shorter urethra, same sizes
Gross hematuria or clots	20 to 24 Fr, 3-way	Bigger channel for irrigation and clot evacuation
BPH, hard to pass	16 Fr coudé	Curved tip up, rides over the prostate
Pediatric	6 to 10 Fr	Size to the child; smaller for infants
Intermittent self-cath	12 to 14 Fr straight	No balloon, single use

2. Stone Management by Size and Location (General Guide Only)

Stone	Typical approach
Ureteral, under 5 mm	Usually passes; hydration, analgesia, medical expulsive therapy
Ureteral, 5 to 10 mm	Trial of passage with MET, or ureteroscopy or ESWL
Ureteral, over 10 mm	Intervention (ureteroscopy or ESWL)
Kidney, under 10 mm	ESWL, ureteroscopy, or surveillance if asymptomatic
Kidney, 10 to 20 mm	ESWL or ureteroscopy
Kidney, over 20 mm or staghorn	PCNL
Infected and obstructed	Emergency decompression (stent or nephrostomy) plus antibiotics

This is an approximate teaching guide; real decisions depend on the patient, anatomy, and local practice.

3. Common Urology Medications

Class	Examples	Key side effects	Exam pearl
Alpha-blockers	Tamsulosin, alfuzosin, doxazosin	Orthostatic hypotension, dizziness, retrograde ejaculation, floppy iris	Work within days; also used as MET for stones; ask before cataract surgery
5-alpha-reductase inhibitors	Finasteride, dutasteride	Decreased libido, ED, gynecomastia	Shrink the prostate over months; halve the PSA (double the reading); reduce hematuria
Anticholinergics	Oxybutynin, tolterodine, solifenacin	Dry mouth, constipation, blurred vision, confusion in elderly	For overactive bladder; can cause retention in bladder outlet obstruction
Beta-3 agonist	Mirabegron	Hypertension	Overactive bladder alternative; fewer cognitive effects, better for elderly
PDE5 inhibitors	Sildenafil, tadalafil	Headache, flushing, visual changes	Contraindicated with nitrates; tadalafil also treats BPH symptoms
Medical expulsive therapy	Tamsulosin (alpha-blocker)	As above	Relaxes distal ureter to help small stones pass

4. Call Urology NOW

- **Testicular torsion:** acute severe scrotal pain, high-riding testis, save within about 6 hours.
- **Infected obstructed kidney:** obstructing stone plus fever or sepsis, needs urgent decompression.
- **Fournier gangrene:** necrotizing infection of the perineum or genitals, surgical emergency.
- **Priapism:** painful erection lasting over 4 hours.
- **Paraphimosis:** retracted foreskin trapped behind the glans, swelling.
- **Gross hematuria with clot retention:** bladder full of clot, cannot void.
- **Suspected urethral or renal injury:** blood at the meatus, pelvic trauma.
- **Acute urinary retention:** painful, cannot void, needs drainage.
- **Penile fracture:** sudden pop and detumescence during intercourse.

5. Normal Values Students Forget

Value	Rough number	Note
Post-void residual (normal)	Under about 50 mL	Adult
Post-void residual (abnormal)	Over about 200 mL	50 to 200 mL is equivocal (approximate)
Bladder capacity	About 400 to 500 mL	Adult
Adequate urine output	Over 0.5 mL/kg/hr	Oliguria is roughly under 400 to 500 mL/day
PSA traditional cutoff	Under 4 ng/mL	A single threshold, imperfect
PSA age-specific reference ranges (historical, Oesterling 1993)	40s under 2.5; 50s under 3.5; 60s under 4.5; 70s under 6.5 ng/mL	Current guidelines lean on a baseline PSA, its trend, and risk factors rather than age bands alone

6. Pre-Rounding Checklist for Urology Inpatients

- **Vitals and fevers:** any spike suggests urosepsis or a line or wound infection.
- **Urine output:** total overnight and the trend; record each source separately (Foley, nephrostomy, drains).
- **Catheter:** in or out, draining, urine color (clear versus bloody), and whether it is a three-way.
- **Irrigation (CBI):** running or off, is the outflow clearing, is inflow matching outflow, any clots.
- **Drains:** JP or others, volume and character of output.
- **Stents and nephrostomy tubes:** present, draining, and what is the plan (removal or exchange).
- **Creatinine and electrolytes:** the trend, especially after obstruction relief.
- **Hemoglobin:** if there was bleeding or a resection.
- **Pain, bowel function, and diet:** watch for post-op ileus.
- **Mobility and DVT prophylaxis.**
- **The plan:** trial of void, catheter or stent removal, discharge criteria.

7. Rotation Day-One Cheat Sheet

- Know the plumbing: kidney to ureter to bladder to urethra, and the three prostate zones.
- Learn to place a Foley cleanly and always reduce the foreskin afterward.
- Recognize the common consults: retention, hematuria, stones, infection, and scrotal pain.
- Never miss the emergencies: torsion, infected obstructed kidney, Fournier gangrene, priapism, and paraphimosis.
- Be able to read a urinalysis and spot a stone on a CT KUB.
- On rounds, always check catheters, irrigation, drains, urine output, creatinine, and fevers.
- Carry gloves and know where the bladder scanner lives.
- Ask for the day's OR list and read the cases the night before.
- Protect patient privacy at all times.

Glossary

5-ARI: 5-alpha-reductase inhibitor; shrinks the prostate and lowers PSA (finasteride, dutasteride).

Alpha-blocker: smooth-muscle relaxant that eases bladder-neck and prostate outflow in BPH.

Anuria: absence of urine output.

ASB (asymptomatic bacteriuria): bacteria in the urine without symptoms; usually not treated.

AUR: acute urinary retention; sudden painful inability to void.

BCG: Bacillus Calmette-Guerin, intravesical immunotherapy for high-risk bladder cancer.

BPH: benign prostatic hyperplasia; non-cancerous prostate growth causing outflow symptoms.

CBI: continuous bladder irrigation; flushing the bladder to prevent clots.

CIS: carcinoma in situ; flat high-grade urothelial cancer.

Coudé: a urethral catheter with a curved firm tip for a difficult pass.

Cryptorchidism: an undescended testis.

Cysto (cystoscopy): camera examination of the urethra and bladder.

DRE: digital rectal exam; feeling the prostate and rectal wall.

Dysuria: painful or burning urination.

ED: erectile dysfunction.

Epididymitis: inflammation or infection of the epididymis.

ESWL: extracorporeal shock wave lithotripsy; breaking stones with external shock waves.

Foley: an indwelling urethral catheter held in place by a balloon.

Fournier gangrene: necrotizing infection of the perineum and genitals; a surgical emergency.

Fr (French): catheter sizing unit based on outer circumference.

Frequency: voiding more often than normal.

Gleason score: grading system for prostate cancer aggressiveness.

GU: genitourinary.

Hematuria: blood in the urine (gross if visible, microscopic if only on testing).

HoLEP: holmium laser enucleation of the prostate for BPH.

Hydrocele: fluid collection around the testis.

Hydronephrosis (hydro): dilation of the kidney collecting system, usually from obstruction.

Ileal conduit: urinary diversion using a bowel segment draining to a stoma.

IPSS: International Prostate Symptom Score; a questionnaire for BPH symptoms.

KUB: kidneys, ureters, and bladder; a plain film or CT region.

LUTS: lower urinary tract symptoms (frequency, urgency, weak stream, nocturia).

MET: medical expulsive therapy; an alpha-blocker to help a stone pass.

MIBC: muscle-invasive bladder cancer.

Neobladder: a bladder reconstructed from bowel after cystectomy.

Nephrostomy: a tube draining the kidney through the skin of the flank.

NMIBC: non-muscle-invasive bladder cancer.

Nocturia: waking at night to urinate.

OAB: overactive bladder; urgency with or without urge incontinence.

Oliguria: abnormally low urine output.

Orchidopexy: surgical fixation of a testis in the scrotum.

Orchiectomy: surgical removal of a testis.

Paraphimosis: a retracted foreskin trapped behind the glans; an emergency.

PCNL: percutaneous nephrolithotomy; removing large kidney stones through a flank tract.

Phimosis: a foreskin that cannot be retracted over the glans.

PI-RADS: a 1 to 5 suspicion score for prostate cancer on MRI.

Priapism: a prolonged, often painful erection; an emergency over 4 hours.

PSA: prostate-specific antigen; a blood marker for prostate conditions.

PVR: post-void residual; urine left in the bladder after voiding.

Pyelonephritis (pyelo): infection of the kidney.

RCC: renal cell carcinoma; the most common kidney cancer.

Retrograde ejaculation: semen passing backward into the bladder.

RPLND: retroperitoneal lymph node dissection, used in testicular cancer.

RUG: retrograde urethrogram; contrast study mapping the urethra.

SPC: suprapubic catheter; bladder drainage through the abdominal wall.

Staghorn: a large branching stone filling the kidney collecting system.

Stent (double-J): a tube from kidney to bladder keeping the ureter open.

Stricture: a scar narrowing of the urethra or ureter.

Struvite: an infection stone from urease-producing bacteria.

TRUS: transrectal ultrasound of the prostate.

TURBT: transurethral resection of a bladder tumor.

TURP: transurethral resection of the prostate for BPH.

TUR syndrome: dilutional hyponatremia from irrigation fluid absorbed during TURP.

UPJ: ureteropelvic junction; a common site of obstruction and stones.

Urgency: a sudden compelling need to void.

Urodynamics: pressure and flow testing of bladder function.

URS: ureteroscopy; scope passed up to the ureter or kidney.

Urosepsis: sepsis originating from the urinary tract.

UTI: urinary tract infection.

UVJ: ureterovesical junction; where the ureter enters the bladder.

Varicocele: dilated veins of the scrotum, usually left-sided.

VCUG: voiding cystourethrogram; the test for reflux and posterior urethral valves.

VUR: vesicoureteral reflux; urine flowing backward from bladder to ureter.

PART 5

Board-Style Practice Questions

Board-Style Practice Questions (MCCQE and USMLE Level)

This section is a bank of 88 original, single-best-answer clinical vignettes written at the level of the MCCQE Part I and the USMLE Step 1 and Step 2 CK. They are grouped by topic and cover the same material as the chapters you just read, now tested the way exams actually test it: a short clinical story, a focused question, five options, and one best answer.

Each question is written in learning mode. The answer, a full explanation of why the correct choice is right and why each other option is wrong, and a one-line educational objective all follow immediately. To self-test, cover everything below the options, commit to an answer, then read on.

These questions are entirely original teaching items written for this book. They are not reproduced from any question bank or examination.

How to use this bank. First pass: do a topic block after reading its chapter, untimed, and read every explanation even when you answer correctly. Second pass: a week later, redo the ones you missed. The educational objective is the single sentence worth memorizing from each item.

Educational use only. These questions are a study aid, not clinical guidance. Confirm every drug, dose, and management choice against current guidelines and your supervising physician before applying it to a patient.

Kidney Stones and Obstructive Uropathy

Question 1

A 44-year-old man comes to the emergency department with two hours of severe right-sided flank pain that comes in waves and radiates toward his groin. He is restless and cannot find a comfortable position. He is afebrile, blood pressure 138/84, heart rate 96. Urinalysis shows microscopic hematuria. He has no prior stone history and is not taking anticoagulants. Serum creatinine is normal.

Which of the following is the most appropriate initial imaging study?

- **A.** Contrast-enhanced CT of the abdomen and pelvis
- **B.** Renal and bladder ultrasonography
- **C.** Non-contrast CT of the abdomen and pelvis
- **D.** Plain abdominal radiograph (KUB)
- **E.** Magnetic resonance urography

Answer: C

Explanation. Non-contrast CT of the abdomen and pelvis is the first-line study for suspected acute stone disease because it detects stones of nearly all compositions, defines size and location, and reveals secondary signs of obstruction, with a sensitivity of roughly 96% and specificity of roughly 98%. A low-dose protocol keeps radiation acceptably low in an otherwise healthy adult, and the scan also identifies alternative diagnoses when the picture is atypical. Contrast is not needed to see a stone and can actually obscure a small calculus once the collecting system opacifies. Ultrasonography is a reasonable first choice in pregnancy or in young patients when minimizing radiation matters but is less sensitive for ureteral stones; a plain radiograph misses radiolucent stones and small calculi; MR urography lacks sensitivity for stones and is reserved for situations such as pregnancy when ultrasound is inconclusive.

Educational objective. Non-contrast CT is the first-line imaging test for suspected acute renal colic in adults, offering the highest sensitivity and specificity while defining stone size and location.

Question 2

A 33-year-old woman presents with left flank pain and one episode of vomiting. Non-contrast CT shows a 6 mm stone lodged in the distal left ureter near the bladder, with mild upstream hydronephrosis and no abscess. She is afebrile, her pain settles with a nonsteroidal anti-inflammatory drug, she tolerates oral fluids, and her serum creatinine is normal. Urinalysis shows hematuria without pyuria or nitrites.

Which of the following is the most appropriate next step in management?

- **A.** Discharge with an alpha-blocker (tamsulosin 0.4 mg once daily), analgesia, and urology follow-up
- **B.** Immediate ureteroscopy with laser lithotripsy
- **C.** Extracorporeal shock wave lithotripsy that day
- **D.** Admission for intravenous antibiotics
- **E.** Percutaneous nephrostomy

Answer: A

Explanation. A 6 mm distal ureteral stone in a stable, afebrile patient with controlled pain and normal renal function is a candidate for a trial of spontaneous passage supported by medical expulsive therapy. An alpha-blocker such as tamsulosin relaxes distal ureteral smooth muscle and improves passage rates specifically for stones in the 5 to 10 mm range located in the distal ureter. She should strain her urine, use analgesia as needed, and return for fever, uncontrolled pain, or persistent vomiting, with follow-up imaging in about four to six weeks. Immediate ureteroscopy and same-day shock wave lithotripsy are reasonable definitive options but are not required first-line for a stone likely to pass; intravenous antibiotics are unnecessary without evidence of infection; percutaneous nephrostomy is reserved for obstruction with infection or a failing kidney, neither of which is present.

Educational objective. For a stable patient with a 5 to 10 mm distal ureteral stone and no infection, first-line management is medical expulsive therapy with an alpha-blocker plus analgesia and a trial of passage.

Question 3

A 58-year-old woman with diabetes is brought in with rigors and confusion. Temperature is 39.2 C, blood pressure 88/52, heart rate 122. Non-contrast CT shows a 9 mm stone obstructing the mid-right ureter with moderate hydronephrosis. Urinalysis shows pyuria and positive nitrites; her white cell count and lactate are elevated. She receives intravenous fluids and broad-spectrum antibiotics per local guidelines, but her blood pressure remains low.

In addition to ongoing resuscitation, which of the following is the most appropriate next step?

- **A.** Continue antibiotics alone and reassess in 24 hours
- **B.** Emergency ureteroscopy with laser fragmentation and stone extraction
- **C.** Extracorporeal shock wave lithotripsy
- **D.** Urgent decompression of the collecting system with a nephrostomy tube or ureteral stent
- **E.** Oral antibiotics and discharge with close follow-up

Answer: D

Explanation. This is an obstructed, infected kidney with sepsis, one of the true emergencies in stone care. The infected urine is trapped behind the stone, so antibiotics alone cannot reach and clear the source; the collecting system must be drained urgently by either percutaneous nephrostomy or a retrograde ureteral stent, which are considered equivalent for decompression. Definitive stone treatment is deliberately deferred until the patient is stable and the infection is controlled, usually one to two weeks later. Antibiotics alone leave ongoing sepsis behind an undrained obstruction; primary ureteroscopy or shock wave lithotripsy manipulates an infected, obstructed system and can precipitate worsening sepsis; oral antibiotics and discharge are dangerous in a hypotensive, septic patient.

Educational objective. Fever or sepsis with an obstructing ureteral stone mandates urgent drainage (nephrostomy or stent) in addition to antibiotics, with definitive stone treatment postponed until the patient recovers.

Question 4

A 49-year-old woman has had several urinary tract infections over the past year, repeatedly growing *Proteus* species. She is currently afebrile and systemically well. Non-contrast CT shows a large branched calculus that fills the right renal pelvis and extends into several calyces, measuring about 3.5 cm across, with a urine pH of 7.5. Her renal function is preserved and a treated urine culture is now negative.

Which of the following is the most appropriate definitive treatment for this stone?

- **A.** Extracorporeal shock wave lithotripsy as monotherapy
- **B.** Percutaneous nephrolithotomy
- **C.** Flexible ureteroscopy alone
- **D.** Continued observation with suppressive antibiotics
- **E.** Alkalinization of the urine to dissolve the stone

Answer: B

Explanation. A large branched (staghorn) calculus is best treated with percutaneous nephrolithotomy, which is first-line for renal stones larger than about 2 cm and for staghorn stones because it achieves the highest single-procedure clearance. The clinical picture (recurrent *Proteus* infections, alkaline urine, a staghorn) points to a struvite, or magnesium ammonium phosphate, infection stone: urease-producing organisms split urea into ammonia, raising urine pH and precipitating the stone. Complete clearance of every fragment is essential because residual stone harbors bacteria and drives recurrence. Shock wave lithotripsy as monotherapy and ureteroscopy alone cannot reliably clear this stone burden; observation allows ongoing infection and renal damage; urinary alkalinization dissolves uric acid stones, not struvite, which already forms in alkaline urine.

Educational objective. Staghorn and large (greater than 2 cm) renal calculi are treated first-line with percutaneous nephrolithotomy, and a staghorn with recurrent *Proteus* infection and alkaline urine is typically struvite from urease-producing organisms.

Question 5

An 18-year-old man is evaluated for his fourth kidney stone since childhood. His younger sister has also passed stones. He is otherwise healthy and takes no medications. Urine microscopy shows flat, hexagonal crystals, and a urinary cyanide-nitroprusside screen is positive. His stones are only faintly visible on plain radiographs, and his urine is persistently acidic. Serum calcium and uric acid are normal.

Which of the following is the most likely composition of this patient's stones?

- **A.** Calcium oxalate
- **B.** Uric acid
- **C.** Struvite (magnesium ammonium phosphate)
- **D.** Calcium phosphate
- **E.** Cystine

Answer: E

Explanation. Recurrent stones beginning in childhood, a positive family history, and pathognomonic flat hexagonal crystals with a positive cyanide-nitroprusside test point to cystinuria. This is an autosomal recessive defect in the transporter that reabsorbs dibasic amino acids (cystine, ornithine, lysine, arginine) in the proximal tubule; of these only cystine is poorly soluble, so it precipitates in acidic urine. Treatment

centers on high fluid intake, alkalinizing the urine to a pH above 7.5, and a thiol binding agent such as tiopronin when needed. Calcium oxalate is the most common stone overall but does not form hexagonal crystals or present this way; uric acid stones lack cyanide-nitroprusside positivity; struvite is an infection stone forming in alkaline urine with a staghorn pattern; calcium phosphate forms in alkaline urine and is radiodense.

Educational objective. Cystine stones should be suspected in a young patient with recurrent stones, a family history, and hexagonal crystals, reflecting an autosomal recessive defect in dibasic amino acid transport.

Question 6

A 55-year-old man with obesity, type 2 diabetes, and gout presents with right flank pain. A plain abdominal radiograph shows no stone, but non-contrast CT reveals a 9 mm stone in the right renal pelvis. His pain is controlled, he is afebrile, and renal function is normal. Repeated urine testing shows a persistently low urine pH around 5.2. Serum uric acid is elevated.

Which of the following is the most appropriate initial step to dissolve this stone?

- **A.** Thiazide diuretic
- **B.** Acetazolamide
- **C.** Oral urinary alkalinization with potassium citrate, targeting a urine pH of 6.5 to 7.0
- **D.** Restriction of dietary calcium
- **E.** Immediate percutaneous nephrolithotomy

Answer: C

Explanation. A stone that is invisible on plain radiography but clearly seen on CT, forming in persistently acidic urine in a patient with gout, obesity, and diabetes, is a uric acid stone. Uric acid stones are unique in that they can often be dissolved medically rather than removed surgically: raising the urine pH into the 6.5 to 7.0 range with oral potassium citrate markedly increases uric acid solubility. Adequate hydration and, when the serum urate is high, allopurinol are useful adjuncts. A thiazide targets hypercalciuria in calcium stones, not uric acid; restricting dietary calcium is never appropriate and does not affect uric acid solubility; percutaneous nephrolithotomy is invasive and unnecessary when chemodissolution is likely to work; acetazolamide does raise urine pH but promotes calcium phosphate stone formation and is not used for this purpose.

Educational objective. Radiolucent stones forming in acidic urine are uric acid stones, which can often be dissolved with urinary alkalinization (potassium citrate to a urine pH of 6.5 to 7.0) rather than surgery.

Question 7

A 40-year-old healthy man has passed three calcium oxalate stones over the past five years and wants to reduce his risk of further stones. He eats a lot of salty processed food and drinks little water. His blood pressure, serum calcium, and renal function are normal. He asks specifically whether he should cut calcium out of his diet, since his stones contain calcium.

Which of the following is the most appropriate advice for long-term prevention?

- **A.** Restrict dietary calcium as much as possible
- **B.** Increase fluid intake to achieve a urine output above 2.5 L per day, reduce sodium, and maintain a normal dietary calcium intake
- **C.** Start allopurinol
- **D.** Increase animal protein intake
- **E.** Limit fluids in the evening to reduce nocturia

Answer: B

Explanation. Calcium oxalate is the most common stone type, and the cornerstone of prevention is increasing fluid intake to produce more than 2.5 L of urine per day, which is the single most effective lever. Reducing dietary sodium lowers urinary calcium excretion, and a normal calcium intake (roughly 1000 to 1200 mg per day from food) should be maintained. Restricting dietary calcium is a classic mistake: it frees intestinal oxalate for absorption, raising urinary oxalate and paradoxically increasing stone formation. Depending on a 24-hour urine collection, a thiazide (for hypercalciuria) or potassium citrate (for hypocitraturia) can be added. Allopurinol is reserved for hyperuricosuria, not routine calcium stones; increasing animal protein raises acid and uric acid load while lowering citrate; limiting evening fluids reduces urine volume and worsens risk.

Educational objective. For recurrent calcium oxalate stones, increase fluid and reduce sodium while maintaining normal dietary calcium; restricting calcium increases oxalate absorption and worsens stone risk.

Question 8

A 72-year-old man presents with lower abdominal discomfort and inability to void. A bladder scan shows more than one liter of urine, and an indwelling catheter drains 1400 mL. Over the next several hours he produces urine at roughly 300 mL per hour. He feels well, blood pressure is 128/76, and he is drinking freely. Serum sodium and potassium are monitored and remain near normal.

Which of the following is the most appropriate management?

- **A.** Clamp the catheter intermittently to slow urine output
- **B.** Match intravenous fluid to urine output milliliter for milliliter
- **C.** Remove the catheter and give a large fluid bolus
- **D.** Restrict all fluid intake until output falls

- **E.** Keep the catheter draining, allow oral intake, monitor vitals and electrolytes, and give intravenous fluid only if he becomes hemodynamically compromised

Answer: E

Explanation. This is post-obstructive diuresis after relief of chronic urinary retention, most often a physiologic offloading of retained salt, water, and urea that is self-limited. Management is supportive: keep the catheter draining (do not clamp), let the patient drink to meet his own needs, and monitor hemodynamics and electrolytes for hypokalemia, hypomagnesemia, and hyponatremia. Intravenous fluid is given only if the patient cannot keep up orally or becomes hypovolemic, and then at partial replacement (around half the urine output), deliberately aiming for a net-negative balance. Clamping the catheter risks re-obstruction and bladder injury; matching output milliliter for milliliter perpetuates the diuresis; removing the catheter after retention invites recurrent obstruction; blanket fluid restriction risks hypovolemia in a patient who is truly diuresing.

Educational objective. Post-obstructive diuresis is usually self-limited; manage with continued drainage, oral intake, and electrolyte monitoring, giving only partial intravenous replacement (not milliliter-for-milliliter) if hypovolemia develops.

Hematuria, Bladder Cancer, and Upper Tract Disease

Question 9

A 67-year-old man presents to his family physician after noticing bright red urine three times over the past week. The bleeding is painless, occurs throughout the entire stream, and is not associated with fever, dysuria, or flank pain. He has smoked one pack of cigarettes daily for 40 years and worked for two decades in a textile dye factory. Vital signs are normal. Abdominal and genital examinations are unremarkable, and the prostate is smooth and non-tender. Urinalysis confirms numerous red blood cells without pyuria, and urine culture is negative.

Which of the following is the most appropriate next step in evaluation?

- **A.** Reassurance and repeat urinalysis in six months
- **B.** Renal and bladder ultrasound alone
- **C.** Serum prostate-specific antigen and digital rectal examination
- **D.** Cystoscopy together with CT urography
- **E.** A three-day course of oral ciprofloxacin

Answer: D

Explanation. Painless gross hematuria in an adult, especially an older patient with a heavy smoking history and occupational exposure to aromatic amines, is bladder cancer until proven otherwise and mandates a complete evaluation of both the lower and upper urinary tracts. The two essential components

are cystoscopy, which directly inspects the urothelium of the bladder and urethra, and cross-sectional upper-tract imaging with CT urography, which evaluates the kidneys, collecting systems, and ureters. Cystoscopy is indispensable because flat, non-papillary lesions such as carcinoma in situ are frequently invisible on any imaging study and can be identified only by direct visualization and biopsy of the bladder lining. Option A is reasonable only for low-risk microscopic hematuria, not a single episode of gross hematuria in a high-risk patient, and deferral risks missing an invasive cancer. Option B is incorrect because ultrasound alone can miss small urothelial tumors, flat carcinoma in situ, and ureteral lesions. Option C is incorrect because an elevated PSA or benign enlargement does not account for gross hematuria and would not exclude a bladder tumor. Option E is incorrect because there is no evidence of infection, so antibiotics would only delay diagnosis.

Educational objective. Painless gross hematuria in an adult requires complete evaluation with cystoscopy and CT urography, because cystoscopy detects flat tumors such as carcinoma in situ that imaging cannot see.

Question 10

A 58-year-old asymptomatic woman has a routine urine dipstick that reads "blood: moderate." She feels well, is not menstruating, and denies dysuria or any visible blood in the urine. She takes no medications and has never smoked. Her physician wants to confirm whether she genuinely has hematuria before deciding on further evaluation.

Which of the following findings is required to establish a diagnosis of microscopic hematuria?

- **A.** A positive dipstick for blood on two separate occasions
- **B.** At least 3 red blood cells per high-power field on microscopy of a properly collected specimen
- **C.** At least 3 red blood cells per high-power field reported directly by the dipstick
- **D.** Any visible discoloration of the urine
- **E.** More than 5 white blood cells per high-power field accompanying red cells

Answer: B

Explanation. Microscopic hematuria is defined by microscopy, not by dipstick. The accepted threshold is 3 or more red blood cells per high-power field on microscopic examination of a single, properly collected, midstream specimen. The dipstick detects the peroxidase activity of heme and therefore turns positive with myoglobin, free hemoglobin, and certain oxidizing contaminants, so it can read positive without any intact red cells and must always be confirmed by microscopy. Once genuine microscopic hematuria is established, patients are risk-stratified for urinary tract malignancy: risk rises with older age, cigarette smoking measured in pack-years, male sex, irritative voiding symptoms, and exposure to bladder carcinogens. This never-smoking woman sits at the lower-risk end of that spectrum. Option A is incorrect because dipstick positivity, even when repeated, does not confirm intact red cells. Option C is incorrect because a dipstick does not quantify red cells per high-power field. Option D describes possible gross

hematuria, which can also be mimicked by pigments and foods. Option E is incorrect because pyuria with red cells suggests infection but is not the defining criterion.

Educational objective. Microscopic hematuria is defined as at least 3 red blood cells per high-power field on microscopy of a properly collected specimen, and a positive dipstick alone is insufficient because it detects heme rather than intact red cells.

Question 11

A 72-year-old man taking warfarin for atrial fibrillation reports several days of painless, visible blood in his urine with a few small clots. His INR today is 2.4, within his target range of 2 to 3, and he is hemodynamically stable. He has a 30 pack-year smoking history, is afebrile, and has no dysuria. Urinalysis shows abundant red blood cells.

Which of the following is the most appropriate next step in his management?

- **A.** Attribute the bleeding to warfarin and simply recheck the INR
- **B.** Hold warfarin for one week and reassess his symptoms only
- **C.** Switch warfarin to a direct oral anticoagulant
- **D.** Reassure him and repeat urinalysis in one year
- **E.** Proceed with full urinary tract evaluation including cystoscopy and CT urography

Answer: E

Explanation. A therapeutic level of anticoagulation does not by itself explain gross hematuria and must never be used to dismiss it. Anticoagulated patients with hematuria harbor clinically important urologic disease, including urothelial malignancy, at rates similar to non-anticoagulated patients, and anticoagulation may simply unmask bleeding from an underlying lesion. This man carries multiple red flags (advanced age, smoking history, gross hematuria), so a complete evaluation with cystoscopy and CT urography is required regardless of his warfarin use and in-range INR. Option A is a classic error that delays cancer diagnosis. Option B addresses neither the diagnostic question nor the malignancy risk, and stopping anticoagulation in atrial fibrillation carries thromboembolic hazard. Option C does not evaluate the source of bleeding. Option D is appropriate only for low-risk microscopic hematuria, not gross hematuria in a high-risk patient.

Educational objective. Anticoagulation, even at a therapeutic level, does not excuse hematuria, and affected patients still require a complete urologic evaluation to exclude malignancy.

Question 12

A 63-year-old man is newly diagnosed with high-grade urothelial carcinoma of the bladder. In reviewing potential contributing exposures, his physician records the following: he has smoked 1.5 packs of

cigarettes daily for 35 years, worked briefly as a hairdresser in his twenties, drinks two cups of coffee daily, took a several-month course of an herbal weight-loss supplement a decade ago, and traveled once to sub-Saharan Africa as a young adult.

Which of the following is the greatest risk factor for his bladder cancer?

- **A.** Cigarette smoking
- **B.** Coffee consumption
- **C.** Occupational exposure as a hairdresser
- **D.** Prior herbal supplement use
- **E.** History of travel to sub-Saharan Africa

Answer: A

Explanation. Cigarette smoking is the single greatest risk factor for urothelial carcinoma of the bladder, accounting for roughly half of all cases and conferring a several-fold increase in risk that scales with pack-years; the responsible carcinogens include aromatic amines excreted in the urine. Occupational exposure to aromatic amines (historically in the dye, rubber, leather, painting, and hairdressing trades) is a well-established but quantitatively smaller contributor for most patients. Option B is incorrect because coffee is not an established independent bladder carcinogen once smoking is accounted for. Option C is a far weaker driver than a 35 pack-year smoking history. Option D is incorrect because aristolochic acid in some herbals is linked more strongly to upper tract disease, and a single short course is minor. Option E raises *Schistosoma haematobium*, which predisposes to squamous cell carcinoma in endemic regions, but a single trip without chronic infection is not a major risk, and this tumor is urothelial.

Educational objective. Cigarette smoking is the most important risk factor for urothelial bladder cancer, whereas aromatic amines act occupationally and chronic *Schistosoma haematobium* infection specifically predisposes to squamous cell carcinoma.

Question 13

A 60-year-old woman undergoes transurethral resection of a 2 cm papillary bladder tumor discovered during her hematuria workup, and all visible tumor is removed. Final pathology reports high-grade urothelial carcinoma invading the lamina propria (stage T1). The pathologist explicitly notes that no muscularis propria (detrusor muscle) is present in the submitted specimen.

Which of the following is the most appropriate next step in management?

- **A.** Begin intravesical BCG and start routine surveillance
- **B.** Proceed directly to radical cystectomy
- **C.** Start systemic cisplatin-based chemotherapy
- **D.** Repeat transurethral resection within a few weeks to obtain muscle in the specimen
- **E.** Obtain a bone scan and CT of the chest

Answer: D

Explanation. Transurethral resection of a bladder tumor is both diagnostic and therapeutic: it removes visible tumor and provides the pathologic staging that drives management. The critical dividing line is whether tumor invades the detrusor (muscularis propria): non-muscle-invasive disease (Ta, T1, carcinoma in situ) is managed with resection plus intravesical therapy, whereas muscle-invasive disease (T2 or higher) requires radical treatment. When the specimen contains no muscularis propria, the pathologist cannot confirm or exclude muscle invasion, so the tumor may be understaged. For a high-grade T1 tumor with no muscle in the specimen, a restaging resection within roughly two to six weeks is required before committing to a treatment pathway. Option A risks treating an understaged muscle-invasive cancer as superficial. Option B is premature when the tumor has not been properly staged, and many high-grade T1 tumors are managed with bladder preservation. Option C is reserved for confirmed muscle-invasive or metastatic disease. Option E is driven by confirmed muscle-invasive disease, whereas the immediate problem is inadequate local staging.

Educational objective. TURBT is both diagnostic and therapeutic, and because detrusor muscle in the specimen determines the non-muscle-invasive versus muscle-invasive boundary, a high-grade T1 tumor lacking muscle requires a restaging resection.

Question 14

A 68-year-old man with high-grade non-muscle-invasive bladder cancer that includes carcinoma in situ completes a transurethral resection and then begins a six-week induction course of intravesical bacillus Calmette-Guerin (BCG) instillations. His urologist explains that this live attenuated mycobacterial preparation reduces the risk of both recurrence and progression.

Which of the following best describes the mechanism by which BCG treats his cancer?

- **A.** Direct chemotherapeutic cross-linking of tumor cell DNA
- **B.** Stimulation of a local cell-mediated (Th1) immune response against tumor cells
- **C.** Selective inhibition of tumor angiogenesis
- **D.** Blockade of androgen receptors on urothelial cells
- **E.** Systemic cytotoxic killing of circulating tumor cells

Answer: B

Explanation. BCG is an immunotherapy. After instillation, the live attenuated organisms attach to and are internalized by urothelial and tumor cells, triggering a robust local immune reaction. This provokes a T-helper-1 (Th1) polarized, cell-mediated response, with release of cytokines such as interferon-gamma, interleukin-2, and tumor necrosis factor, recruitment of natural killer cells, macrophages, and cytotoxic T lymphocytes, and immune-mediated destruction of residual tumor cells in the bladder lining. Because the effect depends on an intact local immune response, BCG is held with traumatic catheterization, gross hematuria, or active urinary tract infection. Option A describes alkylating chemotherapeutic agents such

as intravesical mitomycin C. Option C is incorrect because BCG is not primarily anti-angiogenic. Option D is a prostate cancer concept with no role here. Option E is incorrect because BCG works locally within the bladder rather than systemically.

Educational objective. Intravesical BCG treats high-risk non-muscle-invasive bladder cancer by stimulating a local Th1 cell-mediated immune response rather than by direct cytotoxicity.

Question 15

A 62-year-old man who is otherwise fit, with normal renal function and no significant cardiac disease, is found on restaging transurethral resection to have high-grade urothelial carcinoma invading the detrusor muscle (stage T2). Staging CT of the chest, abdomen, and pelvis shows no nodal or distant metastases.

Which of the following is the most appropriate treatment?

- **A.** Intravesical BCG induction and maintenance
- **B.** Repeat transurethral resection alone with surveillance
- **C.** Neoadjuvant cisplatin-based chemotherapy followed by radical cystectomy with urinary diversion
- **D.** Intravesical mitomycin C
- **E.** Long-term surveillance cystoscopy without intervention

Answer: C

Explanation. This patient has muscle-invasive bladder cancer (T2), a potentially lethal disease that requires definitive, aggressive therapy rather than the bladder-sparing intravesical approaches used for non-muscle-invasive tumors. In a fit patient with adequate renal function, the standard of care is neoadjuvant cisplatin-based combination chemotherapy followed by radical cystectomy with pelvic lymph node dissection and urinary diversion (for example, an ileal conduit or an orthotopic neobladder). Neoadjuvant cisplatin chemotherapy provides a real survival advantage over surgery alone. Selected patients may alternatively be offered bladder-preserving trimodality therapy (maximal resection plus chemoradiation). Option A is intravesical therapy for high-risk non-muscle-invasive disease and does not control muscle-invasive cancer. Option B leaves invasive tumor untreated. Option D is used for non-muscle-invasive tumors. Option E abandons a curable but life-threatening cancer.

Educational objective. Muscle-invasive bladder cancer in a fit patient is treated with neoadjuvant cisplatin-based chemotherapy followed by radical cystectomy with urinary diversion.

Question 16

A 70-year-old man is evaluated for a single episode of painless gross hematuria. Cystoscopy shows a normal-appearing bladder with no tumors, and bladder washings return a urine cytology that is positive

for high-grade malignant cells. CT urography demonstrates a 1.5 cm soft-tissue filling defect within the left renal pelvis with associated mild hydronephrosis. He has a long smoking history.

Which of the following is the most likely diagnosis?

- **A.** Carcinoma in situ of the bladder
- **B.** Clear cell renal cell carcinoma
- **C.** Upper tract urothelial carcinoma of the renal pelvis
- **D.** A non-obstructing calcium oxalate stone
- **E.** Benign ureteral fibroepithelial polyp

Answer: C

Explanation. A soft-tissue filling defect in the renal pelvis or ureter, combined with a positive high-grade urine cytology and a normal-appearing bladder, is the classic presentation of upper tract urothelial carcinoma. Urine cytology is highly specific and quite sensitive for high-grade urothelial disease and carcinoma in situ (its principal strength), but it performs poorly for low-grade tumors and cannot by itself localize the lesion (its principal limitation); when cytology is positive yet the bladder looks normal, the malignant cells must be arising from the upper tract. The urothelium behaves as a single field, so smokers and patients with prior bladder cancer are at risk throughout the collecting system. Diagnosis is completed with ureteroscopy and biopsy, and high-risk disease is treated with radical nephroureterectomy including a bladder cuff. Option A could explain a positive cytology, but cystoscopy was normal and the lesion lies in the renal pelvis. Option B forms an enhancing solid parenchymal mass, not a filling defect, and does not shed urothelial cells. Option D would appear as a dense calcification, not a soft-tissue defect. Option E would not shed high-grade malignant cells.

Educational objective. A collecting-system filling defect with a positive high-grade cytology and a normal bladder indicates upper tract urothelial carcinoma, reflecting cytology's strength for high-grade disease and its inability to localize the lesion.

BPH, LUTS, and Urinary Retention

Question 17

A 66-year-old man sees his family physician for urinary symptoms that have developed gradually over two years. He needs to rush to the toilet when the urge strikes, wakes three times each night to void, and passes small amounts frequently during the day. He also notices that his stream is weaker than it used to be and that he waits several seconds before urine begins to flow. His post-void residual is 40 mL, and digital rectal examination reveals a smoothly enlarged, non-nodular prostate.

Which of the following is best classified as a storage (filling) symptom?

- **A.** Weak, slow urinary stream
- **B.** Hesitancy before the stream begins

- C. Urinary urgency
- D. Straining to void
- E. Sensation of incomplete emptying

Answer: C

Explanation. Storage (filling) symptoms occur while the bladder is filling and include urgency, frequency, nocturia, and urgency incontinence, so urinary urgency (C) is correct. Voiding (emptying) symptoms occur during micturition: a weak or slow stream (A), hesitancy (B), and straining (D) all fall in this group. The sensation of incomplete emptying (E) is a post-micturition symptom, not a storage symptom. Classifying symptoms this way matters because storage-predominant complaints point toward overactive bladder or detrusor overactivity, whereas voiding-predominant complaints point toward bladder outlet obstruction such as BPH.

Educational objective. Separate storage LUTS (urgency, frequency, nocturia, urgency incontinence) from voiding LUTS (hesitancy, weak stream, intermittency, straining) when assessing lower urinary tract symptoms.

Question 18

A 61-year-old man with moderate lower urinary tract symptoms and a prostate estimated at 35 mL is started on tamsulosin 0.4 mg once daily after conservative measures failed to help. His blood pressure is well controlled and he takes no other medications. He asks what unwanted effect he is most likely to notice.

Which of the following adverse effects is he most likely to experience?

- A. Orthostatic hypotension with syncope
- B. Reduced or absent ejaculate
- C. Gynecomastia
- D. Priapism
- E. Acute urinary retention

Answer: B

Explanation. Tamsulosin (like silodosin) is a relatively selective alpha-1A antagonist. Alpha-1A receptors predominate in prostatic and bladder-neck smooth muscle, so blockade relaxes outlet tone (the mechanism of symptom relief) but also impairs seminal emission and bladder-neck closure, producing ejaculatory dysfunction (reduced or absent ejaculate). This is the most common bothersome effect of the selective agents, so B is correct. Orthostatic hypotension (A) is more characteristic of non-selective alpha-blockers (doxazosin, terazosin), especially with the first dose. Gynecomastia (C) is linked to 5-alpha-reductase inhibitors. Priapism (D) is not a recognized alpha-blocker effect. Alpha-blockers relieve rather than cause retention (E). One more high-yield point: tamsulosin predisposes to intraoperative floppy iris

syndrome, so any patient scheduled for cataract surgery should have the ophthalmic surgeon informed beforehand.

Educational objective. Selective alpha-1A antagonists most commonly cause ejaculatory dysfunction and can trigger intraoperative floppy iris syndrome, whereas orthostatic hypotension is more typical of non-selective alpha-blockers.

Question 19

A 68-year-old man with a large prostate (roughly 70 mL) has taken finasteride 5 mg daily for the past 15 months for bothersome BPH. His PSA before starting the drug was 2.4 ng/mL, and he feels his symptoms are modestly better. Today his measured PSA is 2.6 ng/mL. He has no urinary infection, and digital rectal examination is unchanged and non-nodular.

Which of the following is the most appropriate next step?

- **A.** Reassure him that the PSA is stable and repeat it in one year
- **B.** Attribute the value to benign enlargement and take no action
- **C.** Stop finasteride because it is raising his PSA
- **D.** Recognize that the value should be doubled and arrange further evaluation
- **E.** Increase the finasteride dose to lower the PSA further

Answer: D

Explanation. After about 6 to 12 months, 5-alpha-reductase inhibitors lower serum PSA by roughly 50 percent, so to interpret PSA in a man on long-term finasteride or dutasteride you multiply the measured value by 2. Here the measured 2.6 ng/mL corresponds to a true value near 5.2 ng/mL. Moreover, the drug should have driven his baseline 2.4 downward to around 1.2, not left it essentially unchanged. A PSA that fails to fall (or rises) on a 5-alpha-reductase inhibitor is a red flag for prostate cancer and warrants further evaluation, so D is correct. Simple reassurance or ignoring the number (A, B) misses cancer because it skips the correction. Finasteride lowers PSA rather than raising it, so C misreads the physiology. Escalating the dose (E) neither addresses the concern nor reflects how these agents are used.

Educational objective. In men on a 5-alpha-reductase inhibitor for 6 months or more, double the measured PSA to interpret it; a value that fails to fall as expected, or rises, suggests malignancy and needs evaluation.

Question 20

A 64-year-old man has bothersome lower urinary tract symptoms with an International Prostate Symptom Score in the moderate-to-severe range. His prostate is enlarged at roughly 65 mL, his PSA is 3.2 ng/mL, and his post-void residual is 90 mL. He has taken tamsulosin for six months with only partial

relief and is frustrated by ongoing symptoms. He says his main goal is to avoid future episodes of acute retention and the need for surgery.

Which of the following is the most appropriate next step in management?

- **A.** Discontinue tamsulosin and start an antimuscarinic
- **B.** Refer immediately for transurethral resection of the prostate
- **C.** Continue tamsulosin and add finasteride
- **D.** Continue tamsulosin and add a bedtime loop diuretic
- **E.** Reassure him and make no medication change

Answer: C

Explanation. This man has a large gland (well above the 30 to 40 mL threshold) with an elevated PSA and moderate-to-severe symptoms only partially controlled on an alpha-blocker. Adding a 5-alpha-reductase inhibitor to the alpha-blocker (combination therapy) is the evidence-based move: large randomized trials showed that in men with larger prostates, combining the two classes reduces symptom progression, acute urinary retention, and the need for surgery more than either drug alone. The alpha-blocker relaxes the dynamic (smooth-muscle) component quickly, while the 5-alpha-reductase inhibitor shrinks the static (glandular) component over months, which fits his goal of avoiding retention and surgery, so C is correct. Switching to an antimuscarinic (A) abandons outlet treatment and could worsen emptying. TURP (B) is premature without optimized medical therapy or a hard surgical indication. A bedtime loop diuretic (D) is not BPH therapy and would aggravate nocturia. Doing nothing (E) ignores his bother and progression risk.

Educational objective. In men with bothersome LUTS and an enlarged prostate inadequately controlled on an alpha-blocker, adding a 5-alpha-reductase inhibitor (combination therapy) reduces progression, acute retention, and surgery.

Question 21

An 80-year-old woman is evaluated for urinary urgency, frequency, and several episodes of urgency-related leakage per week. A voiding diary and pelvic examination confirm overactive bladder, and her urinalysis is normal. Her post-void residual is 30 mL. She has mild memory impairment and has fallen twice in the past year. Six weeks of bladder training and fluid adjustment have not adequately controlled her symptoms, and she wishes to try a medication.

Which of the following is the most appropriate medication?

- **A.** Mirabegron
- **B.** Immediate-release oxybutynin
- **C.** Diphenhydramine
- **D.** Imipramine
- **E.** A high starting dose of solifenacin

Answer: A

Explanation. In an older adult with cognitive impairment and a falls history, antimuscarinic (anticholinergic) drugs are a poor choice: their central effects worsen confusion and cognition, their peripheral effects increase falls, and cumulative anticholinergic burden is associated with dementia. A beta-3 adrenergic agonist such as mirabegron relaxes the detrusor through a different mechanism, carries no meaningful cognitive burden, and avoids the dry mouth and constipation of antimuscarinics, so it is preferred here (A). Immediate-release oxybutynin (B) has the highest anticholinergic burden and is specifically flagged to avoid in older adults. Diphenhydramine (C) and imipramine (D) are strongly anticholinergic and inappropriate. A high-dose antimuscarinic (E) only magnifies the same risks. Blood pressure should be monitored once a beta-3 agonist is started.

Educational objective. In older adults, particularly with cognitive impairment or fall risk, a beta-3 agonist (mirabegron) is preferred over antimuscarinics for overactive bladder because antimuscarinics worsen cognition and increase falls.

Question 22

A 72-year-old man reports urinary urgency, frequency, and nocturia. He also mentions a weak stream and a sense that he does not empty his bladder completely. Digital rectal examination shows a moderately enlarged, non-nodular prostate, and his urinalysis is normal. His physician is considering an antimuscarinic to relieve the storage symptoms.

Which of the following is the best next step before starting this medication?

- **A.** Start the antimuscarinic and reassess in four weeks
- **B.** Order urodynamic studies
- **C.** Perform cystoscopy
- **D.** Start a beta-3 agonist instead without any further assessment
- **E.** Measure the post-void residual volume

Answer: E

Explanation. This man has storage symptoms but also voiding symptoms (weak stream, incomplete emptying) and an enlarged prostate, so he may already be emptying poorly. Antimuscarinics reduce detrusor contractility and can precipitate acute urinary retention when a large residual is already present; guidelines advise caution once the post-void residual is elevated (commonly cited around 250 to 300 mL). The simplest, safest step is therefore to measure the post-void residual before prescribing (E). If it is low, an antimuscarinic (or a beta-3 agonist) can be started; if it is high, management changes. Starting the drug blindly (A) risks retention. Urodynamics (B) and cystoscopy (C) are more invasive and are not the initial safety check. Choosing a beta-3 agonist with no assessment (D) is safer than an antimuscarinic but still skips documenting how well he empties.

Educational objective. Check a post-void residual before starting an antimuscarinic for overactive bladder, especially in men with voiding symptoms or outlet obstruction, to avoid precipitating urinary retention.

Question 23

A 75-year-old man is brought to the emergency department because he has been unable to pass urine for 10 hours and has severe lower abdominal discomfort. He has a long history of BPH. On examination his bladder is palpable and tender to the level of the umbilicus. A bladder scan estimates 1100 mL of retained urine, and his creatinine is mildly elevated above his baseline.

Which of the following is the best initial management?

- **A.** Insert a urethral catheter, drain the bladder completely, and monitor urine output and electrolytes
- **B.** Drain only 500 mL, then clamp the catheter and release it in stages over 24 hours
- **C.** Arrange urgent transurethral resection of the prostate
- **D.** Start tamsulosin and observe without catheterization
- **E.** Place a suprapubic catheter as the first-line approach

Answer: A

Explanation. This is acute urinary retention. The immediate priority is to relieve the obstruction by decompressing the bladder, and a urethral catheter is the standard first-line route (A). The bladder should be drained completely: the old practice of partial or gradual (clamped) drainage to prevent hematuria or hypotension is not supported by evidence, so B reflects an outdated myth. Because he had a large retained volume (over 1000 mL) and azotemia, he is at risk for post-obstructive diuresis, so after decompression his urine output and electrolytes must be monitored and fluids replaced if he produces large volumes. Emergency TURP (C) is not first-line; definitive surgery is planned later. An alpha-blocker (D) is a useful adjunct that improves the odds of a successful later voiding trial but does not relieve the acute retention. A suprapubic catheter (E) is reserved for when urethral catheterization fails or is contraindicated.

Educational objective. Manage acute urinary retention with prompt, complete bladder decompression by urethral catheter, then monitor for post-obstructive diuresis after high-volume or azotemic retention.

Question 24

A 70-year-old man is undergoing transurethral resection of a large prostate (about 90 mL) under spinal anesthesia using a monopolar resectoscope with hypotonic glycine irrigation. Roughly 70 minutes into the resection he becomes restless and confused, complains of nausea and blurred vision, and his blood pressure rises while his heart rate falls. An urgently drawn serum sodium is 118 mmol/L.

Which of the following is the most likely underlying cause of his condition?

- **A.** Hemorrhagic shock from prostatic bleeding
- **B.** Venous air embolism
- **C.** Hypernatremia from insensible fluid losses
- **D.** Systemic absorption of hypotonic irrigation fluid causing dilutional hyponatremia
- **E.** Gram-negative septic shock

Answer: D

Explanation. This is TURP syndrome. During resection of a large gland, open prostatic venous sinuses absorb the hypotonic, sodium-free irrigant (classically glycine with monopolar systems), producing volume overload and, most importantly, dilutional hyponatremia. The low sodium (here 118 mmol/L) drives the neurologic features (confusion, restlessness, visual changes, nausea) and the cardiovascular picture (hypertension with reflex bradycardia), so D is correct; the risk rises with longer resection times and larger glands. Hemorrhagic shock (A) would cause hypotension and tachycardia, not hypertension with bradycardia, and would not explain the hyponatremia. Insensible losses tend toward hypernatremia (C), the opposite of the measured value. Air embolism (B) and septic shock (E) do not account for the profound dilutional hyponatremia that defines the syndrome. Using bipolar (saline) resection or enucleation techniques largely eliminates the problem.

Educational objective. TURP syndrome is dilutional hyponatremia with volume overload from absorption of hypotonic irrigation through opened venous sinuses; suspect it during prolonged resection of a large prostate, and prevent it with isotonic (bipolar/saline) systems.

Prostate Cancer and PSA

Question 25

A 55-year-old man presents with 3 days of fever, perineal pain, dysuria, and urinary frequency. His temperature is 38.6 C. Digital rectal examination reveals an exquisitely tender, boggy prostate. Urinalysis shows pyuria and bacteriuria, and a urine culture is pending. A PSA sent from the emergency department returns at 11 ng/mL. A screening PSA one year earlier was 1.2 ng/mL.

Which of the following is the most appropriate next step regarding his elevated PSA?

- **A.** Schedule a transrectal prostate biopsy this week
- **B.** Order a multiparametric MRI of the prostate now
- **C.** Treat the infection and repeat the PSA after several weeks
- **D.** Refer him for radical prostatectomy
- **E.** Begin androgen deprivation therapy

Answer: C

Explanation. PSA is made by prostatic epithelium and is prostate-specific, not cancer-specific. Anything that disrupts the epithelial barrier (acute bacterial prostatitis, catheterization or other instrumentation, urinary retention, recent ejaculation, or a vigorous rectal exam) can raise serum PSA, sometimes dramatically. This man has textbook acute bacterial prostatitis (fever, dysuria, a tender boggy gland, pyuria), which fully accounts for the jump from 1.2 to 11. The right move is to treat the infection and let the inflammation settle, then recheck the PSA weeks later. Option A is wrong because biopsying an acutely infected gland is painful, uninterpretable, and risks seeding sepsis. Option B is wrong because MRI during acute inflammation mimics tumor and cannot be read reliably. Option D is wrong because there is no tissue diagnosis of cancer. Option E is wrong because androgen deprivation treats known prostate cancer, not a urinary infection.

Educational objective. An elevated PSA is prostate-specific rather than cancer-specific, so reversible causes such as prostatitis should be treated and the PSA rechecked before any cancer workup.

Question 26

A 42-year-old Black man with no urinary symptoms asks about prostate cancer screening. His father was diagnosed with prostate cancer at age 58. He has no other medical problems and a life expectancy well beyond 10 years.

Which of the following is the most appropriate recommendation?

- **A.** No screening is indicated until age 55
- **B.** Start empiric finasteride to prevent prostate cancer
- **C.** Obtain a prostate biopsy now
- **D.** Begin a shared decision-making discussion about PSA testing now
- **E.** Defer any discussion until he develops urinary symptoms

Answer: D

Explanation. For average-risk men, PSA screening is offered through shared decision-making beginning around age 50 (commonly framed as ages 50 to 69), balancing earlier detection of aggressive disease against the harms of false positives, biopsy complications, and overdiagnosis of indolent cancer. Men at higher baseline risk warrant an earlier conversation, around age 40 to 45. The higher-risk groups are men of African ancestry, men with a first-degree relative affected by prostate cancer, and men with a known BRCA mutation. This patient carries two of these features, so the appropriate step is to start the shared decision-making discussion now in his early 40s. Option A ignores his elevated risk. Option B is not recommended chemoprevention and does not replace a screening decision. Option C requires an abnormal PSA or exam first. Option E is wrong because prostate cancer is usually asymptomatic when it is still curable.

Educational objective. Prostate cancer screening is a shared decision beginning around age 50 for average-risk men, but African ancestry, a family history, or a BRCA mutation shifts the conversation earlier, to roughly age 40 to 45.

Question 27

Two 63-year-old men each undergo prostate biopsy, and both are reported as having a Gleason score of 7. Patient 1's report reads Gleason 3+4=7 (Grade Group 2). Patient 2's report reads Gleason 4+3=7 (Grade Group 3). Their PSA values and clinical stages are otherwise identical.

Which of the following best explains why Patient 2 has a worse prognosis despite the same Gleason sum?

- **A.** Patient 2's tumor is larger in absolute volume
- **B.** Patient 2 has a higher proportion of the higher-grade (pattern 4) tissue
- **C.** Pattern 3 is biologically more aggressive than pattern 4
- **D.** Grade Group 3 indicates the cancer has already spread to distant sites
- **E.** A sum of 7 carries the same prognosis regardless of which pattern predominates

Answer: B

Explanation. Gleason grading assigns the two most prevalent architectural patterns, and the score is written as (predominant pattern) + (second pattern). Higher patterns (4 and 5) are more disorganized and biologically aggressive. In 4+3=7 the aggressive pattern 4 is the predominant component, whereas in 3+4=7 the better-differentiated pattern 3 predominates and pattern 4 is only secondary. Because more of Patient 2's tumor is made of pattern 4, his 4+3 disease (Grade Group 3) carries a worse prognosis than 3+4 disease (Grade Group 2), even though both sum to 7. For reference, Gleason 6 (3+3, Grade Group 1) is the lowest-grade cancer diagnosed on biopsy, the effective floor. Option A is wrong because the scenario holds volume and stage constant. Option C reverses the biology. Option D is wrong because Grade Group reflects differentiation, not metastatic status. Option E is wrong because the order of the two numbers changes the prognosis.

Educational objective. The first number in a Gleason score is the predominant pattern, so 4+3 (Grade Group 3) contains more high-grade tissue and carries a worse prognosis than 3+4 (Grade Group 2) despite an identical sum of 7.

Question 28

A 66-year-old man is diagnosed with prostate cancer after a PSA of 5.2 ng/mL. Biopsy shows Gleason 3+3=6 (Grade Group 1) in 2 of 12 cores, each less than 30% involved. His digital rectal exam is normal (clinical stage T1c). He has no family history, is otherwise healthy, and has a long life expectancy. He asks whether he can avoid surgery or radiation for now.

Which of the following is the most appropriate management?

- **A.** Immediate radical prostatectomy
- **B.** Immediate external beam radiotherapy with androgen deprivation
- **C.** Active surveillance with scheduled PSA, DRE, imaging, and repeat biopsy
- **D.** Watchful waiting with treatment deferred until end-of-life symptoms
- **E.** Bilateral orchiectomy

Answer: C

Explanation. This man has low-risk, localized prostate cancer (Grade Group 1, PSA under 10, clinical T1c, low core involvement). For such disease, active surveillance is the preferred initial strategy: Grade Group 1 cancer has a very low risk of metastasis or death over 10 years, while surgery and radiation carry real risks of incontinence and erectile dysfunction. Active surveillance is not neglect. It is a structured program of serial PSA measurements, periodic rectal exams, prostate MRI, and repeat biopsy, with a switch to curative treatment if the disease progresses. Options A and B expose him to incontinence, erectile dysfunction, and bowel toxicity with no proven survival benefit in this risk group. Option D (watchful waiting) is a lower-intensity, palliative-intent strategy for men with limited life expectancy, whereas this healthy man should be monitored with curative intent. Option E is a form of androgen deprivation reserved for advanced disease.

Educational objective. Low-risk, Grade Group 1 localized prostate cancer is best managed with active surveillance, a structured monitoring program that triggers curative treatment on progression, rather than immediate surgery or radiation.

Question 29

A 62-year-old man with localized prostate cancer is choosing between radical prostatectomy and external beam radiotherapy. His baseline continence and erectile function are normal, and he wants to understand how the side-effect profiles differ.

Which of the following side effects is most characteristic of radical prostatectomy compared with radiotherapy?

- **A.** Urinary incontinence appearing immediately after treatment
- **B.** Radiation proctitis with rectal bleeding
- **C.** Erectile dysfunction that develops gradually over 1 to 2 years
- **D.** Chronic diarrhea and bowel urgency
- **E.** Acute cystitis during a course of daily treatment

Answer: A

Explanation. Surgery and radiation give similar cancer control for localized disease but differ in their signature toxicities. Radical prostatectomy physically disrupts the urethral sphincter and bladder neck, so urinary incontinence is worst immediately after catheter removal and then improves over the following

months. Erectile dysfunction after surgery is likewise immediate, because the cavernous nerves are stretched or removed at operation, with partial recovery (if any) over 1 to 2 years. Radiotherapy shows the opposite pattern: continence is usually preserved early, but the beam irradiates the adjacent rectum and bladder, producing bowel symptoms (proctitis, rectal bleeding, urgency) and cystitis, and its erectile dysfunction is characteristically delayed, developing over 1 to 2 years. Options B and D are hallmark radiation effects. Option C is the radiation pattern of erectile dysfunction. Option E describes radiotherapy, not a single operation.

Educational objective. Radical prostatectomy characteristically causes immediate urinary incontinence and immediate erectile dysfunction, whereas radiotherapy causes bowel symptoms (proctitis) and erectile dysfunction that develops gradually over 1 to 2 years.

Question 30

A 70-year-old man with newly diagnosed metastatic prostate cancer is started on leuprolide, a GnRH (LHRH) agonist. Over the following months he reports hot flashes, decreased libido, and fatigue. His oncologist counsels him about long-term bone loss and cardiovascular risk.

Which of the following best describes the mechanism of action of this drug?

- **A.** Direct blockade of androgen receptors on prostate cells
- **B.** Inhibition of 5-alpha-reductase, blocking conversion of testosterone to dihydrotestosterone
- **C.** Inhibition of adrenal CYP17, blocking androgen synthesis
- **D.** A direct cytotoxic effect on prostate cancer cells
- **E.** Continuous GnRH receptor stimulation that downregulates pituitary GnRH receptors, lowering LH and testosterone

Answer: E

Explanation. Physiologic GnRH is released in pulses to drive pituitary LH secretion. A GnRH agonist such as leuprolide delivers continuous, non-pulsatile stimulation, which after an initial surge downregulates and desensitizes pituitary GnRH receptors. LH then falls, testicular testosterone production drops to castrate levels (below 50 ng/dL), and the androgen-driven tumor is deprived of its fuel. The resulting hypogonadal state explains the adverse effects: hot flashes, loss of libido and erectile function, fatigue, muscle loss, osteoporosis with fracture risk, and increased cardiovascular and metabolic risk. One caveat is the early testosterone flare from the initial surge, which can transiently worsen symptoms or precipitate cord compression in high-burden disease unless an antiandrogen is given as cover. Option A describes androgen receptor antagonists. Option B describes 5-alpha-reductase inhibitors, which do not achieve castration. Option C describes abiraterone. Option D describes chemotherapy.

Educational objective. GnRH agonists lower testosterone to castrate levels by continuously stimulating and then downregulating pituitary GnRH receptors, and the resulting hypogonadism causes hot flashes, sexual dysfunction, osteoporosis, and cardiovascular risk.

Question 31

A 72-year-old man with a history of prostate cancer presents with 3 weeks of progressively worsening mid-back pain that is worse at night and now accompanied by bilateral leg weakness and new difficulty initiating urination. Plain radiographs show dense sclerotic (osteoblastic) lesions in several thoracic vertebrae.

Which of the following is the best next step in management?

- **A.** Reassurance and outpatient physiotherapy
- **B.** Oral NSAIDs and follow-up in 6 weeks
- **C.** Plain radiographs of the lumbar spine only
- **D.** Urgent MRI of the whole spine and immediate corticosteroids
- **E.** Nerve conduction studies

Answer: D

Explanation. Prostate cancer characteristically metastasizes to bone, and its deposits are classically osteoblastic (bone-forming and sclerotic) rather than lytic, which is why they look dense on plain films and light up on bone scan. The combination here is a red-flag emergency: progressive back pain worse at night, bilateral leg weakness, and new voiding difficulty in a patient with known cancer all point to metastatic epidural spinal cord compression. The best next step is urgent MRI of the entire spine (to localize the compression and detect additional skip lesions) together with immediate corticosteroids such as dexamethasone to reduce cord edema, followed by urgent radiotherapy or surgical decompression. Delay risks permanent paraplegia and loss of bladder and bowel function. Options A, B, and C ignore neurologic red flags (and the deficits localize to the thoracic cord, above the lumbar spine). Option E assesses peripheral nerves, not cord compression, and would waste time.

Educational objective. Prostate cancer metastasizes to bone as osteoblastic lesions, and back pain with neurologic deficits signals spinal cord compression, an emergency requiring urgent whole-spine MRI and corticosteroids.

Question 32

A 64-year-old man has taken finasteride for benign prostatic hyperplasia for the past 2 years. His PSA was 3.2 ng/mL before starting the drug and fell to 1.6 ng/mL after one year of treatment. On routine testing today his PSA is 3.4 ng/mL. His digital rectal exam is unchanged and unremarkable.

Which of the following is the most appropriate interpretation of his current PSA?

- **A.** The value is reassuring because 3.4 is within the normal range
- **B.** His PSA has effectively doubled from its treated nadir and should be evaluated for prostate cancer
- **C.** The finasteride dose should be increased to lower the PSA
- **D.** No action is needed because finasteride raises PSA over time
- **E.** PSA should be rechecked only after stopping finasteride for 5 years

Answer: B

Explanation. 5-alpha-reductase inhibitors (finasteride, dutasteride) shrink the prostate and lower serum PSA by roughly 50% after 6 to 12 months, so the measured value is doubled to estimate the true PSA. Just as important, once a man is stable on one of these drugs his PSA should stay suppressed, so any confirmed rise above the treated nadir is abnormal and warrants evaluation for prostate cancer, even when the absolute number still looks normal. This man's PSA fell appropriately to 1.6 but has now climbed to 3.4, roughly double his nadir (a corrected value near 7). It is that rise, not the raw number, that is the red flag, prompting a confirmatory repeat PSA, then MRI and biopsy as indicated. Option A ignores both the doubling correction and the rise. Option C is wrong because these drugs are not titrated to chase the PSA, and a rising value signals possible tumor. Option D is wrong because these drugs lower PSA. Option E is wrong because the value is interpreted by doubling it and evaluating the rise now.

Educational objective. A 5-alpha-reductase inhibitor halves the PSA, so the measured value is doubled to interpret it, and any rise above the treated nadir is a red flag for prostate cancer regardless of the absolute number.

The Acute Scrotum, Scrotal Masses, and Testicular Cancer

Question 33

A 14-year-old boy is brought to the emergency department with sudden, severe left scrotal pain that started 3 hours ago and woke him from sleep. He has vomited once. He has no fever, dysuria, or urethral discharge. On examination the left testis sits higher than the right and lies in a horizontal (transverse) position, and it is exquisitely tender. The cremasteric reflex is absent on the left but present on the right. Lifting the scrotum does not relieve the pain.

Which of the following is the most appropriate next step in management?

- **A.** Obtain a color Doppler ultrasound of the scrotum
- **B.** Send urinalysis and urine culture, then start antibiotics
- **C.** Proceed to emergent surgical scrotal exploration
- **D.** Prescribe scrotal elevation, ice, and NSAIDs with next-day follow-up
- **E.** Reassure and discharge with urology follow-up in 1 week

Answer: C

Explanation. This is textbook testicular torsion in an adolescent: sudden severe pain, a high-riding testis in a transverse lie, an absent cremasteric reflex, and no relief with elevation (a negative Prehn sign). Torsion is a clinical diagnosis, and the testis is salvageable only within a narrow window (roughly greater than 90% salvage if detorsed within 6 hours, falling to about 50% by 12 hours and under 10% by 24 hours). The correct move is to go straight to the operating room for exploration and detorsion; if the testis is viable it is fixed with a three-point orchidopexy, and because the underlying bell-clapper deformity is usually bilateral, the contralateral testis is fixed at the same operation. Option A only delays definitive surgery when the picture is diagnostic; Doppler is a tiebreaker for genuinely equivocal cases, and normal flow never overrides strong clinical suspicion. Option B is wrong because nothing suggests infection. Options D and E will cost the testis.

Educational objective. Testicular torsion is a clinical diagnosis that mandates emergent exploration within the salvage window; do not delay surgery to obtain an ultrasound.

Question 34

A 9-year-old boy has had a dull left scrotal ache for 2 days. He is afebrile with no vomiting, dysuria, or discharge. The testis is in a normal vertical position and is of normal size, with only mild diffuse tenderness. The single most tender spot is a small firm nodule at the upper pole, and a bluish discoloration is visible through the scrotal skin over that nodule when a light is shone on it. The cremasteric reflex is present bilaterally. Color Doppler shows normal, symmetric blood flow to both testes.

Which of the following is the most likely diagnosis?

- **A.** Testicular torsion
- **B.** Torsion of the appendix testis
- **C.** Acute bacterial epididymitis
- **D.** Incarcerated inguinal hernia
- **E.** Germ cell tumor of the testis

Answer: B

Explanation. The blue dot sign (a tender, bluish upper-pole nodule seen through thin scrotal skin), focal upper-pole tenderness, a preserved cremasteric reflex, and normal symmetric Doppler flow are the classic picture of a torsed appendix testis, a small embryologic remnant. It is most common in prepubertal boys and is self-limited, managed with rest, scrotal support, and analgesia rather than surgery. Option A is wrong because true testicular torsion causes sudden severe pain, a high-riding transverse testis, an absent cremasteric reflex, and absent or asymmetric flow. Option C is uncommon at this age without a urinary anomaly and typically produces epididymal tenderness with increased Doppler flow. Option D produces a groin-to-scrotum bulge, often with bowel symptoms. Option E presents as a painless, firm, intratesticular mass, not a tender upper-pole nodule with preserved flow.

Educational objective. The blue dot sign with a preserved cremasteric reflex and normal Doppler flow identifies a self-limited torsion of the appendix testis, distinguishing it from surgical testicular torsion.

Question 35

A 24-year-old man has 5 days of gradually worsening right scrotal pain and swelling and a low-grade fever. He recently had a new sexual partner and reports some clear urethral discharge and mild dysuria. On examination the epididymis is swollen and tender, and lifting the scrotum eases the pain somewhat. The cremasteric reflex is intact. Urinalysis shows pyuria, and a urethral nucleic acid amplification test is pending.

Infection with which of the following organisms is the most likely cause?

- A. Escherichia coli
- B. Mumps virus
- C. Chlamydia trachomatis
- D. Mycobacterium tuberculosis
- E. Pseudomonas aeruginosa

Answer: C

Explanation. In sexually active men younger than about 35, acute epididymitis is usually a sexually transmitted infection, and Chlamydia trachomatis is the most common pathogen (Neisseria gonorrhoeae is next). The new partner, urethral discharge, dysuria, and pyuria all point to an STI, and empiric therapy covers both organisms (for example, ceftriaxone plus doxycycline). The gradual onset, relief with elevation, and intact cremasteric reflex separate this from torsion. Option A (enteric organisms such as E. coli) causes epididymitis in older men (often with outlet obstruction or instrumentation), in prepubertal boys, or with a urinary anomaly. Option B causes orchitis, usually with parotitis. Option D is a chronic, indurated process with a beaded vas deferens. Option E is not a usual cause in this setting.

Educational objective. Acute epididymitis in sexually active young men is usually due to Chlamydia trachomatis or Neisseria gonorrhoeae, whereas enteric organisms such as E. coli predominate in older men and boys.

Question 36

A 28-year-old man notices a painless lump in his right testis, along with a vague sense of heaviness, over the past 3 weeks. He denies trauma, fever, and urinary symptoms. On examination there is a firm, non-tender nodule arising from within the body of the right testis. It does not transilluminate, and the surrounding testicular tissue and the epididymis feel normal. There is no cough impulse and nothing to reduce.

Which of the following is the most likely diagnosis?

- **A.** Hydrocele
- **B.** Varicocele
- **C.** Spermatocele
- **D.** Epididymal cyst
- **E.** Germ cell tumor of the testis

Answer: E

Explanation. A painless, firm, solid mass arising within the testis in a young man is a germ cell tumor until proven otherwise; germ cell tumors are the most common solid malignancy in men aged 15 to 35. The lesion is intratesticular and does not transilluminate (it is solid, not cystic), which is the key discriminator from the benign lesions below. Appropriate next steps are a scrotal ultrasound, serum tumor markers (AFP, beta-hCG, LDH) drawn before surgery, and radical inguinal orchiectomy. Option A is a fluid collection that surrounds the testis and transilluminates. Option B is a soft bag of worms that decompresses when the patient lies down. Option C is a cystic, transilluminating lesion at the head of the epididymis. Option D is likewise cystic and extratesticular. In short, solid and intratesticular points to cancer, whereas cystic or extratesticular lesions are almost always benign.

Educational objective. A painless, firm, solid, non-transilluminating intratesticular mass in a young man is testicular cancer until proven otherwise.

Question 37

A 30-year-old man has a firm, painless right intratesticular mass, and scrotal ultrasound confirms a solid hypoechoic lesion. He is being prepared for radical inguinal orchiectomy.

Which of the following is the most appropriate test to obtain before surgery?

- **A.** Serum prostate-specific antigen (PSA)
- **B.** Serum alpha-fetoprotein (AFP), beta-hCG, and LDH
- **C.** Trans-scrotal needle biopsy of the mass
- **D.** Serum AFP alone, since it is elevated in all germ cell tumors
- **E.** No blood tests are needed until after the orchiectomy

Answer: B

Explanation. Serum tumor markers (AFP, beta-hCG, and LDH) must be drawn before orchiectomy. They establish a baseline, contribute to staging (the S stage), and are followed afterward by their half-lives to detect residual or recurrent disease (AFP half-life about 5 to 7 days, beta-hCG about 1 to 3 days). Their patterns also guide interpretation: AFP is never produced by pure seminoma, so an elevated AFP indicates nonseminomatous elements regardless of the histology slide; beta-hCG can be elevated in either seminoma or nonseminoma; and LDH reflects tumor bulk. Option A is a prostate marker with no role

here. Option C is contraindicated for a suspected testicular tumor. Option D is false because pure seminoma does not make AFP, so a normal AFP does not exclude cancer. Option E loses the essential preoperative baseline.

Educational objective. Obtain serum AFP, beta-hCG, and LDH before orchiectomy for baseline, staging, and monitoring; remember that AFP is never elevated in pure seminoma.

Question 38

A 30-year-old man has a solid right intratesticular mass with tumor markers already drawn, and the plan is a radical inguinal orchiectomy in which the spermatic cord is clamped at the internal inguinal ring and the testis is removed intact. A medical student asks why the surgeon will not simply obtain tissue through a small scrotal incision.

Avoiding a trans-scrotal biopsy or orchiectomy is most important because such an approach does which of the following?

- **A.** Disrupts the normal lymphatic drainage of the testis and risks tumor spread to the inguinal lymph nodes
- **B.** Causes immediate hematogenous spread of tumor to the lungs
- **C.** Makes the serum tumor markers falsely negative
- **D.** Converts a seminoma into a nonseminomatous tumor
- **E.** Prevents the pathologist from grading the tumor

Answer: A

Explanation. The testis and its lymphatics develop retroperitoneally and drain along the gonadal vessels to the retroperitoneal (para-aortic and interaortocaval) lymph nodes, whereas the scrotal skin drains to the inguinal nodes. Cutting through the scrotum breaches this boundary and can seed tumor into an abnormal, inguinal drainage basin, which complicates staging and treatment. For that reason the standard operation is a radical inguinal orchiectomy: the cord is controlled at the internal ring and the testis is delivered intact without ever entering the scrotum. Option B is wrong because the concern is altered lymphatic drainage, not instantaneous hematogenous spread. Option C is wrong because markers are measured in blood. Option D is wrong because an incision cannot change histology. Option E is wrong because the whole specimen is removed for pathology at orchiectomy.

Educational objective. Testicular tumors are removed by radical inguinal orchiectomy because a trans-scrotal approach disrupts lymphatic drainage and risks spreading tumor to the inguinal nodes.

Question 39

A 10-month-old boy, born at term, is seen because his right testis has never been felt in the scrotum. On examination the right testis is palpable in the inguinal canal but cannot be brought down into the scrotum; the left testis is normally descended. He is otherwise well and growing normally.

Which of the following is the most appropriate next step?

- **A.** Reassure the parents that the testis will descend by puberty and simply observe
- **B.** Order a scrotal and pelvic ultrasound to locate the testis
- **C.** Order CT of the abdomen and pelvis
- **D.** Refer for orchidopexy
- **E.** Begin human chorionic gonadotropin (hCG) hormonal therapy

Answer: D

Explanation. In a term infant, a testis that has not descended by about 6 months is very unlikely to descend on its own, so the standard treatment is surgical orchidopexy, ideally between 6 and 12 months of age (and by roughly 18 months at the latest). Early orchidopexy improves fertility potential and repositions the testis where it can be examined; importantly, it reduces but does not eliminate the elevated risk of testicular cancer, so lifelong self-examination is advised. Option A only delays a needed operation. Options B and C are unhelpful because imaging does not change management: a palpable testis is localized by examination, and a non-palpable one is evaluated with diagnostic laparoscopy, not ultrasound or CT. Option E is not a reliable definitive treatment.

Educational objective. An undescended testis is treated with orchidopexy at 6 to 12 months of age; imaging is unhelpful, and the cancer risk is lowered but not eliminated.

Question 40

A 46-year-old man reports a few months of a dull left scrotal ache and a "bag of worms" sensation. When he stands, a soft, wormlike cluster of veins is palpable above the left testis and enlarges with the Valsalva maneuver. Notably, when he lies down the mass does not decompress.

Which of the following is the most appropriate next step?

- **A.** Reassure and observe, since left-sided varicoceles are common and benign
- **B.** Obtain a scrotal ultrasound only, then discharge him
- **C.** Order a semen analysis and refer for varicocele repair for fertility
- **D.** Start antibiotics for presumed epididymitis
- **E.** Obtain cross-sectional imaging of the abdomen and retroperitoneum

Answer: E

Explanation. Most varicoceles are left-sided because the left gonadal vein drains into the left renal vein, and a typical varicocele empties when the patient lies supine. Two features are red flags: a varicocele that

fails to decompress when supine, and a new right-sided varicocele. Either raises concern for venous obstruction from a retroperitoneal or renal process (for example, a renal tumor with renal-vein thrombus, or a retroperitoneal mass compressing the vein), so the next step is cross-sectional imaging of the abdomen and retroperitoneum. Options A and B ignore the non-decompressing feature that breaks the benign rule. Option C is appropriate for a typical reducible varicocele in a man with infertility and abnormal semen parameters, but here the atypical feature must be investigated first. Option D is wrong because this is not an infection.

Educational objective. A varicocele that does not decompress when supine, or any new right-sided varicocele, warrants abdominal and retroperitoneal imaging to exclude a renal or retroperitoneal cause of venous obstruction.

Urinary Tract Infection, Pyelonephritis, and GU Infections

Question 41

A 74-year-old woman living in a nursing home is found to have a positive urine culture obtained during routine screening. She has no burning with urination, no urgency, no frequency, no suprapubic or flank pain, and no fever, and she feels at her usual baseline. Vital signs are normal. Urinalysis shows many bacteria and moderate leukocytes, and culture grows more than 10^5 CFU/mL of *Escherichia coli*. She is not pregnant and has no urologic procedure planned.

Which of the following is the most appropriate next step?

- **A.** Oral nitrofurantoin for 5 days
- **B.** Single-dose oral fosfomycin
- **C.** Oral trimethoprim-sulfamethoxazole for 3 days
- **D.** No antibiotic therapy, with reassurance and monitoring
- **E.** Intravenous ceftriaxone and hospital admission

Answer: D

Explanation. This is asymptomatic bacteriuria: significant bacteriuria without any urinary symptoms or systemic signs. In almost all populations, treating it does not reduce symptomatic infections and only selects for resistant organisms and causes drug side effects, so antibiotics are not indicated. The only widely accepted exceptions are pregnancy and treatment before a urologic procedure expected to breach the mucosa with anticipated bleeding. Elderly, institutionalized, diabetic, catheterized, and spinal-cord-injured patients with no symptoms should not be treated, and vague findings such as cloudy or malodorous urine do not justify antibiotics. Options A, B, and C are valid regimens for symptomatic uncomplicated cystitis but are wrong here because she has no symptoms. Option E is aggressive over-treatment of an afebrile, well patient.

Educational objective. Asymptomatic bacteriuria is treated only in pregnancy and before a mucosa-breaking urologic procedure; screening for and treating it in other patients causes harm without benefit.

Question 42

A healthy 26-year-old woman presents with two days of burning with urination, urinary frequency, and urgency, along with mild suprapubic discomfort. She has no fever, no flank pain, no nausea, and no vaginal discharge. She is not pregnant and takes no medications. Temperature is normal and there is no costovertebral angle tenderness. Urinalysis shows pyuria and positive nitrites. In her region, *E. coli* resistance to trimethoprim-sulfamethoxazole exceeds 20%.

Which of the following is the most appropriate antibiotic?

- **A.** Nitrofurantoin for 5 days
- **B.** Trimethoprim-sulfamethoxazole for 3 days
- **C.** Oral ciprofloxacin for 7 days
- **D.** Oral amoxicillin for 7 days
- **E.** Intravenous ceftriaxone

Answer: A

Explanation. She has acute uncomplicated cystitis: lower-tract symptoms in a healthy, nonpregnant woman with no fever or flank pain. First-line options are nitrofurantoin for 5 days, trimethoprim-sulfamethoxazole for 3 days, or a single dose of fosfomycin. Because local trimethoprim-sulfamethoxazole resistance exceeds roughly 20%, it is a poor empiric choice (B), which makes nitrofurantoin the best answer. Fluoroquinolones (C) work but are reserved because of collateral damage (resistance, *Clostridioides difficile*, tendinopathy). Amoxicillin (D) has high *E. coli* resistance. Intravenous ceftriaxone (E) is unnecessary for an afebrile woman who can take oral medication. Note that although nitrofurantoin is excellent for cystitis, it must not be used for pyelonephritis: it concentrates in urine but does not reach therapeutic levels in the renal parenchyma or bloodstream.

Educational objective. First-line therapy for uncomplicated cystitis is nitrofurantoin, trimethoprim-sulfamethoxazole (where resistance is low), or single-dose fosfomycin; nitrofurantoin is inadequate for pyelonephritis because it does not achieve therapeutic renal tissue concentrations.

Question 43

A 34-year-old man presents with three days of dysuria and increased urinary frequency. He has no fever, no flank pain, and no perineal pain, and the prostate is not tender on gentle examination. He has no urinary catheter, no known urologic abnormality, and is otherwise healthy. Urinalysis shows pyuria and bacteriuria.

Which of the following is the most appropriate next step in management?

- **A.** Single-dose oral fosfomycin without a culture
- **B.** No treatment, with a repeat urinalysis in one week
- **C.** Send a urine culture and treat with a 7-day course guided by local guidelines
- **D.** Reassurance that cystitis in men resolves without antibiotics
- **E.** Immediate cystoscopy

Answer: C

Explanation. Any UTI in a man is considered complicated because of the longer urethra, potential prostatic involvement, and a higher likelihood of an underlying functional or anatomic factor. Complicated UTIs (male sex, pregnancy, indwelling catheter, obstruction, immunocompromise, or an anatomic or functional abnormality) warrant a urine culture to guide therapy and a longer course than the short regimens used for uncomplicated female cystitis. A 7-day oral course (for example a fluoroquinolone or trimethoprim-sulfamethoxazole, chosen per local guidelines and culture) is appropriate. Single-dose fosfomycin (A) and other ultra-short regimens are inadequate for a complicated infection and skip the culture. No treatment (B, D) is wrong because he is symptomatic. Cystoscopy (E) is reserved for recurrent infection, obstruction, or failure to respond.

Educational objective. All UTIs in men are treated as complicated, requiring a urine culture and a longer (about 7-day) antibiotic course rather than the short regimens used for uncomplicated cystitis in women.

Question 44

A 29-year-old woman presents with one day of fever to 39 degrees C, right flank pain, nausea, and two episodes of vomiting, preceded by two days of burning with urination. She is not pregnant. On examination she has marked right costovertebral angle tenderness. Urinalysis shows pyuria, positive nitrites, and white blood cell casts. She is tachycardic but normotensive.

Which of the following is the most likely diagnosis?

- **A.** Acute uncomplicated cystitis
- **B.** Acute pyelonephritis
- **C.** Nephrolithiasis without infection
- **D.** Pelvic inflammatory disease
- **E.** Asymptomatic bacteriuria

Answer: B

Explanation. Fever, flank pain with costovertebral angle tenderness, nausea and vomiting, and pyuria with white blood cell casts indicate acute pyelonephritis (infection of the renal parenchyma and collecting system); white blood cell casts localize the inflammation to the kidney. Cystitis (A) causes lower-tract

symptoms without fever, flank pain, or casts. Nephrolithiasis without infection (C) causes colicky flank pain but not fever, pyuria with casts, and nitrites. Pelvic inflammatory disease (D) causes lower abdominal and pelvic pain with cervical motion tenderness, not costovertebral angle tenderness with casts.

Asymptomatic bacteriuria (E) is by definition without symptoms. Disposition depends on severity: a well-appearing, nonpregnant patient who tolerates oral intake can be managed as an outpatient, whereas admission for intravenous antibiotics is indicated for vomiting, sepsis, pregnancy, suspected obstruction, or failed outpatient therapy. This patient's repeated vomiting favors admission. Nitrofurantoin and fosfomycin are urinary agents not appropriate for pyelonephritis.

Educational objective. Fever, flank pain with costovertebral angle tenderness, and white blood cell casts define acute pyelonephritis; disposition depends on the ability to tolerate oral therapy, hemodynamic stability, pregnancy, and obstruction.

Question 45

A 63-year-old postmenopausal woman has had four culture-confirmed episodes of uncomplicated cystitis in the past year, each of which responded promptly to antibiotics. She has no diabetes, no incontinence, and a normal post-void residual, and renal and bladder ultrasound is unremarkable. She is troubled by the recurrences and asks how to prevent them.

Which of the following is most likely to reduce her recurrent infections?

- **A.** Topical vaginal estrogen
- **B.** Oral systemic estrogen therapy
- **C.** Long-term daily oral broad-spectrum antibiotics as the first measure
- **D.** Cranberry juice as definitive prevention
- **E.** Routine surveillance cystoscopy and renal imaging

Answer: A

Explanation. She meets the definition of recurrent UTI (at least 2 infections in 6 months or at least 3 in 12 months). In postmenopausal women, estrogen deficiency thins the vaginal epithelium, reduces lactobacilli, and raises vaginal pH, which favors colonization by uropathogens. Topical (vaginal) estrogen restores the protective flora and lowers pH and is a guideline-supported, low-risk intervention that reduces recurrences. Systemic oral estrogen (B) has not shown the same benefit and carries thromboembolic and other systemic risks. Continuous antibiotic prophylaxis (C) is effective but sits lower on the prevention ladder because of resistance and side effects, and it is considered after behavioral measures and vaginal estrogen. Cranberry products (D) have weak, inconsistent evidence. Her workup is already reassuring, so repeated cystoscopy and imaging (E) are unnecessary.

Educational objective. In postmenopausal women with recurrent UTIs, topical vaginal estrogen restores protective flora and reduces recurrences and is preferred over systemic estrogen or first-line continuous antibiotics.

Question 46

A 70-year-old man is recovering on the ward five days after a hip operation and has had an indwelling urinary catheter since surgery. He is afebrile and hemodynamically stable, with no suprapubic pain, no flank pain, and no new confusion. A nurse notes that the urine in the drainage bag looks cloudy and sends a specimen, and culture grows more than 10^5 CFU/mL of *Klebsiella*. He continues to feel well.

Which of the following is the most appropriate next step?

- **A.** Start oral trimethoprim-sulfamethoxazole based on sensitivities
- **B.** Start intravenous antibiotics for catheter-associated infection
- **C.** Perform continuous bladder irrigation with an antibiotic solution
- **D.** Exchange the catheter and start prophylactic antibiotics
- **E.** Withhold antibiotics, reassess the need for the catheter, and remove it as soon as possible

Answer: E

Explanation. This is catheter-associated asymptomatic bacteriuria. Colonization of an indwelling catheter is nearly universal over time, and treating asymptomatic catheter bacteriuria does not prevent symptomatic infection; it only selects for resistant organisms and exposes the patient to drug harms. Cloudy or malodorous urine alone, without fever, suprapubic or flank pain, systemic signs, or new delirium, is not an indication to treat, and asymptomatic catheterized patients should generally not even have urine cultured. The correct actions are to withhold antibiotics and to review whether the catheter is still needed, removing it as early as possible, because the catheter drives both the bacteriuria and future infection. Options A, B, C, and D all involve treating asymptomatic bacteriuria and are therefore wrong. The only exceptions for treating asymptomatic bacteriuria remain pregnancy and pre-urologic-procedure with anticipated mucosal trauma.

Educational objective. Catheter-associated asymptomatic bacteriuria should not be cultured or treated; the priority is prompt removal of the unnecessary catheter.

Question 47

A 55-year-old woman presents with high fever, rigors, and left flank pain. She is confused, with blood pressure 84/50 mmHg, heart rate 122 per minute, and temperature 39.5 degrees C, and her serum lactate is elevated. Non-contrast CT shows a 9-mm stone obstructing the left ureter with upstream hydronephrosis, and urinalysis shows pyuria and bacteriuria. Broad-spectrum intravenous antibiotics and intravenous fluids are started, and she is resuscitated per sepsis guidelines.

Which of the following is the most appropriate next step in management?

- **A.** Continue antibiotics and fluids alone and observe for 48 hours
- **B.** Proceed directly to ureteroscopy with laser stone fragmentation
- **C.** Urgently decompress the obstructed kidney with a percutaneous nephrostomy or a retrograde ureteral stent
- **D.** Perform extracorporeal shock wave lithotripsy of the stone
- **E.** Discharge on oral antibiotics with outpatient urology follow-up

Answer: C

Explanation. This is an infected, obstructed upper urinary tract (an obstructing stone with an infected system) causing sepsis, a urologic emergency. Pus under pressure behind an obstruction will not clear with antibiotics alone, because the drug cannot reach the walled-off collecting system and the sepsis will progress. The definitive early step is urgent decompression, achieved with either a percutaneous nephrostomy tube or a retrograde ureteral stent, alongside antibiotics and resuscitation. Continuing antibiotics and fluids alone (A) risks rapid deterioration and death. Definitive stone treatment such as ureteroscopy (B) or shock wave lithotripsy (D) is contraindicated during active sepsis, because manipulating an infected stone can worsen bacteremia, so stone removal is deferred. Oral antibiotics and outpatient follow-up (E) are unsafe in a septic, hypotensive patient.

Educational objective. An infected, obstructed urinary system with sepsis requires emergent decompression (nephrostomy or ureteral stent) in addition to antibiotics and resuscitation; antibiotics alone are inadequate, and definitive stone treatment is deferred.

Question 48

A 23-year-old sexually active man presents with three days of dysuria and a purulent urethral discharge. He recently had a new partner and uses condoms inconsistently. He has no fever, no flank pain, and no testicular pain. Examination confirms mucopurulent discharge at the meatus, and a urine nucleic acid amplification test is sent for gonorrhea and chlamydia.

Which of the following is the most appropriate treatment?

- **A.** Oral azithromycin as a single dose alone
- **B.** Intramuscular ceftriaxone plus oral doxycycline
- **C.** Oral ciprofloxacin alone
- **D.** Oral doxycycline alone
- **E.** Await test results before giving any antibiotic

Answer: B

Explanation. He has acute urethritis, most commonly caused by *Neisseria gonorrhoeae* and/or *Chlamydia trachomatis*, and co-infection is common, so empiric therapy must cover both organisms

without waiting for results. The recommended regimen is a single intramuscular dose of ceftriaxone (for gonorrhea) plus oral doxycycline for 7 days (for chlamydia). Azithromycin alone (A) or doxycycline alone (D) does not reliably treat gonorrhea. Ciprofloxacin and other fluoroquinolones (C) are no longer recommended for gonorrhea because of widespread resistance. Waiting for results (E) is inappropriate for symptomatic urethritis: empiric dual therapy is started at presentation, with partner notification and testing for other sexually transmitted infections, including syphilis and HIV.

Educational objective. Empiric treatment of acute urethritis covers both gonorrhea and chlamydia with intramuscular ceftriaxone plus oral doxycycline, given at presentation rather than after test results return.

Kidney Cancer, Renal Masses, and Adrenal Lesions

Question 49

A 63-year-old woman undergoes contrast-enhanced CT of the abdomen for right upper quadrant pain thought to be biliary. The scan shows gallstones and, incidentally, a 3.2 cm solid enhancing mass in the upper pole of the right kidney. She has no hematuria, no flank pain, and no palpable mass, and she feels well.

Which of the following best explains why most renal cell carcinomas today are diagnosed without the classic triad of flank pain, hematuria, and a palpable mass?

- **A.** Renal cell carcinoma rarely invades the collecting system
- **B.** The triad occurs only when tumors are bilateral
- **C.** Cross-sectional imaging now detects most tumors while they are small and asymptomatic
- **D.** Modern tumors are biologically less aggressive than in past decades
- **E.** Widespread anticoagulation suppresses hematuria

Answer: C

Explanation. The classic triad is a marker of locally advanced, late-stage disease and was always uncommon; its appearance historically signaled a poor prognosis. Because abdominal CT and ultrasound are now ordered frequently for unrelated complaints, the majority of renal cell carcinomas are discovered incidentally as small, organ-confined, asymptomatic masses (C), well before a triad could develop. A: collecting-system invasion does cause hematuria, but that is not why the triad is now uncommon. B: the triad reflects tumor size and local extent, not bilaterality. D: tumor biology has not fundamentally changed; earlier detection has. E: anticoagulation would tend to unmask hematuria, not suppress the triad.

Educational objective. Renal cell carcinoma is now most often found incidentally on cross-sectional imaging, and the classic triad reflects late, locally advanced disease.

Question 50

A 59-year-old man is found to have a 4 cm clear cell renal cell carcinoma. He has smoked one pack of cigarettes daily for 35 years, has a body mass index of 33 kg/m², and has hypertension treated with two agents. He asks which of his characteristics most increased his risk of developing this cancer.

Which of the following is the strongest modifiable risk factor for renal cell carcinoma in this patient?

- **A.** His 35 pack-year smoking history
- **B.** His body mass index of 33 kg/m²
- **C.** His hypertension
- **D.** His male sex
- **E.** A germline VHL mutation

Answer: A

Explanation. Cigarette smoking is the most firmly established modifiable risk factor for renal cell carcinoma, with a dose-dependent association that roughly doubles risk (A). B and C: obesity and hypertension are genuine independent risk factors, but individually they are weaker and less consistently identified as the leading modifiable factor. D: male sex (roughly a 2:1 predominance) is a real risk factor but is not modifiable. E: a germline VHL mutation causes hereditary clear cell renal cell carcinoma, but nothing here (no young age of onset, bilateral or multifocal tumors, syndromic features, or family pattern) suggests it, and it is not modifiable.

Educational objective. Among the modifiable risk factors for renal cell carcinoma (smoking, obesity, hypertension), cigarette smoking carries the strongest and most consistent, dose-dependent association.

Question 51

A 66-year-old man with a 9 cm right renal mass is noted on routine bloodwork to have a hemoglobin of 19.2 g/dL and a hematocrit of 57%. His oxygen saturation is normal, he has never smoked, and he has no lung disease or sleep apnea. Serum erythropoietin is elevated. Several weeks after radical nephrectomy, his hemoglobin normalizes.

Which of the following is the most likely mechanism of his elevated hemoglobin?

- **A.** Tumor secretion of parathyroid hormone-related peptide
- **B.** Tumor secretion of renin
- **C.** Chronic hypoxemia driving a physiologic response
- **D.** Autonomous tumor production of erythropoietin
- **E.** Reversible intrahepatic cholestasis

Answer: D

Explanation. Renal cell carcinoma is a classic cause of paraneoplastic erythrocytosis: the tumor drives autonomous, inappropriate erythropoietin production, raising red cell mass, and normalization of the hemoglobin after nephrectomy confirms the tumor as the source (D). A: parathyroid hormone-related peptide produces paraneoplastic hypercalcemia, not polycythemia. B: renin secretion produces hypertension (with hypokalemia), not erythrocytosis. C: a physiologic, appropriate rise in erythropoietin requires hypoxemia, which is absent here. E: reversible intrahepatic cholestasis describes Stauffer syndrome, a paraneoplastic hepatic dysfunction that perturbs liver tests rather than the hemoglobin.

Educational objective. Renal cell carcinoma can autonomously secrete erythropoietin, causing paraneoplastic polycythemia that resolves after tumor removal; its other paraneoplastic mediators (PTHrP, renin) and Stauffer syndrome produce distinct syndromes.

Question 52

A 55-year-old man with a solitary functioning right kidney (his left kidney was removed years earlier after trauma) is found to have a 2.8 cm peripheral, exophytic enhancing mass in the mid-right kidney. His serum creatinine is mildly elevated, with an estimated GFR of 58 mL/min/1.73 m². Staging imaging shows no metastatic disease.

Which of the following is the most appropriate management?

- A. Radical nephrectomy
- B. Whole-kidney external beam radiation
- C. Partial nephrectomy
- D. Systemic tyrosine kinase inhibitor therapy
- E. Bilateral nephrectomy with dialysis planning

Answer: C

Explanation. This is a small (cT1a, 4 cm or less) localized renal mass in a patient with a solitary kidney and already reduced renal function. Partial (nephron-sparing) nephrectomy removes the tumor while preserving functioning parenchyma, protecting against progression to advanced chronic kidney disease and dialysis; it is preferred for small masses whenever technically feasible and is imperative in a solitary kidney (C). A: radical nephrectomy would render him anephric and dialysis-dependent. B: renal cell carcinoma is relatively radioresistant, and whole-kidney radiation is not curative. D: systemic therapy is reserved for metastatic disease. E: bilateral nephrectomy is not indicated with a single small tumor in a solitary kidney. The expected histology is clear cell renal cell carcinoma, the most common subtype.

Educational objective. For small localized renal masses, partial nephrectomy is preferred to preserve renal function, and it is essential when the tumor is in a solitary kidney or when baseline renal function is already impaired.

Question 53

An 84-year-old man with severe COPD on home oxygen, coronary artery disease, and frailty is found to have an incidental 2.2 cm enhancing solid renal mass during a workup for pneumonia. He has no urinary symptoms and lives independently but tires easily. He and his family are anxious but wish to avoid major surgery if it is reasonable to do so.

Which of the following is the most appropriate next step in management?

- **A.** Radical nephrectomy
- **B.** Active surveillance, with renal mass biopsy to guide decisions
- **C.** Immediate systemic immunotherapy
- **D.** Whole-body PET with empiric chemotherapy
- **E.** Genetic counseling and prophylactic contralateral nephrectomy

Answer: B

Explanation. Small renal masses (4 cm or less) generally grow slowly and rarely metastasize, and roughly one in five prove benign (oncocytoma, angiomyolipoma). In an elderly, frail patient whose competing cardiopulmonary mortality is high, active surveillance is appropriate, and a percutaneous renal mass biopsy can establish histology and clarify whether any intervention is warranted, sparing him the risks of surgery (B). A: radical nephrectomy is excessive and high-risk given his comorbidity and the small tumor. C and D: systemic therapy is for metastatic disease. E: there is no indication for contralateral surgery, and genetic counseling is not the priority in an octogenarian with a solitary sporadic mass.

Educational objective. In a comorbid or elderly patient with a small renal mass, active surveillance, often paired with renal mass biopsy to establish histology, is a guideline-supported strategy that avoids surgical morbidity.

Question 54

A 60-year-old woman presents with right flank discomfort and new lower-extremity edema. Contrast-enhanced CT shows a 10 cm right renal mass with expansion of the right renal vein and enhancing tumor extending into the inferior vena cava.

Which of the following is the most important next step to guide surgical planning?

- **A.** Cross-sectional imaging (contrast CT or MRI) to define the cephalad extent of the tumor thrombus
- **B.** Percutaneous biopsy of the intravascular thrombus
- **C.** Therapeutic anticoagulation for a presumed bland clot
- **D.** Referral for whole-kidney radiotherapy
- **E.** A bone scan before any further imaging

Answer: A

Explanation. Renal cell carcinoma has a well-known propensity to invade the renal vein and grow as a tumor thrombus into the inferior vena cava, sometimes reaching the diaphragm or right atrium. Defining the cephalad (upper) extent of the thrombus with dedicated cross-sectional imaging is essential, because it determines the operative approach and whether cardiac surgery with cardiopulmonary bypass will be required (A). B: biopsy of the thrombus is unnecessary and risky, since a venous filling defect contiguous with an enhancing renal mass is tumor thrombus. C: this is tumor, not bland clot. D: renal cell carcinoma is radioresistant. E: a bone scan is reserved for bony symptoms or high-risk features and would not guide the thrombectomy plan.

Educational objective. Renal cell carcinoma can extend as tumor thrombus up the renal vein into the inferior vena cava; cross-sectional imaging to establish the cephalad extent is critical for surgical planning, including the potential need for cardiopulmonary bypass.

Question 55

A 46-year-old asymptomatic woman undergoes CT that reveals a well-circumscribed 2 cm right renal lesion. Regions within the lesion measure negative 40 Hounsfield units, matching her subcutaneous fat, with no calcification. She has no features of tuberous sclerosis.

Which of the following is the most likely diagnosis?

- A. Clear cell renal cell carcinoma
- B. Oncocytoma
- C. Renal abscess
- D. Simple cyst
- E. Angiomyolipoma

Answer: E

Explanation. Macroscopic (bulk) fat within a renal lesion, shown by negative Hounsfield unit measurements matching body fat, is essentially diagnostic of angiomyolipoma, a benign tumor composed of blood vessels, smooth muscle, and fat (E). A: clear cell renal cell carcinoma is the most common renal malignancy but does not contain macroscopic fat, so the presence of fat argues strongly against it. B: oncocytoma is benign (classically with a central scar) but contains no fat and cannot be reliably distinguished from renal cell carcinoma on imaging alone. C: an abscess presents with fever and infectious signs. D: a simple cyst measures near water density (0 to 20 HU), not fat density. Small asymptomatic angiomyolipomas are typically observed, whereas those larger than 4 cm or symptomatic risk spontaneous hemorrhage (Wunderlich syndrome) and may warrant embolization.

Educational objective. Macroscopic fat on CT (negative Hounsfield units) is characteristic of a benign angiomyolipoma and effectively excludes renal cell carcinoma.

Question 56

A 44-year-old woman reports episodes of pounding headache, palpitations, and drenching sweats, during which her blood pressure surges to 210/120 mmHg. CT shows a 4 cm right adrenal mass, and plasma free metanephrines are markedly elevated. Laparoscopic adrenalectomy is planned.

Which of the following is the most appropriate next step in her preoperative management?

- **A.** Start a nonselective beta-blocker (propranolol) first
- **B.** Start alpha-adrenergic blockade (for example, phenoxybenzamine) with volume expansion, then add a beta-blocker if needed
- **C.** Proceed directly to surgery without pharmacologic preparation
- **D.** Perform percutaneous biopsy of the adrenal mass to confirm the diagnosis
- **E.** Begin an ACE inhibitor as the sole preoperative agent

Answer: B

Explanation. The paroxysmal headache, palpitations, and diaphoresis with episodic hypertension, together with elevated metanephrines and an adrenal mass, indicate a pheochromocytoma. Adequate preoperative alpha-blockade (begun roughly 10 to 14 days before surgery) with liberal salt and fluid intake re-expands the catecholamine-contracted intravascular volume and blunts alpha-mediated vasoconstriction; a beta-blocker can be added afterward to control reflex tachycardia (B). A: giving a beta-blocker first is dangerous, because blocking beta-mediated vasodilation leaves alpha-mediated vasoconstriction unopposed and can precipitate a hypertensive crisis, which is why alpha blockade must precede beta blockade. C: operating on an unprepared patient risks intraoperative crisis and arrhythmia. D: biopsy of a suspected pheochromocytoma can trigger a catecholamine surge. E: an ACE inhibitor alone does not provide the alpha-blockade and volume expansion required.

Educational objective. Pheochromocytoma requires alpha-adrenergic blockade with volume expansion before beta-blockade and before surgery; giving a beta-blocker first, or biopsying the mass, can precipitate a hypertensive crisis.

Men's Health: ED, Testosterone, Infertility, and Priapism

Question 57

A 54-year-old man sees his family physician because of difficulty achieving erections that has developed gradually over the past year. He has no chest pain and rarely exercises. He smokes half a pack of cigarettes daily and has a body mass index of 31 kg/m². Blood pressure is 148/92 mm Hg. On examination the penis is normal with no palpable plaque, both testes are of normal size, and femoral and pedal pulses are diminished. He has never had his blood sugar or cholesterol checked.

Which of the following is the most appropriate next step in management?

- **A.** Prescribe sildenafil and arrange no further testing
- **B.** Order nocturnal penile tumescence testing
- **C.** Screen for cardiovascular risk by checking fasting glucose (or HbA1c), a lipid panel, and blood pressure
- **D.** Refer directly for placement of a penile prosthesis
- **E.** Begin intracavernosal alprostadil injections

Answer: C

Explanation. Erectile dysfunction and atherosclerotic vascular disease share the same endothelial substrate, so new organic ED in a middle-aged man is a sentinel marker of occult cardiometabolic disease. Because the small cavernosal arteries narrow before the larger coronary arteries, ED often precedes a myocardial infarction by several years. This man has multiple untreated risk factors (smoking, obesity, elevated blood pressure, diminished peripheral pulses), so the priority is to screen for diabetes and dyslipidemia and to address cardiovascular risk, not simply to hand over a pill. C is correct. A misses a chance to detect diabetes or coronary disease. B (nocturnal penile tumescence testing) is a specialized study reserved for distinguishing psychogenic from organic ED and is unnecessary when the picture is clearly vasculogenic. D and E are advanced ED therapies far down the treatment ladder.

Educational objective. New-onset erectile dysfunction is a marker of systemic vascular disease and should prompt screening for diabetes, dyslipidemia, and cardiovascular risk.

Question 58

A 60-year-old man with stable angina takes sublingual nitroglycerin as needed plus a daily long-acting nitrate. Without telling his physician, he obtains sildenafil from a friend and takes a dose before sexual activity. Within the hour he becomes lightheaded and nearly faints. In the emergency department he is pale and diaphoretic, and blood pressure is 74/40 mm Hg.

Which of the following best explains the mechanism of his hypotension?

- **A.** Sildenafil blocks alpha-1 adrenergic receptors on vascular smooth muscle
- **B.** Nitrates and sildenafil both antagonize endothelial nitric oxide synthase
- **C.** Sildenafil directly stimulates guanylate cyclase independent of nitric oxide
- **D.** Both agents raise cyclic GMP, producing additive vascular smooth-muscle relaxation and profound vasodilation
- **E.** Sildenafil inhibits the breakdown of cyclic AMP in cardiac myocytes

Answer: D

Explanation. Nitric oxide activates guanylate cyclase, which raises cyclic GMP (cGMP), lowering intracellular calcium and relaxing vascular and cavernosal smooth muscle. Nitrates act as exogenous nitric oxide donors that drive cGMP production, whereas PDE5 inhibitors such as sildenafil block

phosphodiesterase type 5, the enzyme that degrades cGMP. Given together, one arm floods the pathway while the other prevents its clearance, so cGMP accumulates and causes synergistic systemic vasodilation and dangerous hypotension. This is why any nitrate is an absolute contraindication to PDE5 inhibitors. D is correct. A describes agents like phentolamine. B is wrong because both drugs enhance, not antagonize, nitric-oxide signaling. C is wrong because sildenafil preserves cGMP by inhibiting its breakdown and still requires nitric oxide from sexual stimulation to work. E is wrong because sildenafil is selective for cGMP-specific PDE5.

Educational objective. PDE5 inhibitors prevent cyclic GMP breakdown, so combining them with nitrates causes additive cGMP accumulation and life-threatening hypotension, making nitrate use an absolute contraindication.

Question 59

A 25-year-old man is seen for difficulty maintaining erections during intercourse that began three months ago after he started a new relationship. He reports that the problem occurs only with his partner. He consistently wakes with firm erections and has no difficulty achieving a rigid erection during masturbation. He takes no medications, has no medical problems, and does not smoke. Genital and cardiovascular examinations are normal, and an early-morning testosterone level is normal.

Which of the following is the most likely diagnosis?

- **A.** Vasculogenic erectile dysfunction
- **B.** Psychogenic erectile dysfunction
- **C.** Hypogonadism
- **D.** Neurogenic erectile dysfunction
- **E.** Corporo-venous occlusive dysfunction (venous leak)

Answer: B

Explanation. The hallmark of psychogenic ED is a situational pattern with preserved spontaneous erections. Firm nocturnal and early-morning erections and normal erections with masturbation indicate that the vascular, neurologic, and hormonal machinery required for an erection is intact, so the difficulty during partnered intercourse is driven by psychological factors such as performance anxiety and relationship dynamics. His young age, absence of vascular risk factors, normal examination, and normal testosterone all support this. B is correct. A and E (vasculogenic causes, including venous leak) typically produce a gradual, constant loss of erections with loss of nocturnal tumescence in older men with vascular risk factors. C is excluded by the normal morning testosterone and preserved libido. D (neurogenic ED) follows spinal cord injury, pelvic surgery, or diabetic neuropathy and would also blunt reflex and nocturnal erections.

Educational objective. Situational erectile dysfunction with preserved nocturnal and masturbatory erections points to a psychogenic rather than organic cause.

Question 60

A 47-year-old man reports several months of low energy and reduced sexual desire. His physician draws a total testosterone level at 4 PM during the same visit, and the result is mildly below the reference range. He has no history of testicular disease, takes no opioids or glucocorticoids, and his examination is unremarkable.

Which of the following is the most appropriate next step?

- **A.** Repeat the total testosterone on an early-morning sample and, if it is again low, measure LH and FSH
- **B.** Begin testosterone replacement therapy now
- **C.** Obtain a pituitary MRI
- **D.** Start clomiphene citrate
- **E.** Order a karyotype to evaluate for Klinefelter syndrome

Answer: A

Explanation. Testosterone secretion follows a diurnal rhythm that peaks in the early morning, and levels fluctuate from day to day, so a single low afternoon value is not sufficient to diagnose testosterone deficiency. The diagnosis requires two low early-morning total testosterone measurements together with consistent signs and symptoms. Once a low level is confirmed, LH and FSH localize the problem: high gonadotropins indicate primary (testicular) failure, whereas low or inappropriately normal gonadotropins indicate a secondary (central) cause. A is correct. B is premature on one incorrectly timed value. C (pituitary MRI) is reserved for confirmed secondary hypogonadism, particularly with very low testosterone or elevated prolactin. D (clomiphene) is a fertility-sparing treatment that comes after the diagnosis is established. E (karyotype) is considered for confirmed primary hypogonadism with small firm testes.

Educational objective. Diagnosing testosterone deficiency requires two low early-morning testosterone levels plus symptoms, with LH and FSH measured to separate primary from secondary hypogonadism.

Question 61

A 31-year-old man has low libido and fatigue. Two early-morning total testosterone levels are low, and his symptoms are consistent with testosterone deficiency. He and his wife are actively trying to conceive their first child. His LH and FSH are low-normal, and semen analysis shows a low-normal sperm concentration.

Administration of which of the following is contraindicated in this patient?

- **A.** Clomiphene citrate
- **B.** Human chorionic gonadotropin (hCG)
- **C.** Intramuscular testosterone cypionate
- **D.** Lifestyle and weight-optimization counseling
- **E.** An aromatase inhibitor when the testosterone-to-estradiol ratio is low

Answer: C

Explanation. Exogenous testosterone suppresses the hypothalamic-pituitary-gonadal axis by negative feedback, lowering LH and FSH. This drops intratesticular testosterone (which must be far higher than serum testosterone to support sperm production) and impairs spermatogenesis, frequently causing oligospermia or azoospermia. It is therefore contraindicated in a man who wants to preserve fertility and can act as an unintended male contraceptive. C is correct. The other options raise testosterone or improve symptoms while preserving the axis: clomiphene (A) is a selective estrogen receptor modulator that increases endogenous LH, FSH, and testosterone; hCG (B) mimics LH to stimulate Leydig cells directly and maintains intratesticular testosterone; weight optimization (D) can reverse obesity-related hypogonadism; and an aromatase inhibitor (E) is used when excess aromatization produces a low testosterone-to-estradiol ratio. As an aside, any man on testosterone (when fertility is not a concern) must have his hematocrit monitored, because erythrocytosis above 54 percent calls for dose reduction, a switch toward a transdermal preparation, or phlebotomy.

Educational objective. Exogenous testosterone suppresses gonadotropins and intratesticular testosterone and must be avoided in men seeking fertility, who should instead receive clomiphene or hCG; men who do take testosterone require hematocrit monitoring.

Question 62

A 28-year-old man and his partner have been unable to conceive after 18 months of regular unprotected intercourse. Two semen analyses show a low sperm concentration with reduced motility. On examination in the standing position, there is a soft mass along the left spermatic cord that feels like a bag of worms and enlarges with the Valsalva maneuver; it decompresses when he lies down. Both testes are of normal size and consistency, and serum FSH is normal.

Which of the following is the most appropriate management?

- **A.** Immediate in vitro fertilization with intracytoplasmic sperm injection
- **B.** Microsurgical subinguinal varicocelectomy
- **C.** Microdissection testicular sperm extraction (micro-TESE)
- **D.** Exogenous testosterone therapy
- **E.** Vasovasostomy

Answer: B

Explanation. The palpable left-sided scrotal mass that feels like a bag of worms, increases with Valsalva, and decompresses when supine is a clinical varicocele, the most common surgically correctable cause of male infertility (roughly 90 percent are left-sided because the left testicular vein drains into the left renal vein at a right angle). Repair is indicated when a man has a palpable varicocele, an abnormal semen analysis, and a couple with infertility, all present here. The microsurgical subinguinal approach preserves the testicular artery and lymphatics and has the lowest rates of hydrocele and recurrence. B is correct. A skips a durable, cheaper correction of the underlying cause. C (micro-TESE) is the retrieval procedure for non-obstructive azoospermia (no sperm in the ejaculate, elevated FSH, small soft testes), which is not this man's picture. D (testosterone) would suppress spermatogenesis. E (vasovasostomy) reverses a prior vasectomy, which he has not had.

Educational objective. A clinical varicocele with an abnormal semen analysis in an infertile couple is the most common correctable cause of male infertility and is best treated with microsurgical subinguinal varicocelectomy.

Question 63

A 34-year-old man comes to the emergency department because of a painful, rigid erection that has lasted about six hours and did not follow sexual activity. He denies any recent trauma to the perineum or genitals. On examination the corpora cavernosa are rigid and tender while the glans is soft. A cavernosal blood sample is dark, and blood gas analysis shows a low pO₂, a high pCO₂, and a low pH.

Which of the following is the most appropriate next step in management?

- A. Reassurance and observation
- B. Oral pseudoephedrine
- C. Selective internal pudendal arteriography with embolization
- D. Corporal aspiration followed by intracavernosal phenylephrine
- E. Immediate placement of a penile prosthesis

Answer: D

Explanation. A painful, rigid erection lasting more than four hours with dark, hypoxic, acidotic cavernosal blood (low pO₂, high pCO₂, low pH) defines ischemic (low-flow) priapism. This is a compartment syndrome of the penis: stagnant blood produces tissue hypoxia and acidosis, and beyond roughly four hours the smooth muscle begins to suffer ischemic injury. First-line treatment is decompression by corporal aspiration combined with intracavernosal injection of a sympathomimetic such as phenylephrine to produce detumescence; a surgical shunt is reserved for failure of these measures. D is correct. A suits non-ischemic (high-flow) priapism, which is painless, only partially rigid, follows perineal or straddle trauma, and shows bright, well-oxygenated cavernosal blood. B (pseudoephedrine) treats retrograde ejaculation. C (arteriographic embolization) is the treatment for high-flow priapism

caused by an arterial-cavernosal fistula. E (prosthesis) is considered only in very prolonged or refractory ischemic priapism after standard measures fail.

Educational objective. Ischemic priapism lasting more than four hours is a penile compartment syndrome treated urgently with aspiration and intracavernosal phenylephrine, in contrast to painless high-flow priapism, which follows trauma and can be observed.

Question 64

A 50-year-old man reports that over the past three months his erect penis has developed an upward bend that makes intercourse awkward, and he notices pain with erections. He can feel a firm nodule on the top of the shaft. He says the curvature still seems to be changing from week to week. He is able to achieve and maintain erections adequate for penetration.

Which of the following is the most appropriate management?

- **A.** Surgical plication of the tunica albuginea now
- **B.** Incision of the plaque with grafting now
- **C.** Reassurance and observation, with reassessment once the disease has stabilized
- **D.** Placement of an inflatable penile prosthesis now
- **E.** Immediate intralesional collagenase followed by surgical straightening

Answer: C

Explanation. Peyronie disease has two phases. The acute (active or inflammatory) phase features penile pain and a curvature that is still evolving, and it typically lasts several months before the disease enters the chronic (stable) phase, in which the pain resolves and the deformity becomes fixed. This man has painful, changing dorsal curvature of only three months, so he is clearly in the acute phase. Definitive procedures should be deferred until the disease has been stable for a period (generally at least about 12 months), because operating on an evolving curve risks correcting a deformity that will keep changing. The appropriate step now is reassurance and observation, often with supportive measures for pain, and reassessment once things stabilize. C is correct. A (plication) and B (incision and grafting) are surgical corrections reserved for the stable phase with a fixed, function-impairing curve. D (prosthesis) is reserved for stable-phase disease with refractory erectile dysfunction. E (collagenase with straightening) is a stable-phase option and is inappropriate while the plaque is still active.

Educational objective. Peyronie disease progresses from an acute painful phase with a changing curve to a stable phase with a fixed deformity, and definitive intervention should be deferred until the disease stabilizes.

Incontinence, Female Urology, and Neurogenic Bladder

Question 65

A 58-year-old woman, para 3, reports two distinct patterns of urine loss over the past two years. She leaks when she coughs, laughs, or lifts her grandchildren, and separately she sometimes feels a sudden, overwhelming urge and leaks before she can reach the toilet. Both are equally bothersome. She is postmenopausal and takes no hormone therapy. Urinalysis is negative, post-void residual is 30 mL, and a cough in the office produces a brief spurt of urine from the urethra.

Which is the most likely type of urinary incontinence?

- **A.** Stress urinary incontinence
- **B.** Urgency urinary incontinence
- **C.** Mixed urinary incontinence
- **D.** Overflow incontinence
- **E.** Functional incontinence

Answer: C

Explanation. She describes both an exertional (cough, laugh, lift) sphincteric leak and an urgency-driven leak from detrusor overactivity, and the two coexisting phenotypes define mixed urinary incontinence; management targets the more bothersome component first, with pelvic floor training helping both. Pure stress (A) would explain the exertional leak but not the urgency episodes. Pure urgency (B) would explain the urgency leak but not the reproducible cough-induced loss. Overflow (D) is excluded by the low post-void residual, which rules out chronic retention. Functional incontinence (E) requires a cognitive or mobility barrier to reaching the toilet, which she does not have.

Educational objective. Coexisting exertional leakage and urgency leakage define mixed urinary incontinence, and the dominant component is treated first.

Question 66

A 49-year-old woman describes losing small amounts of urine when she coughs, sneezes, or runs, without any preceding urge. She has no dysuria, frequency, or hematuria. Urinalysis is negative and post-void residual is 25 mL. You want to demonstrate the diagnosis during her office visit.

Which is the best next step to confirm the diagnosis?

- **A.** Cystoscopy
- **B.** Observe the urethra for leakage during a forceful cough with a comfortably full bladder
- **C.** Multichannel urodynamics
- **D.** Empiric antimuscarinic trial
- **E.** Renal and bladder ultrasonography

Answer: B

Explanation. The office cough stress test confirms stress incontinence when urine loss is seen from the urethra at the exact moment of a cough with a comfortably full bladder; if the supine test is negative despite a convincing history, it is repeated standing. Cystoscopy (A) is reserved for hematuria, recurrent infection, or suspected fistula or mesh complication, not uncomplicated stress incontinence. Multichannel urodynamics (C) is selective, used for mixed or complex cases, prior surgery, or neurogenic overlap, not routine straightforward stress incontinence. An antimuscarinic trial (D) treats urgency, not a demonstrated stress leak. Ultrasonography (E) adds nothing when the residual is already low and there is no upper-tract concern.

Educational objective. The office cough stress test, leakage coincident with a cough at a full bladder, confirms stress urinary incontinence.

Question 67

A 74-year-old man with several years of weak stream, hesitancy, and nocturia now reports near-constant dribbling of small amounts of urine, day and night. On examination he has suprapubic fullness and a bladder palpable to the umbilicus. Post-void residual is 700 mL. Urinalysis shows no infection, and his creatinine is mildly elevated compared with a prior value.

Which is the most likely mechanism of his urinary incontinence?

- **A.** Detrusor overactivity
- **B.** Intrinsic sphincter deficiency
- **C.** Functional incontinence from impaired mobility
- **D.** Chronic urinary retention with overflow
- **E.** Urethral hypermobility

Answer: D

Explanation. Long-standing bladder outlet obstruction from benign prostatic enlargement has produced chronic high-volume retention, and once intravesical pressure exceeds outlet resistance the bladder leaks continuously, which is overflow incontinence; the palpable bladder, 700 mL residual, and rising creatinine confirm it. This case also carries the central safety lesson: always check a urinalysis and a post-void residual before treating any incontinence, and never start an antimuscarinic in a man with retention, because it further impairs emptying and can precipitate acute retention. Detrusor overactivity (A) causes urgency incontinence with a low residual and would wrongly prompt an anticholinergic here. Intrinsic sphincter deficiency (B) and urethral hypermobility (E) are stress mechanisms typical of women. Functional incontinence (C) requires a cognitive or mobility barrier, which is absent.

Educational objective. Continuous dribbling with a high post-void residual signals overflow from chronic retention; measure the residual and urinalysis before treating, and never give an antimuscarinic to a man in retention.

Question 68

A 40-year-old woman, para 2, has leaked urine with coughing and exercise for eight months. She reports no urgency, dysuria, or hematuria. Her BMI is 27. Urinalysis is negative, post-void residual is 20 mL, and the cough stress test is positive. She is keen to avoid surgery.

Which is the most appropriate initial treatment?

- **A.** Supervised pelvic floor muscle training
- **B.** Mid-urethral sling
- **C.** Immediate-release oxybutynin
- **D.** Urethral bulking injection
- **E.** Mirabegron

Answer: A

Explanation. Uncomplicated stress incontinence is treated first with conservative measures, and supervised pelvic floor muscle training (structured with a physiotherapist, which outperforms self-directed Kegels) is the first-line intervention, alongside lifestyle measures. A mid-urethral sling (B) and urethral bulking (D) are surgical or procedural options reserved for patients who fail an adequate conservative trial. Oxybutynin (C) and mirabegron (E) treat urgency incontinence and have no role in pure stress incontinence.

Educational objective. Supervised pelvic floor muscle training is the first-line treatment for stress urinary incontinence.

Question 69

A 55-year-old woman with pure stress incontinence has completed four months of supervised pelvic floor muscle training and modest weight loss but still leaks substantially with activity and is very bothered. Urinalysis is negative, post-void residual is normal, and the cough stress test is positive. She has no significant urgency and only minimal pelvic organ prolapse.

Which is the most appropriate next step in management?

- **A.** Repeat a further six months of supervised pelvic floor muscle training
- **B.** Oral duloxetine
- **C.** Systemic (oral) estrogen therapy
- **D.** Artificial urinary sphincter
- **E.** Mid-urethral sling

Answer: E

Explanation. For bothersome pure stress incontinence that persists after an adequate conservative trial, the mid-urethral synthetic sling is the gold-standard surgical treatment, with durable cure rates and low morbidity. Repeating pelvic floor training (A) is unlikely to add benefit after an adequate supervised course when bother persists. Duloxetine (B) offers only modest benefit, is limited by nausea, and is not approved for this indication in the United States. Systemic estrogen (C) does not treat stress incontinence and can worsen it; only local vaginal estrogen has a role, for atrophic mucosal symptoms. The artificial urinary sphincter (D) is used for male post-prostatectomy sphincteric incontinence and, rarely, severe female intrinsic sphincter deficiency after other options fail, not as the initial surgical choice.

Educational objective. The mid-urethral sling is the gold-standard surgical treatment for stress urinary incontinence after failed conservative therapy.

Question 70

A 64-year-old man is three months out from radical prostatectomy for localized prostate cancer. He leaks urine with coughing and on standing and currently uses three pads per day, down from five pads per day one month ago. He has no urgency-predominant symptoms. Urinalysis is negative and post-void residual is low. He asks what can be done to fix the leakage.

Which is the most appropriate next step in his care?

- **A.** Placement of an artificial urinary sphincter now
- **B.** Continue pelvic floor muscle training and reassess, because most men improve over the first year
- **C.** Male sling now
- **D.** Urethral bulking injection now
- **E.** Start immediate-release oxybutynin

Answer: B

Explanation. Post-prostatectomy incontinence is primarily sphincteric, and continence improves over roughly the first twelve months, so the correct approach is to reinforce pelvic floor muscle training and reassess, especially since his pad use is already declining. Surgical correction is deferred until about one year of persistent, stable incontinence: an artificial urinary sphincter (A) is reserved for severe or stable incontinence at that point, and a male sling (C) for mild-to-moderate stable leakage, neither offered at three months. Urethral bulking (D) has modest durability and is premature during the expected recovery window. Oxybutynin (E) treats urgency, not stress leakage, and could impair bladder emptying.

Educational objective. Post-prostatectomy stress incontinence usually improves over the first year with pelvic floor training, so surgical correction is deferred until about twelve months.

Question 71

An 82-year-old woman has urgency incontinence, a sudden compelling urge followed by leakage on the way to the toilet, that has not improved with bladder training and fluid management. She has mild cognitive impairment, a fall three months ago, and takes several medications with anticholinergic properties. Urinalysis is negative and post-void residual is 40 mL.

Which is the most appropriate pharmacologic therapy?

- **A.** Immediate-release oxybutynin
- **B.** Solifenacin
- **C.** Mirabegron
- **D.** Tolterodine
- **E.** Imipramine

Answer: C

Explanation. In a frail, cognitively impaired, fall-prone patient already carrying a high anticholinergic burden, a beta-3 agonist such as mirabegron is preferred because it relaxes the detrusor without the cognitive and anticholinergic risks of antimuscarinics. Immediate-release oxybutynin (A) is the worst choice, being highly lipophilic, centrally penetrant, and explicitly flagged on the Beers criteria. Solifenacin (B) and tolterodine (D) are still antimuscarinics that add to the cumulative anticholinergic load linked to confusion, falls, and dementia risk. Imipramine (E), a tricyclic, carries anticholinergic, orthostatic, and cardiac conduction risks that are especially hazardous in the elderly.

Educational objective. In cognitively vulnerable or fall-prone older adults with overactive bladder, choose a beta-3 agonist over an antimuscarinic to avoid anticholinergic burden.

Question 72

A 45-year-old man presents with two days of progressive difficulty urinating and now continuous dribbling of urine. He has severe low back pain radiating down both legs, numbness across the buttocks, inner thighs, and perineum, and on examination has reduced anal sphincter tone and bilateral lower-limb weakness. His bladder is distended, and the post-void residual is 800 mL after he attempts to void.

Which is the best next step in management?

- **A.** Start an antimuscarinic for presumed overactive bladder
- **B.** Reassure and arrange outpatient urodynamics in six weeks
- **C.** Prescribe tamsulosin and discharge with urology follow-up
- **D.** Emergent MRI of the lumbosacral spine
- **E.** Perform an office cough stress test

Answer: D

Explanation. New urinary retention with overflow leakage, saddle anesthesia, reduced anal tone, and bilateral leg weakness is cauda equina syndrome, a surgical emergency, so the best next step is emergent MRI of the lumbosacral spine to confirm compression while arranging urgent decompression and draining the bladder with a catheter; delay risks permanent bladder, bowel, and sexual dysfunction. An antimuscarinic (A) worsens an already retaining bladder and misreads the pathology. Outpatient urodynamics (B), tamsulosin with discharge (C), and a cough stress test (E) all dangerously postpone recognition and decompression of a time-critical neurosurgical emergency.

Educational objective. New urinary retention with saddle anesthesia and bilateral leg findings signals cauda equina syndrome and demands emergent lumbosacral MRI and decompression.

Urologic Emergencies, GU Trauma, and Stricture

Question 73

A 61-year-old man with poorly controlled type 2 diabetes reports two days of scrotal and perineal pain that has become severe over the last several hours and feels far worse than the skin appears. His temperature is 38.9 C, heart rate 122/min, and blood pressure 86/52 mm Hg. Examination shows dusky, mottled skin over the left hemiscrotum and perineum with palpable crepitus and a thin, foul-smelling discharge. Laboratory studies show a white blood cell count of 21,000/microL, a glucose of 24 mmol/L, and a lactate of 4.8 mmol/L.

Which of the following is the most appropriate next step in management?

- **A.** Intravenous broad-spectrum antibiotics alone with serial examinations
- **B.** CT of the pelvis to confirm the diagnosis before any intervention
- **C.** Emergent surgical debridement with broad-spectrum intravenous antibiotics and resuscitation
- **D.** Bedside incision and drainage of a scrotal abscess
- **E.** Scrotal ultrasound to assess testicular perfusion

Answer: C

Explanation. This is Fournier gangrene, a necrotizing soft-tissue infection of the perineum and genitalia. The classic clues are pain out of proportion to skin findings, crepitus (from gas-forming organisms), and septic physiology. It is a surgical emergency, and outcome is driven by how quickly necrotic tissue is excised: definitive treatment is emergent, aggressive debridement back to healthy bleeding tissue, combined with broad-spectrum intravenous antibiotics that cover gram-positive, gram-negative, and anaerobic organisms, plus fluid resuscitation and glucose control. Option A is wrong because antibiotics cannot penetrate dead, avascular tissue. Option B is wrong because the diagnosis is clinical, and imaging that delays the operating room costs the patient; a normal scan does not exclude the disease. Option D is inadequate for a spreading fascial infection. Option E is wrong because the testes have a separate blood supply and are usually spared, so scrotal ultrasound neither makes the diagnosis nor treats the process.

Educational objective. Fournier gangrene is a surgical emergency treated with emergent debridement plus broad-spectrum antibiotics and resuscitation; neither antibiotics nor imaging should delay the operating room.

Question 74

A 46-year-old woman presents with one day of right flank pain, rigors, and fever. Her temperature is 39.6 C, heart rate 128/min, and blood pressure 84/50 mm Hg. Non-contrast CT shows a 9 mm stone obstructing the proximal right ureter with moderate hydronephrosis. Urinalysis shows pyuria and bacteriuria, and lactate is elevated. She receives two liters of intravenous crystalloid and empiric intravenous antibiotics but remains febrile and hypotensive.

What is the best next step in management?

- **A.** Continue intravenous antibiotics and fluids alone and reassess in 24 hours
- **B.** Extracorporeal shock wave lithotripsy of the stone
- **C.** Immediate ureteroscopy with laser lithotripsy and stone extraction
- **D.** Urgent decompression of the collecting system with a percutaneous nephrostomy or ureteral stent
- **E.** Switch to oral antibiotics and arrange outpatient urology follow-up

Answer: D

Explanation. This is an infected, obstructed kidney (obstructive pyelonephritis progressing to urosepsis), one of the true "can die tonight" urologic emergencies. Infected urine trapped behind an obstruction is essentially pus under pressure, and systemic antibiotics cannot sterilize a system that does not drain. The priority is urgent source control by decompressing the collecting system, achieved with either a percutaneous nephrostomy tube or a retrograde ureteral stent (both acceptable, with comparable efficacy), alongside the sepsis bundle. Option A allows rapid, sometimes fatal, decompensation. Options B and C are wrong because definitive stone treatment is deferred until the infection has cleared; manipulating the stone during active sepsis can worsen bacteremia and shock. Option E is unsafe in an unstable, septic patient.

Educational objective. An infected, obstructed kidney requires urgent decompression with a nephrostomy or stent; antibiotics alone are insufficient, and definitive stone removal is postponed until the sepsis resolves.

Question 75

A 29-year-old man presents with a painful, rigid erection that has persisted for six hours after he took a friend's erectile dysfunction medication. He has no history of trauma. On examination the corpora cavernosa are rigid and exquisitely tender, while the glans and the underside of the shaft are soft.

Which of the following is the most appropriate initial action?

- **A.** Oral pseudoephedrine and observation
- **B.** Corporal aspiration with intracavernosal phenylephrine injection
- **C.** Urgent penile duplex ultrasound before any intervention
- **D.** Immediate distal corporoglanular shunt
- **E.** Immediate penile prosthesis insertion

Answer: B

Explanation. A painful, rigid erection lasting more than four hours, with rigid corpora but a soft glans and spongiosum, is ischemic (low-flow) priapism, effectively a compartment syndrome of the corpora in which stagnant blood becomes hypoxic and acidotic. The correct first action is corporal aspiration, which simultaneously yields the diagnostic blood gas and relieves pressure, combined with titrated intracavernosal injection of a sympathomimetic such as phenylephrine, given with cardiovascular monitoring. Option A is wrong because oral decongestants are ineffective for established ischemic priapism, and observing allows smooth-muscle necrosis, fibrosis, and permanent erectile dysfunction. Option C is wrong because duplex ultrasound is chiefly for suspected non-ischemic (high-flow) priapism and should not delay treatment of an obvious ischemic case. Option D is the next step only after aspiration and phenylephrine fail. Option E is reserved for very prolonged or refractory cases with established corporal necrosis.

Educational objective. Ischemic priapism beyond four hours is treated first with corporal aspiration and intracavernosal phenylephrine; shunting and prosthesis are later escalations only after first-line therapy fails.

Question 76

A 41-year-old man presents with several days of severe low back pain now radiating down both legs, and he has been unable to pass urine for roughly twelve hours. He feels intense suprapubic fullness. On examination there is reduced sensation over the perineum and inner thighs, decreased anal sphincter tone, and mild weakness of both lower extremities. The bladder is palpable to the umbilicus, and catheterization drains 900 mL of urine.

What is the most likely diagnosis?

- **A.** Benign prostatic hyperplasia with acute urinary retention
- **B.** Uncomplicated lumbar muscle strain
- **C.** Acute bacterial prostatitis
- **D.** Diabetic peripheral neuropathy
- **E.** Cauda equina syndrome

Answer: E

Explanation. Cauda equina syndrome results from compression of the lumbosacral nerve roots, most often by a large central disc herniation, and less commonly by tumor, epidural abscess, or hematoma. The defining combination is bilateral leg pain or weakness, saddle (perineal, S2 to S4) anesthesia, and bladder or bowel dysfunction with reduced anal tone; urinary retention with a large residual is the most consistent urologic finding. It is a surgical emergency requiring urgent MRI of the lumbosacral spine and emergent neurosurgical decompression. Option A is wrong because benign prostatic hyperplasia occurs in older men with chronic obstructive symptoms and does not cause saddle anesthesia, bilateral leg weakness, or a lax anal sphincter. Option B produces no neurologic deficit or retention. Option C causes fever, dysuria, and a tender prostate. Option D is a chronic, symmetric, distal sensory process, not an acute back-pain-with-retention presentation.

Educational objective. Acute urinary retention accompanied by saddle anesthesia, bilateral leg symptoms, and reduced anal tone indicates cauda equina syndrome, a surgical emergency needing urgent MRI and decompression rather than simple catheter management.

Question 77

A 24-year-old man is brought in after falling from his mountain bike onto the handlebars. He is alert with a heart rate of 84/min and blood pressure of 126/78 mm Hg, and he has left flank tenderness and gross hematuria. CT of the abdomen and pelvis with intravenous contrast and delayed excretory images shows a 2.5 cm laceration extending into the renal cortex without collecting-system involvement or contrast extravasation, and no other injuries. Serial hemoglobin values are stable.

Which of the following is the most appropriate management?

- **A.** Immediate exploratory laparotomy with nephrectomy
- **B.** Emergent renal angiography with embolization
- **C.** Admission with bed rest, serial hemoglobin measurements, and observation
- **D.** Immediate ureteral stent placement
- **E.** Discharge home with outpatient follow-up

Answer: C

Explanation. This is a hemodynamically stable blunt renal injury (a deep parenchymal laceration without collecting-system injury or active bleeding, AAST grade III). The great majority of blunt renal trauma, including low- and intermediate-grade injuries in a stable patient, is managed non-operatively with admission, bed rest, serial hemoglobin monitoring, and supportive care, with repeat imaging only if the patient deteriorates. Option A is wrong because exploration is reserved for hemodynamic instability, an expanding or pulsatile hematoma, or a shattered kidney or vascular avulsion; opening the retroperitoneum prematurely releases the tamponade and often leads to avoidable nephrectomy. Option B is for active arterial extravasation (a contrast blush), which is absent. Option D is wrong because there is no collecting-system injury to stent. Option E is wrong because gross hematuria and a grade III laceration require inpatient monitoring for delayed bleeding.

Educational objective. Hemodynamically stable blunt renal trauma, even with a deep parenchymal laceration, is managed non-operatively with admission, bed rest, and serial hemoglobin monitoring.

Question 78

A 32-year-old restrained driver is brought in after a high-speed collision. He had a full bladder at the time of impact and has a seatbelt bruise across the lower abdomen. He reports suprapubic pain and has gross hematuria, with diffuse lower abdominal tenderness and guarding. CT cystography shows contrast extravasating around loops of bowel and pooling above the bladder dome, and his serum creatinine has risen since admission.

Which of the following is the most appropriate next step in management?

- **A.** Urethral catheter drainage alone for 10 to 14 days, then a repeat cystogram
- **B.** Observation with no catheter and repeat imaging in one week
- **C.** Bilateral percutaneous nephrostomy tubes
- **D.** Operative repair with two-layer bladder closure and catheter drainage
- **E.** Immediate cystectomy

Answer: D

Explanation. The mechanism (a blow to a full bladder), contrast outlining bowel loops above the dome, and a rising creatinine from reabsorption of urine across the peritoneum all indicate an intraperitoneal bladder rupture. Intraperitoneal ruptures are repaired operatively with a two-layer closure, catheter drainage, and a cystogram before catheter removal, because they will not seal on their own and leak urine into the abdomen. Option A is the treatment for most extraperitoneal ruptures (perivesical contrast, usually with a pelvic fracture), not intraperitoneal ones, so it is the classic distractor. Option B risks urinary ascites, peritonitis, and sepsis. Options C and E are wrong because nephrostomies do not address a bladder leak, and cystectomy is far too aggressive for a repairable rupture.

Educational objective. Intraperitoneal bladder rupture requires operative repair, whereas most extraperitoneal ruptures are managed with catheter drainage alone.

Question 79

A 28-year-old man is brought in after a motorcycle crash with a pelvic ring fracture. He has blood at the urethral meatus, is unable to void, and has perineal and scrotal bruising. On digital rectal examination the prostate is high-riding. He is hemodynamically stable.

Which of the following is contraindicated at this time?

- **A.** Insertion of a urethral (Foley) catheter

- **B.** Retrograde urethrogram
- **C.** Suprapubic catheter placement if the urethra is found to be disrupted
- **D.** CT of the abdomen and pelvis to evaluate associated injuries
- **E.** Plain pelvic radiograph to characterize the fracture

Answer: A

Explanation. Blood at the meatus, inability to void, a high-riding prostate, and a perineal hematoma after a pelvic fracture point to a posterior urethral injury. Blindly passing a urethral catheter is contraindicated because it can convert a partial urethral disruption into a complete one and worsen bleeding and later stricture. The correct sequence is a retrograde urethrogram first: if the urethra is intact, a single gentle catheter attempt is acceptable, and if there is a complete disruption, a suprapubic catheter is placed with delayed urethroplasty planned in three to six months. Option B is therefore the required first test, not a contraindication. Option C is appropriate once disruption is confirmed. Options D and E are appropriate for a trauma patient with a pelvic fracture. Only the blind urethral catheter is the harmful action to avoid.

Educational objective. With blood at the meatus after pelvic trauma, blind urethral catheterization is contraindicated; a retrograde urethrogram must come first to guide safe drainage.

Question 80

A 35-year-old man reports a progressively weak, splayed urinary stream, straining to void, a sense of incomplete emptying, and two urinary tract infections in the past year. Years earlier he sustained a straddle injury falling astride a metal fence, and more recently he had a difficult, traumatic catheterization during a hospital stay. His symptoms have not improved on tamsulosin. Uroflowmetry shows a low, flat (plateau-shaped) curve, and the digital rectal examination is normal for his age.

Which of the following is the most appropriate next diagnostic step?

- **A.** Transrectal ultrasound-guided prostate biopsy
- **B.** Retrograde urethrogram
- **C.** Serum prostate-specific antigen and initiation of finasteride
- **D.** Non-contrast CT of the abdomen and pelvis
- **E.** Filling cystometry (cystometrogram)

Answer: B

Explanation. A younger man with obstructive voiding (weak stream, straining, incomplete emptying), recurrent urinary tract infections, a plateau-shaped uroflow curve, and a history of both perineal straddle trauma and urethral instrumentation has the classic profile of an anterior urethral stricture. The bulbar urethra is the most common stricture site after a straddle injury, and instrumentation or catheterization is a leading iatrogenic cause. The best next step to define the length, location, and number of strictures is a

retrograde urethrogram, often paired with a voiding study, which then guides treatment. Option A is wrong because nothing suggests prostate cancer in a young man with a stricture history and a normal rectal examination. Option C targets benign prostatic hyperplasia, which is not the mechanism, and he already failed an alpha-blocker. Option D does not adequately image the urethral lumen. Option E assesses detrusor storage function, not the fixed anatomic obstruction. Once characterized, short first-time bulbar strictures may be treated with internal urethrotomy, short bulbar strictures with excision and primary anastomosis, and longer strictures with buccal mucosa graft urethroplasty.

Educational objective. Obstructive voiding with a plateau uroflow and a history of straddle injury or instrumentation suggests a urethral stricture, and the retrograde urethrogram is the key diagnostic step.

Pediatric Urology

Question 81

A previously healthy 10-month-old girl is brought to the clinic with 2 days of fever to 39.3 C and poor feeding. She has no cough, rhinorrhea, or diarrhea, and her abdomen is soft and nontender. A catheterized urine specimen shows more than 50,000 CFU/mL of *Escherichia coli* with pyuria, and she is started on cefixime with rapid improvement. This is her first documented urinary tract infection.

Which of the following is the most appropriate initial imaging study?

- **A.** Voiding cystourethrogram
- **B.** Renal and bladder ultrasound
- **C.** Technetium-99m DMSA renal cortical scan
- **D.** CT urogram of the abdomen and pelvis
- **E.** No imaging is indicated after a single infection

Answer: B

Explanation. After a first febrile urinary tract infection in an infant or young child, the recommended initial study is a renal and bladder ultrasound. It is noninvasive, uses no ionizing radiation, and screens for structural problems such as hydronephrosis, duplication, or a bladder abnormality that would change management. A voiding cystourethrogram (A) is invasive and involves radiation and bladder catheterization, so it is reserved for an abnormal ultrasound, recurrent febrile infections, or an atypical (non-*E. coli*) organism. A DMSA scan (C) detects acute pyelonephritis and cortical scarring but is not the routine first step in a child who has responded well. A CT urogram (D) delivers a large radiation dose and offers no advantage. Choosing no imaging (E) is incorrect because a first febrile infection at this age warrants an ultrasound.

Educational objective. After a first febrile UTI in a young child, obtain a renal and bladder ultrasound first and reserve the voiding cystourethrogram for selected indications.

Question 82

A 2-year-old boy is evaluated after his first febrile urinary tract infection. A renal and bladder ultrasound showed mild fullness of the left renal pelvis, so a voiding cystourethrogram was performed and demonstrates reflux filling the left ureter and a non-dilated renal pelvis (grade II). He is thriving, has normal serum creatinine, is beginning toilet training, and has a soft, nontender abdomen.

Which of the following is the best next step in management?

- **A.** Open ureteral reimplantation of the left ureter
- **B.** Endoscopic subureteric dextranomer/hyaluronic acid injection
- **C.** Low-dose antibiotic prophylaxis with observation, plus attention to bowel and bladder habits
- **D.** Bilateral nephrectomy with dialysis planning
- **E.** No follow-up, as reflux at this grade never causes harm

Answer: C

Explanation. Low-grade vesicoureteral reflux (grades I and II) has a high rate of spontaneous resolution as the child grows and the intravesical ureteral tunnel lengthens, so the appropriate approach is conservative: observation, consideration of continuous antibiotic prophylaxis to reduce recurrent febrile infections, and optimization of bowel and bladder function (treating constipation and voiding dysfunction, which worsen reflux and infection). Open reimplantation (A) and endoscopic injection (B) are reserved for higher grades, breakthrough febrile infections despite prophylaxis, or reflux that fails to resolve over time. Bilateral nephrectomy (D) is never appropriate for a well child with preserved renal function. Declining all follow-up (E) is wrong because even lower grades warrant surveillance and infection prevention while resolution is awaited.

Educational objective. Low-grade vesicoureteral reflux is managed conservatively with surveillance, selective antibiotic prophylaxis, and treatment of bowel and bladder dysfunction, because most cases resolve spontaneously.

Question 83

A healthy 4-year-old boy is referred because his parents intermittently cannot feel his right testis in the scrotum. In a warm, relaxed examination room, the right testis is easily guided from the upper scrotum into a normal dependent scrotal position, where it rests without tension; it retracts upward only when the inner thigh is stroked. The testis is normal in size, and the left testis is normally descended. There is no pain and no inguinal fullness.

Which of the following is the most likely diagnosis?

- **A.** Retractable testis
- **B.** Undescended (cryptorchid) testis
- **C.** Ectopic testis in the superficial inguinal pouch
- **D.** Testicular atrophy from prior torsion
- **E.** Vanishing (absent) testis

Answer: A

Explanation. A retractile testis can be brought fully into the dependent scrotum and remains there without tension once the cremasteric reflex is overcome; the upward movement with thigh stimulation reflects a brisk cremasteric reflex, not true maldescent. It is a normal variant that needs annual examination (because a small proportion later ascend and become truly undescended) but no surgery. A true undescended testis (B) cannot be manipulated into the scrotum or will not stay there, and it should undergo orchidopexy between roughly 6 and 12 months of age; note that the elevated risk of testicular cancer persists despite orchidopexy, so lifelong self-examination is advised. An ectopic testis (C) lies outside the normal path of descent and cannot be positioned normally in the scrotum. Atrophy from prior torsion (D) would produce a small or absent gonad. A vanishing testis (E) would be nonpalpable altogether.

Educational objective. A testis that can be brought into the scrotum and rests there without tension is retractile (a normal variant needing observation), which distinguishes it from a truly undescended testis that requires orchidopexy at 6 to 12 months.

Question 84

A newborn male is examined on the first day of life. The urethral meatus opens on the ventral surface of the glans just proximal to the tip, the foreskin is deficient ventrally and hooded dorsally, and there is mild ventral curvature of the penile shaft. Both testes are descended, and the remainder of the examination is normal. The parents ask that a routine newborn circumcision be performed before discharge.

Which of the following actions is contraindicated at this time?

- **A.** Referral to a pediatric urologist for evaluation
- **B.** Deferring any intervention until a surgical plan is made
- **C.** Reassuring the parents that distal repair generally has good outcomes
- **D.** Examining for associated anomalies such as cryptorchidism
- **E.** Performing a routine newborn circumcision

Answer: E

Explanation. These findings (ventral meatus, dorsal hooded foreskin, and chordee) indicate hypospadias. Routine newborn circumcision is contraindicated because the foreskin is frequently used as vascularized tissue during the reconstructive repair; removing it can compromise surgical options. The

correct pathway is to defer circumcision, refer to a pediatric urologist, and plan repair (commonly around 6 to 18 months of age). Referral (A), deferring intervention (B), and counseling that distal repairs generally do well (C) are all appropriate. Examining for associated anomalies (D) is important, because the combination of proximal hypospadias with a nonpalpable or undescended testis should prompt evaluation for a difference of sex development before sex assignment is assumed.

Educational objective. Do not circumcise a newborn with hypospadias, because the foreskin may be needed for the surgical repair; refer for urologic evaluation instead.

Question 85

A term male newborn had a prenatal ultrasound at 32 weeks showing mild unilateral dilation of the left renal pelvis without ureteral dilation, a normal bladder, and normal amniotic fluid. He is now 2 days old, feeding well, voiding normally, and has a benign abdominal examination with normal serum creatinine. The parents are anxious and ask what should be done.

Which of the following is the most appropriate initial management?

- **A.** Immediate dismembered pyeloplasty
- **B.** Reassurance that most mild cases resolve, with a postnatal renal ultrasound and observation
- **C.** Voiding cystourethrogram on the day of birth
- **D.** Percutaneous nephrostomy tube placement
- **E.** Nephrectomy of the affected kidney

Answer: B

Explanation. Isolated mild antenatal hydronephrosis most often resolves spontaneously, so the appropriate approach is reassurance plus a postnatal renal ultrasound (ideally deferred past the first 48 hours, since early relative oliguria can mask dilation) followed by serial observation. Surgery such as pyeloplasty (A) is reserved for confirmed obstruction with symptoms, worsening dilation, or declining differential function on a diuretic renogram. A voiding cystourethrogram (C) is not obtained routinely for mild isolated hydronephrosis; it is used selectively for high-grade or bilateral dilation, ureteral dilation, a bladder abnormality, or suspected reflux or valves. A nephrostomy tube (D) and nephrectomy (E) are far too aggressive for a well infant with preserved function.

Educational objective. Mild isolated antenatal hydronephrosis usually resolves; manage it with postnatal ultrasound and observation rather than early intervention.

Question 86

A male newborn is noted to have a weak, dribbling urinary stream and a palpable, distended lower abdominal mass consistent with a full bladder. His prenatal ultrasound had shown bilateral

hydroureteronephrosis with a thick-walled bladder and reduced amniotic fluid. After a small feeding tube is passed to drain the bladder and his electrolytes are stabilized, imaging is planned.

Which of the following studies is most likely to establish the diagnosis?

- **A.** Renal and bladder ultrasound alone
- **B.** Technetium-99m MAG3 diuretic renogram
- **C.** Voiding cystourethrogram
- **D.** Retrograde urethrogram
- **E.** Abdominal CT with contrast

Answer: C

Explanation. The clinical picture (a male newborn with a poor stream, a distended bladder, and antenatal bilateral hydroureteronephrosis with a thick-walled bladder) is classic for posterior urethral valves. The voiding cystourethrogram is diagnostic: during voiding it demonstrates a dilated, elongated posterior urethra with an abrupt caliber change at the obstructing valves, often with a trabeculated bladder and reflux. Ultrasound (A) is suggestive and useful for screening but does not directly visualize the valves. A MAG3 renogram (B) assesses differential function and drainage after the diagnosis is made. A retrograde urethrogram (D) is not the standard approach in a neonate and does not capture the voiding dynamics. CT (E) adds radiation without providing the functional voiding view. Management centers on prompt bladder drainage (using a small feeding tube rather than a balloon catheter), correction of electrolyte and fluid derangements, and subsequent cystoscopic valve ablation, with long-term surveillance for bladder dysfunction and chronic kidney disease.

Educational objective. In a male newborn with a poor stream, a distended bladder, and abnormal antenatal imaging, suspect posterior urethral valves and confirm with a voiding cystourethrogram.

Question 87

A 7-year-old boy wets the bed most nights and has done so for his entire life, never having achieved a sustained period of nighttime dryness. He has no daytime urgency, frequency, or wetting, no history of urinary infections, and normal growth. Physical examination, including the lower back, perineum, and neurologic screen, is normal, and a urinalysis is unremarkable. The child is motivated to be dry, and the family wants an approach with the best chance of lasting success.

Which of the following interventions is most likely to result in durable, long-term resolution?

- **A.** Enuresis (bed-wetting) alarm therapy
- **B.** Desmopressin at bedtime
- **C.** Imipramine at bedtime
- **D.** Oxybutynin during the day
- **E.** Scheduled overnight catheterization

Answer: A

Explanation. This is primary monosymptomatic nocturnal enuresis (lifelong, nighttime-only wetting with no daytime symptoms and a normal examination). For a motivated child and engaged family, the enuresis alarm produces the most durable cures because it conditions the arousal and storage response rather than simply reducing urine output, so improvement tends to persist after the alarm is stopped. Desmopressin (B) reduces overnight urine production and works well while it is being taken, but relapse is common once it is discontinued, and it requires counseling about fluid restriction around the dose to avoid hyponatremia. Imipramine (C) is a legacy option limited by cardiac side effects and overdose toxicity. Oxybutynin (D) targets daytime overactive-bladder symptoms, which this child does not have. Overnight catheterization (E) is inappropriate. It is also worth distinguishing this primary pattern from secondary enuresis (new wetting after at least 6 months of dryness), which is a red flag prompting evaluation for a urinary infection, new-onset diabetes, constipation, or a psychosocial stressor.

Educational objective. For primary monosymptomatic nocturnal enuresis, the enuresis alarm offers the most durable cure, whereas desmopressin controls symptoms only while it is taken; new-onset (secondary) enuresis warrants a search for an underlying cause.

Question 88

A 7-year-old boy is brought in because his foreskin still cannot be fully retracted over the glans. The parents report occasional ballooning of the foreskin during voiding but no pain, no infections, and no difficulty urinating. On examination, the preputial opening is snug but the tissue is soft and healthy without a dense white scarred ring, and the glans appears normal. The family would like treatment.

Which of the following is the most appropriate initial treatment?

- **A.** Forceful retraction of the foreskin in the clinic to break adhesions
- **B.** Immediate circumcision
- **C.** Application of a topical corticosteroid cream to the foreskin with gentle (non-forceful) retraction
- **D.** A course of oral antibiotics
- **E.** Topical antifungal cream

Answer: C

Explanation. When phimosis warrants treatment and the tissue is not densely scarred, the first-line measure is a topical corticosteroid (for example, betamethasone) applied to the preputial ring combined with gentle, patient-guided retraction; this succeeds in a large majority of boys and preserves the foreskin. Forceful retraction (A) is contraindicated at any age: it is painful and can tear the tissue, producing scarring (true pathologic phimosis) or trapping the foreskin behind the glans (paraphimosis). Immediate circumcision (B) is reserved for cases that fail medical therapy, dense cicatricial scarring (such as balanitis xerotica obliterans), or recurrent infections. Antibiotics (D) and antifungal cream (E) treat active infections, which this child does not have. It is important to distinguish physiologic phimosis (a normal,

non-retractile foreskin in young children with soft, healthy tissue, needing only reassurance and gentle hygiene) from pathologic phimosis (a scarred, non-retractile ring).

Educational objective. Never force foreskin retraction; treat symptomatic or pathologic phimosis first with a topical corticosteroid, reserving circumcision for refractory or densely scarred cases.

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