

DT SS SURGERY

2nd edition (Latest)



VOL 3

SURGERY GROUP NOTES FOR NEET SS

S.No.	Topic	Page No.
1.	<u>Urology</u>	
1.1	Urinary Symptoms and Investigations	1-21
1.2	Surgical Anatomy of Kidneys	22-25
1.3	Surgical Anatomy of Ureters	26-27
1.4	Embryology of Urinary Tract	28-29
1.5	Congenital Anomalies of Kidneys and Ureters	30-39
1.6	Infections of Urinary Tract	40-45
1.7	Stone Diseases	46-52
1.8	Renal Injuries	53-56
1.9	Benign Tumors of Kidney	57
1.10	Urinary Bladder - Anatomy	58-60
1.11	Urinary Bladder - Physiology	61
1.12	Urinary Bladder - Innervation	62
1.13	Urinary Bladder - Reflexes	63-65
1.14	Urodynamics - Overview	66-68
1.15	Neurogenic Bladder	69-72
1.16	Bladder Congenital Bladder Anomalies	73-75
1.17	Bladder chronic inflammatory conditions of bladder	76-79
1.18	Bladder Trauma	80-81
1.19	Bladder Stones	82-83
1.20	Schistosomiasis	84-86
1.21	Urinary Diversions	87-88
1.22	Prostate Surgical Anatomy	89-90
1.23	Prostate - PSA	91-92
1.24	Prostate BPH	93-100
1.25	Prostate Calculi and Prostatitis	101-103
1.26	Urethra Surgical Anatomy	104
1.27	Urethra - Congenital Anomalies	105-107
1.28	Urethra-Urethral injuries	108-114
1.29	Female Urethra	115-120
1.30	Penis-Anatomy	121
1.31	Penis Phimosis	122-123
1.32	Penis Frenulum Breve	124
1.33	Paraphimosis	125
1.34	Penis Penile Injuries	126

1.35 Penis-Peyronie's Disease	127-128
1.36 Penis Priapism	129-137
1.37 Anatomy (Testis & Scrotum)	138-141
1.38 Undescended testis	142-146
1.39 Testicular Injuries	147
1.40 Torsion Testis	148-151
1.41 Varicocele	152-154
1.42 Hydrocele	155-156
1.43 Cysts in Epididymis	157
1.44 SUI-I	158-163
1.45 SUI II	164-170
1.46 Urogynaec Fistula	171-183
1.47 Pelvic Organ Prolapse -1	184-186
1.48 Pelvic Organ Prolapse -2	187-190
1.49 Renal Tumors	191-195
1.50 Bladder cancer	196-202
1.51 Prostate Cancer	203-218
1.52 Penile Cancer	219-228
1.53 Testicular Tumors	229-232
1.54 Upper Tract Urothelial Tumours 2	233-238

2. Neurosurgery

2.1 General Concepts in Neurosurgery	239-243
2.2 Vascular Surgery (Neurosurgery)	244-251
2.3 Neurooncology	252-260
2.4 Hydrocephalus	261-263
2.5 Pediatric Neurology	264-267
2.6 Spine Surgery	268-270
2.7 Functional Neurosurgery	271-273
2.8 CNS Infection	274-278
2.9 MCQ Discussions (Neurosurgery)	279-284

3. Pediatric Surgery

3.1 General Concepts Pediatric Surgery	285-288
3.2 CTVS	289-296
3.3 GIT-1	297-315
3.4 GIT-2	316-318

3.5 Hepatobiliary System	319-320
3.6 Pediatric Urology	321-329
3.7 Abdominal wall defects	330-331
3.8 Pediatric Trauma	332-334
3.9 Fetal Surgery	335-337
3.10 Oncology	338-345

4. Vascular Surgery

4.1 Acute Limb Ischemia	346-349
4.2 Aortic Syndrome and Aortic Aneurysm	350-359
4.3 Arterial Disease and Evaluation	360-363
4.4 Carotid Artery Disease	364-368
4.5 Lower Limb Peripheral Arterial Disease	369-380
4.6 Lymphatic Pathology	381-387
4.7 Mesenteric Arterial Disease	388-393
4.8 Non-Atherosclerotic Vascular Disease	394-398
4.9 Renal Artery Disease	399-401
4.10 Venous Thromboembolism	402-407
4.11 Varicose Veins	408-424

5. Plastic Surgery

5.1 Wound Healing	425-431
5.2 Skin and Subcutaneous Tissue	432-440
5.3 Reconstructive Techniques	441-464
5.4 Oral & Maxillofacial Surgery	465-477
5.5 Head & Neck Reconstruction	478-489
5.6 Hand Surgery Part-1	490-509
5.7 Hand Surgery Part-2	510-519
5.8 Pediatric Plastic Surgery	520-534
5.9 Aesthetic Surgery	535-552

6. Cardiothoracic Surgery

6.1 History of Cardiovascular and Thoracic Surgery	553-554
6.2 Cardiopulmonary Bypass	555-561
6.3 Coronary Artery Diseases	562-586
6.4 Valvular Heart Diseases	587-606

6.5 Congenital Cardiac Surgeries	643-677
6.6 Thoracic Aorta	678-683
6.7 Thoracic Surgery	684-720
6.8 Miscellaneous-Chest Wall	721-727

7. Transplant surgery

7.1 Immunology of Transplant Rejection and Immunosuppression	682-688
7.2 Organ Donation & Preservation, Kidney Transplantation	689-698
7.3 Surgical Complications, Outcomes of Renal Transplant	699-700
7.4 Heart & Lung Transplantation	701-712
7.5 Pancreas Transplant	713-725
7.6 Intestinal Transplant	726-742
7.7 Liver Transplant-Bailey 28th Edition Update	743-771

URINARY SYMPTOMS AND INVESTIGATIONS

Pain

Dysuria

- Pain while passing urine
- Refers to discomfort experienced during voiding typically described as a sensation akin to passing razor blades or glass.
 - Due to an infection in the lower urinary tract
 - Rarely be due to CIS of the bladder.

Renal pain:

- Caused by distension of the renal capsule
- Constant, gnawing pain in the loin/renal angle.

Ureteric colic:

- Often incorrectly referred to as renal colic
- Different from renal pain
- Typified by the lateralized, colicky pain experienced in ureteric calculus can radiate to the groin or to the testicle/labium but does not radiate to the back of the leg.
- Rarely, be caused by a blood clot or a sloughed renal papilla in the ureter.

Suprapubic pain:

- Infection or inflammation of the bladder can produce suprapubic pain.
- Experienced when the bladder is full and is relieved by micturition is typical of interstitial cystitis, an idiopathic inflammatory disorder of the bladder typically seen in middle-aged women
- Retention of urine

Testicular pain:

- Sudden, severe testicular pain – treated as a medical emergency to rule out a diagnosis of acute testicular torsion.
- Hydroceles and epididymal cysts usually do not cause significant pain
- A dragging sensation in the scrotum that gets worse towards the end of the day is characteristic of a varicocele.
- Idiopathic testicular pain' or 'chronic orchialgia'.
- Patients undergoing vasectomy –10% risk of testicular pain in the short-term following surgery and 1% chance of chronic testicular pain in the longer-term

Perineal pain:

- Feature of a complex of symptoms typically seen in middle-aged men diagnosed having chronic prostatitis.
- With prostatitis, perineal pain may be accompanied by suprapubic pain, low back pain that radiates to the legs and penile pain as well as frequency of micturition and dysuria.

- In the absence of the specific features that are required to diagnose prostatitis, these patients should be considered to have chronic pelvic pain syndrome (CPPS) and not prostatitis.
- Perineal pain is an ominous symptom after previous treatment for a pelvic malignancy, often signifying recurrent pelvic disease.

Lower Urinary Tract Symptoms

00:06:30

- A normal micturition cycle consists of two phases - Storage and voiding.
- During the storage phase, the bladder holds urine at low pressures and the urethral sphincter is closed.
- During voiding, the bladder contracts to expel urine and the voluntary urethral sphincter relaxes to allow its passage.
- The urethral lumen must be patent to allow voiding to occur.
- Disruption of these processes results in lower urinary tract symptoms (LUTS).
- LUTS are classified as either:
 1. Storage LUTS: Frequency, nocturia, urgency and urinary incontinence
 2. Voiding LUTS: Hesitancy, a reduced stream, straining or
 3. Postmicturition LUTS: Incomplete emptying and postmicturition dribble

Storage LUTS:

- Result from failure of the bladder to act as a functioning reservoir
- Seen in patients with an overactive bladder or a bladder neuropathy

Voiding and Post micturition LUTS

- Commonly seen in men with bladder outlet obstruction (BOO) or an underactive bladder
- However, a man with BOO may also have storage LUTS
- The term Prostatism is obsolete
 - It was used to describe a combination of LUTS in men who were presumed to have an enlarged prostate or benign prostatic hyperplasia (BPH)
 - However, the symptoms are not specific to BPH
 - May occur in several other conditions including urinary tract infections (UTI's), urethral stricture, overactive bladder, CIS of the bladder, etc.
 - Thus, the term LUTS is now used to describe all such symptoms.

Lower urinary tract symptoms

- The international continence society provides the internationally accepted definitions for symptoms relating to lower urinary tract function.
- Frequency - the patient considers that they void too often during the day
- Nocturia - the individual wakes at night at least once to void.
- Strangury - a sensation of constantly needing to void. Typically, the patient describes having to stand/sit for long periods with the sensation that micturition is imminent.
- Urgency - a sudden compelling desire to pass urine that is difficult to defer.

- Urge incontinence – involuntary urinary leakage, often a large volume, immediately preceded by the sensation of urgency.
- Stress incontinence – involuntary urinary leakage that occurs when the intra-abdominal pressure rises during coughing, laughing, sneezing or exercising
- Nocturnal enuresis – involuntary loss of urine during sleep.
- Hesitancy – when an individual has difficulty initiating micturition, resulting in a delay in the onset of voiding,
- Reduced urinary stream – usually reported compared with previous performance or in comparison with the performance of others.
- Intermittency – when urine flow stops and starts, on one or more occasions.
- Straining – the muscular effort used in order to initiate, maintain or improve the urinary stream,
- Incomplete emptying – the sensation that, at the end of micturition, bladder fullness persists,
- Post micturition dribble – when involuntary loss of urine occurs immediately after the individual has finished passing urine,

Haematuria

00:14:00

- Hematuria occurs when there is blood in the urine while passing.
- Classified as
 - Visible haematuria (VH) or
 - Non-visible haematuria (NVH).
- Timing of the blood in relation to the urinary stream –
 - Initial (urethral pathology)
 - Throughout the stream (bladder or upper tracts) or
 - Terminal bladder neck or prostatic pathology
- A patient with haematuria should be investigated regardless or whether they are taking anticoagulant therapy.
- Haematuria, especially if painless, may be due to an underlying neoplasm, usually a bladder or renal tumor.
- Causes of haematuria include:
 - Trauma, infection and neoplasm (n) anywhere in the urinary tract.
 - Haematuria in association with loin pain and a palpable loin mass – the classic triad of symptoms and signs of a renal tumor, although this triad is seen in < 10% of these patients.
 - In genitourinary TB, hematuria is usually associated with dysuria and frequency due to bladder infection.
 - In filarial involvement of the retroperitoneal lymphatics, haematuria is intermittent, often lasting months or years, and is associated with "milky' or cloudy urine, a condition called chyluria.
- Haematuria requires detailed investigation in almost all cases except young women with a proven UTI.
- Investigations include -Ultrasound scan (USS) of the kidneys-ureters- bladder (KUB) and additional contrast imaging if needed.

- If no aetiology can be identified on laboratory and imaging studies,
- Cystoscopy is mandatory.
- Although BPH can cause hematuria in older men, this diagnosis should be considered after exclusion of all other causes.
- The cancer detection rate depends on the degree of haematuria-20% in
- Those patients with VH but <5% with NVH.

Discoloration of the Urine

00:16:50

Red urine:

- Many drugs and foodstuffs produce abnormal discoloration of the urine.
- Most frequently encountered clinically are red/orange and brown.
- Consumption of large quantities of beetroot can result in red discoloration of the urine
- Discoloration is due to the excretion of betalain (Betacyanin) Pigments such as betanin.

Haemoglobinuria:

- Apart from haematuria, the presence of haem in the urine also produces red discoloration and generates a positive dipstick test
- Present in haemolytic disorders such as march hematuria, classically seen in dehydrated soldiers after prolonged marching

Myoglobinuria

- Due to myocyte destruction
- E.g. Caused by rhabdomyolysis after crush injury or compartment syndrome
- Also result in red discoloration of the urine

Porphyria

- Disordered haem production result in red discoloration
- Change to brown or purple with exposure to sunlight.
- Several medications can cause red/ orange discoloration of the urine
- Rifampicin, isoniazid or phenazopyridine
- Chlorpromazine, thioridazine, senna and laxatives containing a phenolphthalein component

Brown urine:

- Antibiotics nitrofurantoin and metronidazole - lead to brown urine.
- Brown urine due to high levels of circulating bilirubin is a feature of obstructive jaundice.

Uremia

00:18:09

- Rarely, the initial symptoms of urological disease may be those of severe renal dysfunction or uremia.
- In infants and children- manifest as failure to thrive as well as anorexia, vomiting and altered sensorium due to encephalopathy

Haematospermia

00:18:29

- This refers to blood (bright red or a brown) in semen.
- Most commonly due to benign inflammatory change in the prostate or TB.
- DRE & PSA test-mandatory for all cases
- TRUS or MRI of prostate
- In most cases, haematospermia is self-limiting

Pneumaturia

00:18:51

- Gas in the urine.
- Typically describe frothy urine, bubbles in the urine or a stream that intermittently stops and starts.
- The commonest cause-Colo vesical fistula, usually due to primary pathology in the rectum or sigmoid colon.

'White urine'

00:19:34

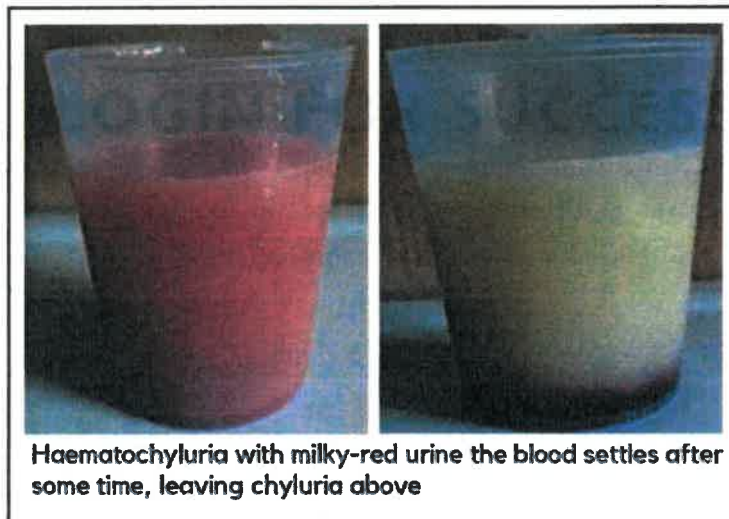
- Seen in two distinct conditions:

Semen in urine (Dhat syndrome)

- In young men -presence of a white substance in urine.
- Usually semen
- Requires no treatment other than reassurance.

Chyluria

- Lymphatic fluid from channels obstructed by filarial inflammation, leaks into the renal pelvicalyceal system and produces milky-white urine.
- Requires investigation for confirmation of the diagnosis.
- Urine for chyle-



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

Symptoms related to the external Genitalia

00:20:57

Testis

- A testis may be absent from the scrotum in patients with undescended or ectopic testes,
- In boys <5 years, a common cause of testicular pain and swelling is torsion of a hydatid of Morgagni (appendix testis).
- In young male suspected of having testicular torsion examination of the normal i.e. contralateral, testis may reveal a horizontal lie or "Clapper bell testis" raising the level of clinical suspicion
- If torsion is suspected, immediate testicular exploration is mandatory and, if confirmed, bilateral
- Testicular fixation is performed. A doppler USS may aid in the diagnosis.
- Patients with Klinefelter's syndrome have bilateral small, firm testes in addition to the other signs
- Typical of this condition.
- A hydrocele is an accumulation of fluid between the testis and the tunica vaginalis
- In the younger male it can be associated with a patent processus vaginalis.
- The hydrocele fluid is typically a yellow colour.
- A testis that cannot be felt in a tense hydrocele- needs to be assessed by USS

Epididymis

00:21:59

- Epididymal pathology is rare in prepubertal males.
- Acute epididymitis
- In sexually active males, acute epididymitis (often due to chlamydia) with significant pain and swelling
- Needs to be distinguished from acute testicular torsion.
- Doppler USS-differentiate between the two conditions:
- Epididymitis - shows an increased blood flow into the inflamed epididymis
- Torsion - shows decreased or complete lack of blood flow to the testis.
- If there is any doubt, scrotal exploration is undertaken.
- Epididymal cysts
- Can be distinguished by the fact that the testis can often be felt separately.
- Contain clear or white fluid.
- Both hydroceles and epididymal cysts transilluminate on clinical examination.
- Genitourinary tb result in bilateral nodular induration of the epididymis and nodularity of the vas deferens.
- May also result in scrotal abscesses that, unlike pyogenic abscesses, are chronic, painless and not warm to touch ('cold abscess')



Spermatic Cord

00:22:51

- 10% males have a left-sided varicocele and a smaller left testis.
- Masses are occasionally found associated with the spermatic cord, which on removal are found to be lipomas, mesotheliomas or sarcomas.

Prepuce (Foreskin)

00:23:32

- Phimosis
 - Occurs when the distal foreskin is tight and will not retract.
- Paraphimosis
 - Occurs when a poorly retractile foreskin becomes trapped in the retracted state and cannot be replaced.
 - Significant edema of the foreskin results, making replacement of the foreskin increasingly difficult.
- Balanitis xerotica obliterans (BXO).
 - Depigmentation and scarring of the distal prepuce

Penis

00:24:57

Peyronie's disease

- Idiopathic condition in which fibrosis develops in the corpora cavernosa of the Penis.
- The 'plaque' of peyronie's fibrosis is usually palpable in the midline anywhere from the base of the penis to just behind the corona.
- Gives rise to painful angulation of the penis on erection.

Penile fracture

- Occurs when there is trauma to the erect penis.
- There is an audible crack during sexual intercourse or forceful masturbation that is followed by immediate penile detumescence.
- Presents with gross bruising of the penile shaft skin.

Glans penis

00:26:10

Genitourinary warts

- In the younger male
- Due to human papillomavirus (HPV) infection

Zoon's balanitis or CIS

- Also known as erythroplasia of Queyrat or Bowen's disease
- In the older male
- Red raised patches on the glans penis or the inner aspect of the prepuce
- Distinguished only on penile biopsy.

Urethra

00:26:43

- Hypospadias
 - Occurs when there is failure of the urethra to completely close on the ventral aspect
- Epispadias
 - Occurs when there is failure of closure on the dorsal surface.
- Urethral diverticulum in a female
 - Cause for recurrent UTIs
- Urethral caruncle
 - Minor prolapse of the urethral mucosa in a female
 - Usually requires no treatment.

Investigation of Urinary Symptoms

00:27:20

Blood tests

Blood counts and chemistry

- Initial blood tests in suspected urological pathologies include a full blood count, urea, creatinine and electrolytes.

Creatinine

- Surrogate marker for renal function (glomerular filtration), is an end product of muscle catabolism and may be unchanged despite a wide variation in estimated glomerular filtration rate (eGFR).
- eGFR is recommended as the optimal method of reporting renal function in many countries.
- Patients with calculus disease
 - Routinely have serum calcium, uric acid and parathyroid hormone levels checked
 - To rule out a metabolic predisposition to stone formation.
- Serum alkaline phosphatase
 - Elevated in patients with bone metastases due to a urological malignancy
 - seen in men with disseminated prostate cancer.

Tumor markers

0028:12

- Serum tumor markers are utilized in patients with prostate and testicular cancer.
- Currently no serum tumor markers exist in routine clinical practice for renal or bladder cancer.

Prostate-specific antigen

00:28:38

- Glycoprotein produced by prostatic epithelial cells.
- Altered architecture of the prostate in conditions such as
 - BPH
 - Prostatitis and
 - Prostate cancer
- Allows PSA to enter the bloodstream and be detected by a blood test.
- The commonly used PSA assays measure the total amount of PSA (tPSA).
- PSA levels can be influenced by certain drugs
 - Salpha-reductase inhibitors, also by aspirin, statins and thiazide diuretics.
- Can be significantly influenced by a recent UTI
- True PSA level only returns to baseline 6 weeks after eradication of an infection.
- Previous edition mentioned a cut off PSA > 3ng/ml is removed in new ED.

Prostatespecific antigen

- PSA values in a population of men form a continuum with no clear abnormal threshold.
- The value of PSA that triggers a biopsy is variable and is influenced by age, ethnicity, family history and findings on DRE.
- Protec T trial
 - The benefits of screening asymptomatic men for prostate cancer using PSA testing are controversial
 - Arge UK based clinical study (Protec T trail) found that at a median of 10 years very few patients died of prostate cancer irrespective of treatment or surveillance
- At present, PSA-based screening for prostate cancer is not routinely performed in the UK
- But men interested in having a PSA test can request this from their family practitioners.
- Risk prediction models
 - Developed in recent years to assist clinicians and patients in predicting prostate cancer diagnosis, stages and prognosis.
 - Available online as a decision aid for an individual man to evaluate his own risk of prostate cancer.
 - It includes
- The prostate cancer prevention trial (PCPT) risk calculator
- European randomized study of screening for prostate cancer (ERSPC) risk calculator.
- For men newly diagnosed with prostate cancer, PSA assists with risk (of disease progression) stratification.
- It is also a useful marker of response to treatment and of disease recurrence after treatment.

Prostate-specific Antigen Derivatives and Kinetics

00:31:42

- Derivatives/kinetics have been used to improve the specificity of testing.
- Derivatives include
 - Free PSA (FPSA)
 - Complexed PSA (CPSA) and
 - Free/total PSA ratio (f/TPSA).
- PSA density (PSAD)
 - Since BPH tissue within prostate also contributes to TPSA, PSA density (PSAD) factors in the volume of the prostate by dividing TPSA by prostate volume.
 - A high PSAD increases the likelihood that the elevated PS is due to malignancy and not due to the large gland alone.
- PSA kinetics
 - Measurement of the rate of change of various forms of PSA based on the premise that a rapid increase or change may be more predictive of cancer.
- PSA velocity
 - The annual absolute increase in TPSA Value >0.75 ng/ml per year compared with baseline has been considered suspicious.
- PSA doubling time
 - The number of months it takes for a baseline PSA to double.

Testis Tumor Markers

00:33:05

- Alpha-fetoprotein (FP)
- Beta-human chorionic gonadotropin (BHCG) and
- Lactate dehydrogenase (LDH)
- Provide insight into the likely diagnosis, histological subtype of germ cell tumor present, success of treatment and recurrence.
- Also contribute to the stratification into prognostic categories using a classification devised by
 - The international germ cell cancer collaborative group.

Urine-Based Tests

00:33:36

Urinalysis

- Urine dipstick test
- Used to screen for significant disease
- Urine is dipped with a stick on which there is a series of small chemical containing pads designed to detect, typically, glucose, bilirubin, ketones, the specific gravity, blood, pH, protein, urobilinogen, nitrites and leukocyte esterase through colour changes.
- A similar test may be performed using reagents in a laboratory.

Midstream specimen of urine or urine culture

- Used to establish the diagnosis of a UTI
- Allows identification of the urinary pathogen and selection of the most appropriate antibiotic.

- Initial urine microscopy followed by urine culture only if appropriate.
- Normal urine contains small numbers of white blood cells, red blood cells and epithelial cells

Cells in normal urine	
White blood cells	3-5 per high-power field
Epithelial cells	< 10-15 per high-power field
Red blood cells	0-2 per high-power field

Early-morning urine- sample

00:34:22

- Sent on three consecutive days for ziehl-Neelsen staining and culture for acid-fast bacilli if genitourinary TB is suspected.
- Ziehl-Neelsen staining
 - Results are available within a day
- Culture
 - Results take 6 weeks.
- Nucleic acid amplification tests
 - Based on PCR, such as Genexpert® and Trunaat
 - Used for rapid detection of a small amount of bacterial DNA.
- An early-morning sample is preferred since it is expected that overnight shedding of bacilli will increase detection rates.

Voided Urine Cytology

00:35:28

- Performed when a urothelial carcinoma is suspected.
- Disadvantage - high false-negative rate.
- Positive voided urine cytology
 - 15% of low-grade transitional cell carcinomas
 - 50% of high-grade transitional cell tumours.

Urine for Chyle

00:35:51

- Performed in specific situations where the suspicion for chyluria is high.
- Restricted to certain endemic regions of the world.
- High-fat diet is administered the night prior to collection of a morning sample of urine.
- The urine may visibly appear milky white

Endoscopy

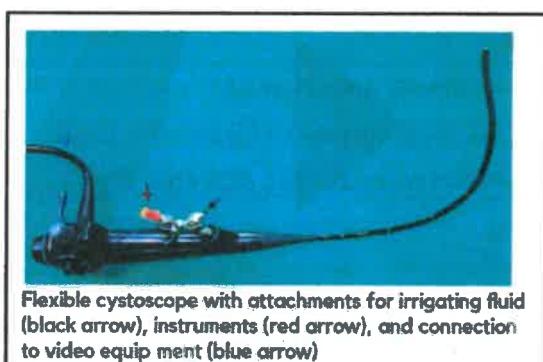
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Cystoscopy

- The entire lining of the urinary tract can be directly visualised from the urethra and bladder (using a cystoscope) to the ureter and renal pelvis (using a semirigid ureteroscope) and finally the renal calyces
 - Cystoscopy
- Undertaken either as flexible cystoscopy using local anesthesia, or as rigid cystoscopy preferably under a general anesthetic.

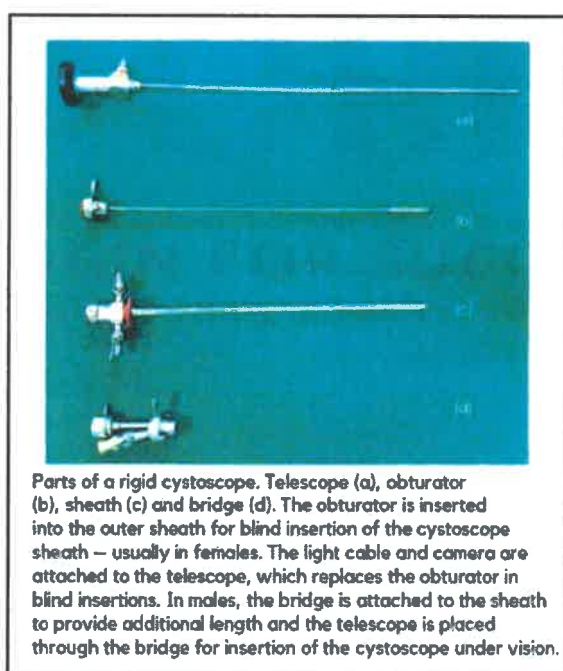
- Telescopes with different fields of view are available (0° , 12° , 30° and 70° lenses are commonly used).
- In the operating theatre most endoscopic procedures including cystoscopy require a urology stack consisting of a camera monitor light source electro cautery and insufflator for laparoscopy procedures
- The male urethra is longer than the female urethra and is angulated at the level of the symphysis pubis. Flexible cystoscopy is poorly tolerated in young males, in whom it may be uncomfortable.
- It is principally a diagnostic tool but a few minor procedures can be accomplished using the flexible cystoscope such as insertion/ removal of ureteric stents, small biopsies and diathermy/laser of small bladder lesions
- More can be achieved with a rigid cystoscope under general anesthesia, especially in relation to instrumentation of the ureters.

Flexible cystoscopy-

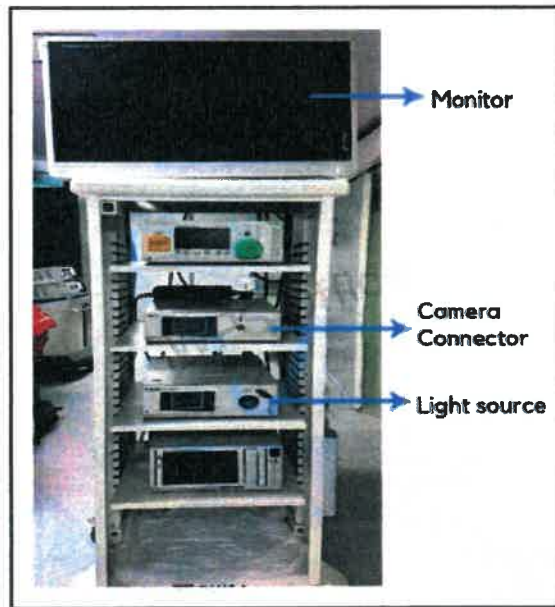


Flexible cystoscope with attachments for irrigating fluid (black arrow), instruments (red arrow), and connection to video equipment (blue arrow)

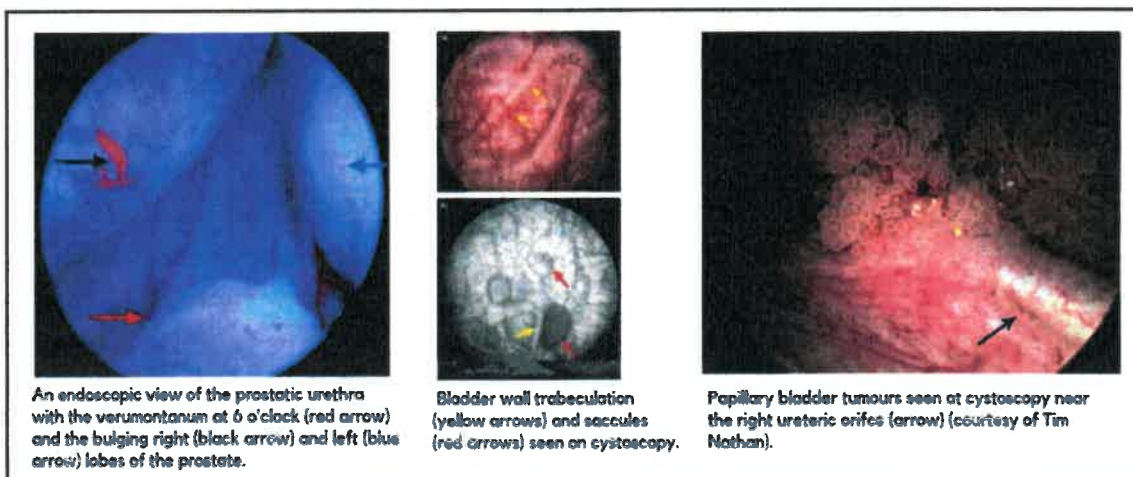
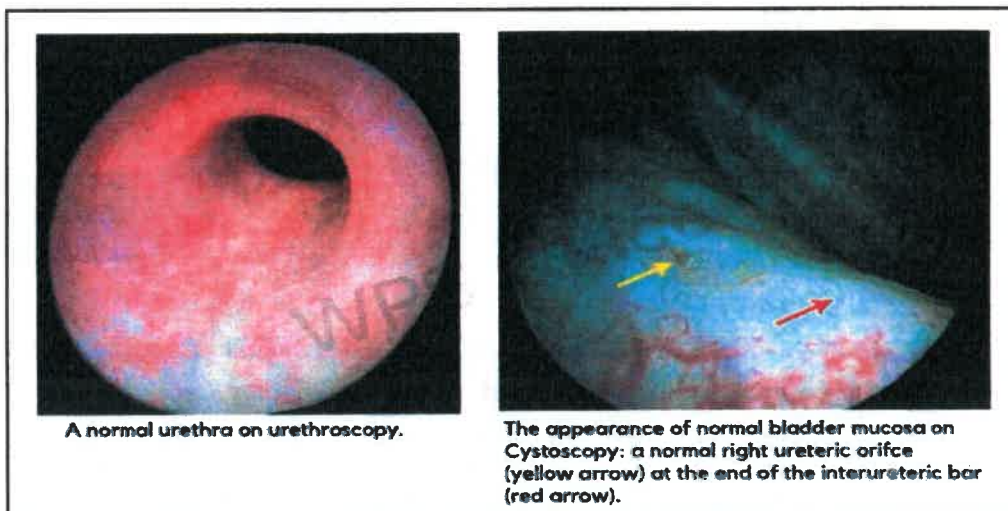
Rigid cystoscope-



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



Cystoscopy



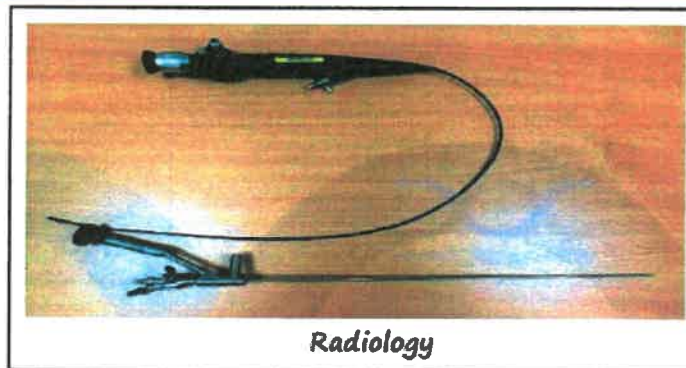
Ureteroscopy

00:39:59

- Performed as both a diagnostic and a therapeutic procedure.
- A rigid or semirigid ureteroscope can be used in the ureter as far as the renal pelvis
- To inspect or operate on the renal pelvis or renal calyces a flexible ureteroscope is needed
- The procedure is most often performed when pathology, commonly stones, strictures or tumours, of the ureter is suspected.

Semi Rigid & Flexible Ureteroscopes

00:40:24



Urinary tract ultrasound scan

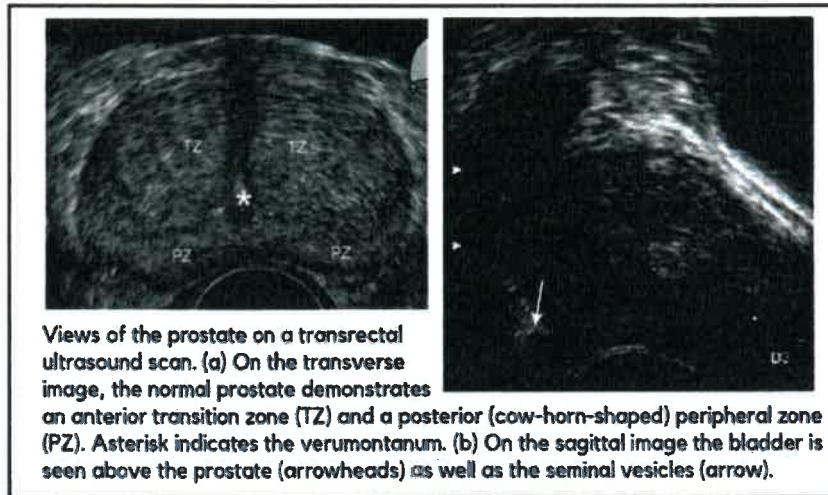
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- USS can characterise pathologies of the kidney, bladder, prostate and testis very good for assessing the ureters unless they are significantly dilated or have sizeable pathology the lack of radiation and contrast exposure coupled with portability and availability make USS the first imaging investigation in urological diseases. it is extremely useful in the detection of hydronephrosis (even at the bedside in an emergency) renal cysts tumors scarring and stones. For detecting renal stones → USS is extensively used for the insertion of a percutaneous tomography (CT) or MRI, particularly for hemorrhagic cysts versus solid lesions. USS can detect bladder tumors calculi a thickened trabeculated bladder wall in patients with BOO and large bladder diverticula it can also be used to determine the residual urine after micturition
- In addition, USS is frequently employed to investigate men with scrotal swellings and has a role to play in the assessment of urethral stricture disease

Transrectal Ultrasound Scan

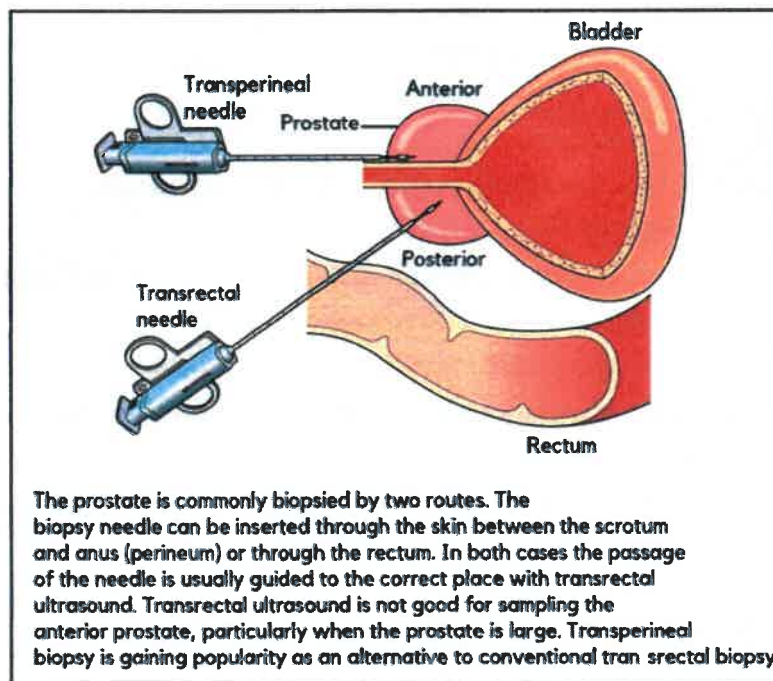
00:41:24

- Performed in conjunction with biopsy of the prostate.
- Requires the use of a special probe that provides transverse as well as sagittal views of the prostate
- Used to guide a prostate biopsy in men suspected to have prostate cancer.
- Classic abnormality associated with prostate cancer is a hypoechoic area in the peripheral zone
- Typically, 12 or more systematic biopsies are taken using a biopsy device
- Additional biopsies may be taken from areas that are suspected to be malignant.



Prostatic Biopsy

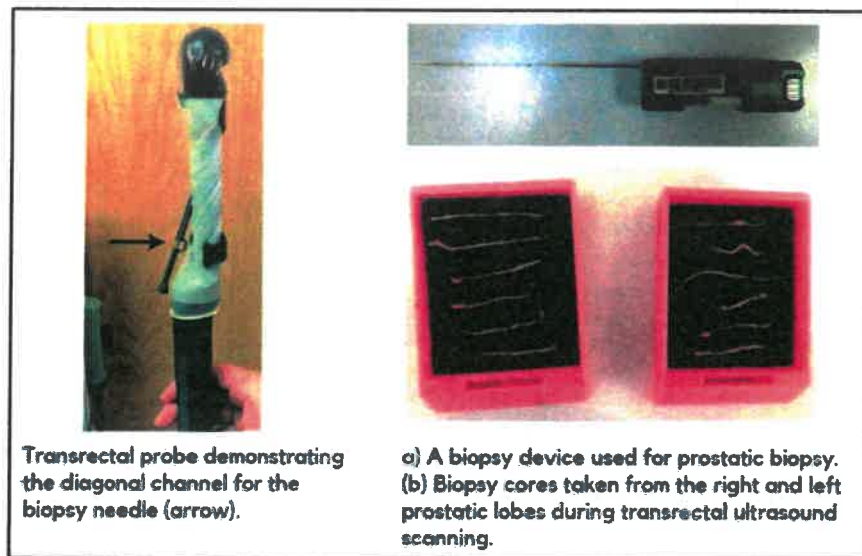
TRUS prostate biopsy



Transperineally Template Biopsies of the Prostate

- Increasingly used clinically and may replace TRUS-guided prostate biopsies as a first-line test.
- Currently, TPTBP are used
- To further evaluate men with a negative TRUS-guided prostate biopsy in whom the PSA trend remains suspicious or younger men for whom a diagnosis of low-risk prostate cancer has been made and in whom it is important to exclude more significant disease in other parts of the prostate (most notably in the anterior aspects of the gland) not easily accessible via the transrectal route.

- Usually performed under *Local anesthetic* and have a much lower risk of sepsis than TRUS-guided biopsies.
wrong!!! TPTBP-done under anesthesia ref: Cambell 12th Ed urology

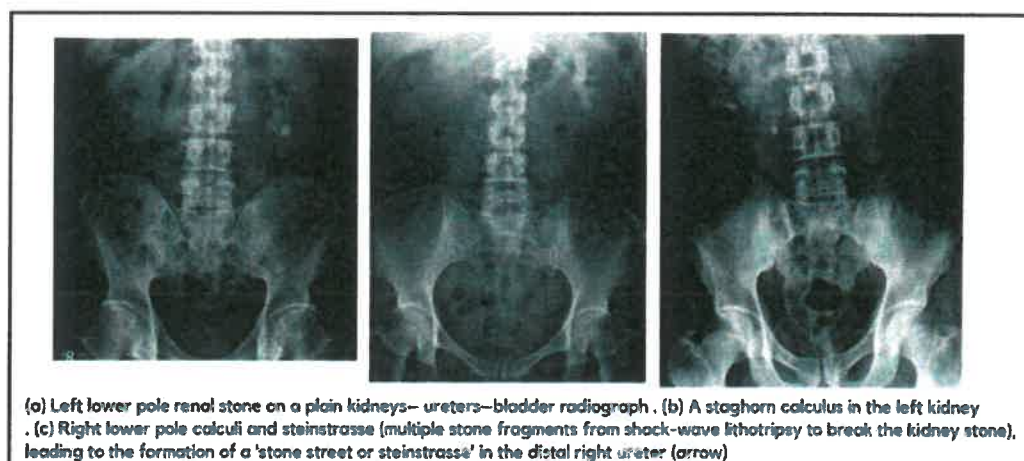


Kidneys-Ureters-Bladder Radiograph

00:44:40

- A plain radiograph of the abdomen and pelvis
- Includes the regions of the body occupied by the KUB called an x-ray KUB
- In the normal setting, soft tissue outlines of the kidneys are commonly seen but normal ureters and bladder will not be seen.
- The commonest indication for a KUB radiograph is to screen patients for the presence of urinary tract calculi.
- Patients who have had a CT scan resulting in the diagnosis of a urinary tract calculus often have a supplementary KUB radiograph to determine if a plain radiograph can be used in the subsequent follow-up of the patient.
- Phleboliths (thrombosed, calcified veins in the pelvis) can easily be mistaken for distal ureteric stones.
- KUB radiograph - used to check for correct positioning of a ureteric stent.

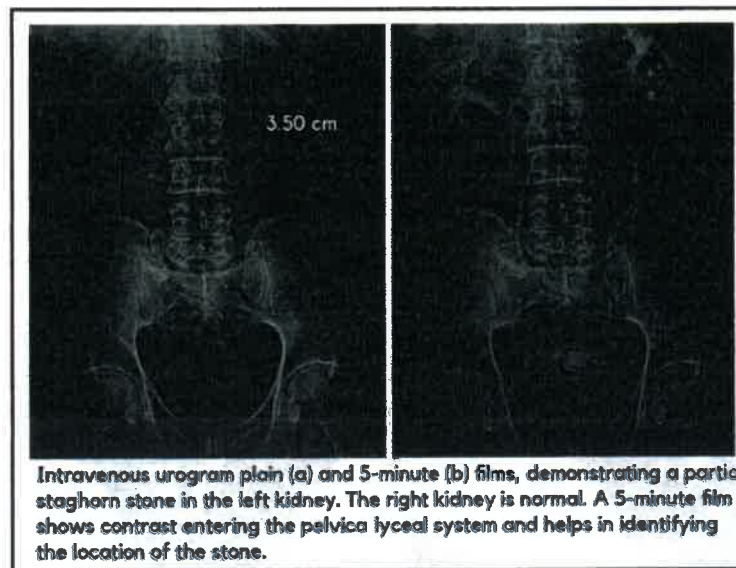
X ray KUB



Intravenous Urography

00:45:48

- Used in the evaluation of stones and urinary TB in many parts of the world, even though it provides less information than a CT scan.
- Due to its wider availability, lower cost and lower radiation exposure IVU

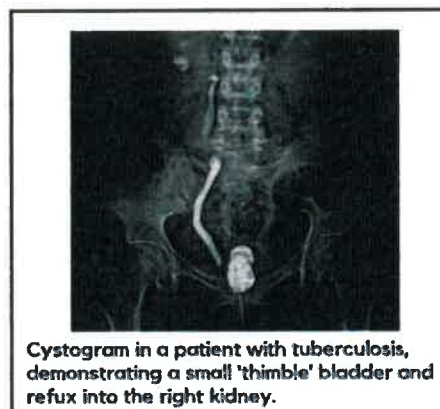


Cystourethrogram

00:47:06

- Retrograde urethrogram
 - Radiocontrast is gently instilled into the urethra to delineate its anatomy.
 - Used to identify urethral strictures in men.
- Voiding cystourethrogram
 - Radiocontrast material is instilled into the bladder, through either a urethral catheter or a suprapubic tube for a voiding cystourethrogram (VCUG).
 - Used to identify reflux into the ureter, usually in children, and
 - For delineation of the proximal urethra in men with complete urethral strictures.
 - Help in assessing bladder capacity in TB

Cystogram-



Computed Tomography Scan

00:48:01

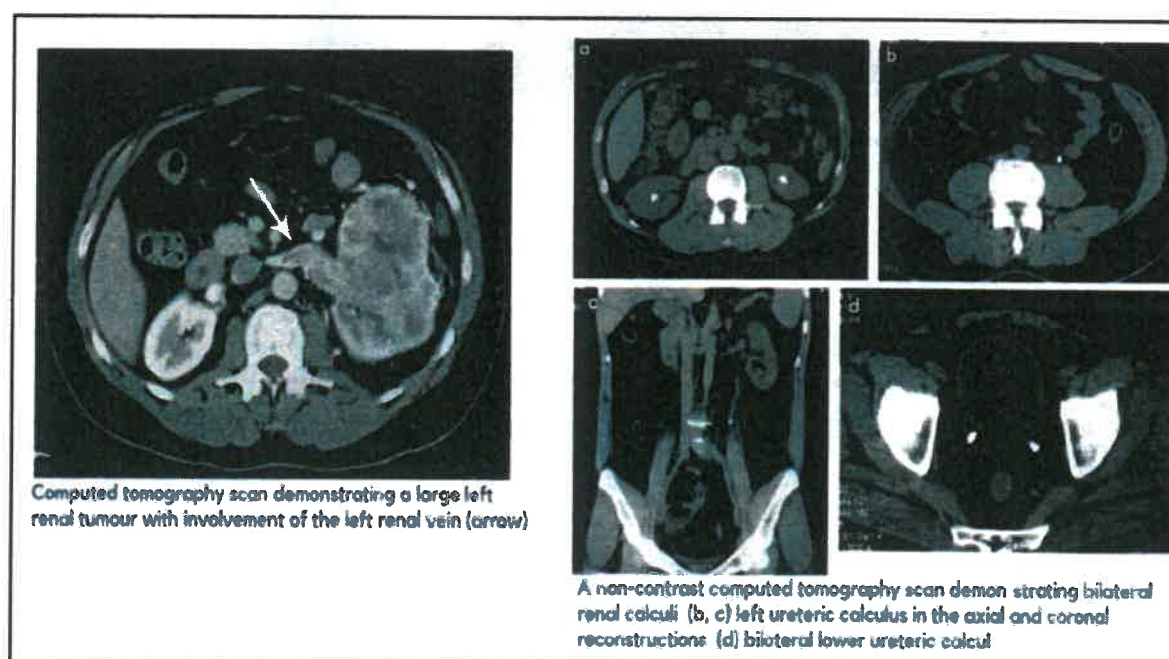
A non-contrast CT scan

- The imaging modality of choice in the investigation of a patient with suspected urinary tract calculi

- Takes less < 2 minutes to perform Picks up most calculi and can be tailored to deliver low radiation doses.
- Other variations of the CT scan include
- Contrast CT, which can be tailored to acquire images in multiple phases (triple phase for renal tumours) and a urography phase for urothelial tumours.
- A contrast CT scan of the chest, abdomen and pelvis
- Used to stage patients with renal tumours, muscle-invasive bladder cancer and young men with testicular cancer.
- CT in men with prostate cancer -have a role to play when lymph node disease is being assessed prior to treatment.

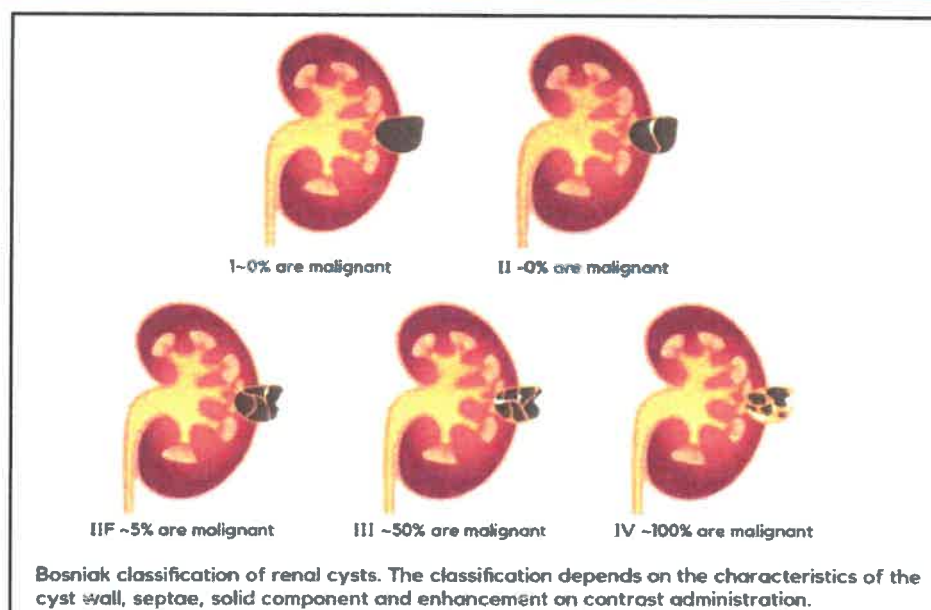
Computed Tomography Scan

00:48:53



Computed tomography scan Bosniak Classification

00:49:34



Magnetic resonance imaging

- In the staging of prostate cancer.
- Multiparametric MRI (MPMRI).
- Modern MRI techniques utilizes both anatomical and functional imaging known as multiparametric MRI (MPMRI). Anatomical imaging is based on stranded MRI techniques (t1 and t2 weighted images) and functional imaging is based on diffusion weighted (DWI) (for water molecule motion assessment) and dynamic contrast enhanced DCE imaging (for tissue perfusion assessment after intravenous contrast administration)
- The multiple parameters assessed in the scan are combined in a five-point scoring system called PI-RADS (prostate imaging reporting and data system) to assign a likelihood. (from 1 benign to 5, highly suspicious) that prostate cancer is present within the abnormality detected on MPMRI of the prostate.
- The lesions identified on mpMRI can be specifically targeted for biopsy using novel technologies.
- MRI images can be fused with real time TRUS-USS images to guide the biopsies to these. Abnormal areas in a similar manner to TRUS biopsy
- Such 'fusion' biopsies require specialised workstations.
- Similar scoring systems are being used to assess bladder cancer. (VIRADS)

Precision trial

00:51:49

- mpMRI has a significant role in the assessment of men with suspected prostate cancer
- MPMRI is increasingly used prior to prostate biopsy.
- Prebiopsy MRI permits selection of biopsy technique (TRUS versus TPTBP)
- SPECT/CT and PET/CT
- Single photon emission computed tomography (SPECT) and positron emission tomography (PET) are nuclear medicine imaging techniques
- Provide metabolic and functional information.
- They have been combined with CT and MRI to provide detailed anatomical and metabolic information.
- PET/CT
 - Promising as a tool for the detection of distant metastases in bladder cancer.
 - Has not been used extensively in patients with renal cancer
 - In men with testicular cancer, it is recommended in the follow-up of patients with seminoma with any residual mass.
- Pet/CT may use a number of different radiotracers including C-CHOLICE, F-choline, F-fluciclovine and the newer gallium (Ga) -labelled antibodies targeting prostate specific membrane antigen (PSMA) for the detection and staging of prostate cancer and its recurrence after initial definitive therapy.

Bone Scan

00:53:15

- Used when bone metastases are suspected based on symptoms or other investigations.
- Also used in the routine staging of patients with high-risk prostate cancer
- Although there is a <5% chance of a bone scan being positive until the PSA is >40 ng/ml.

Dimercaptosuccinic acid renogram

- 99mTc dimercaptosuccinic acid (DMSA) is a technetium radiopharmaceutical used in renal imaging to evaluate renal structure especially in the pediatrics population used to detect renal scarring

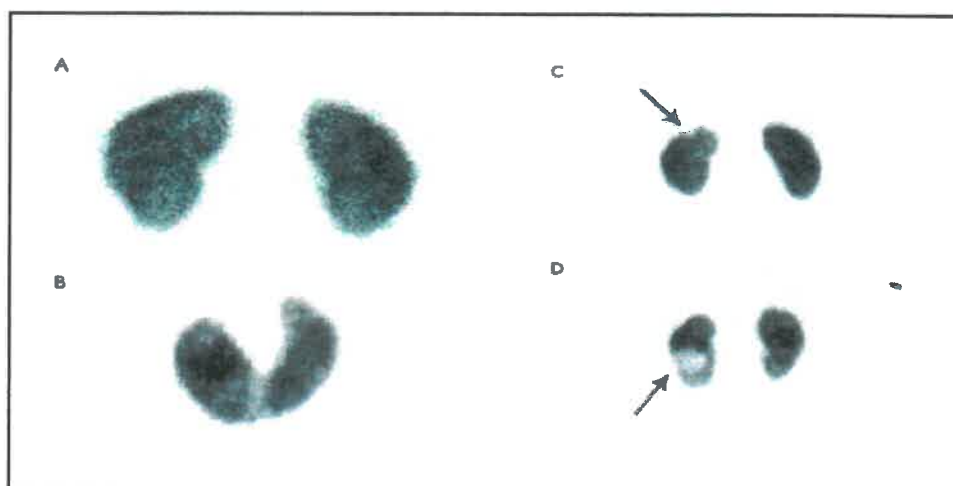
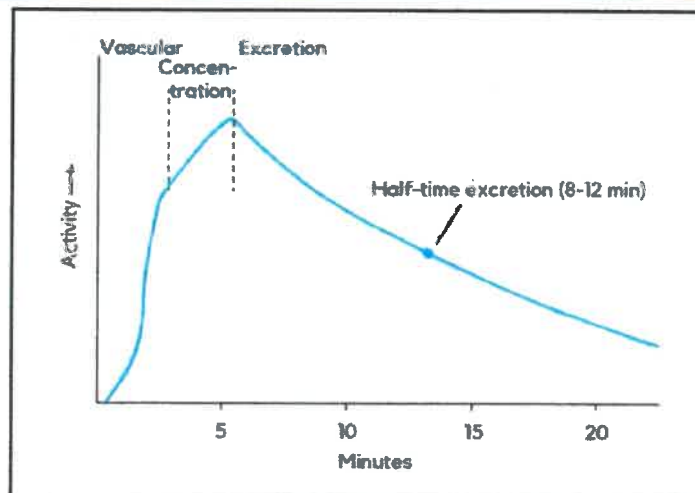
Diethylenetriamine Penta- Acetate renogram

00:53:50

- 99mTc diethylenetriamine Penta-acetate (DTPA) is a technetium radio pharmaceutical used in renal imaging.
- Used frequently in patients suspected of having ureteropelvic junction (UPJ) obstruction
- But it has largely been superseded by the mercaptoacetyltriglycine (mag3) renogram in such cases.
- Mercaptoacetyltriglycine renogram
 - 99mTc mercaptoacetyltriglycine (mag3) is now the radio-pharmaceutical of choice used in the assessment of patients with suspected upper urinary tract obstruction such as UPJ obstruction.
 - The shape of the renogram curve is dependent, first, on mag3 uptake from the circulation to the kidney and, second, on mag3 elimination from the kidney into the bladder.

Mercapto Acetyl Triglycine Renogram (MAG3)

00:54:13



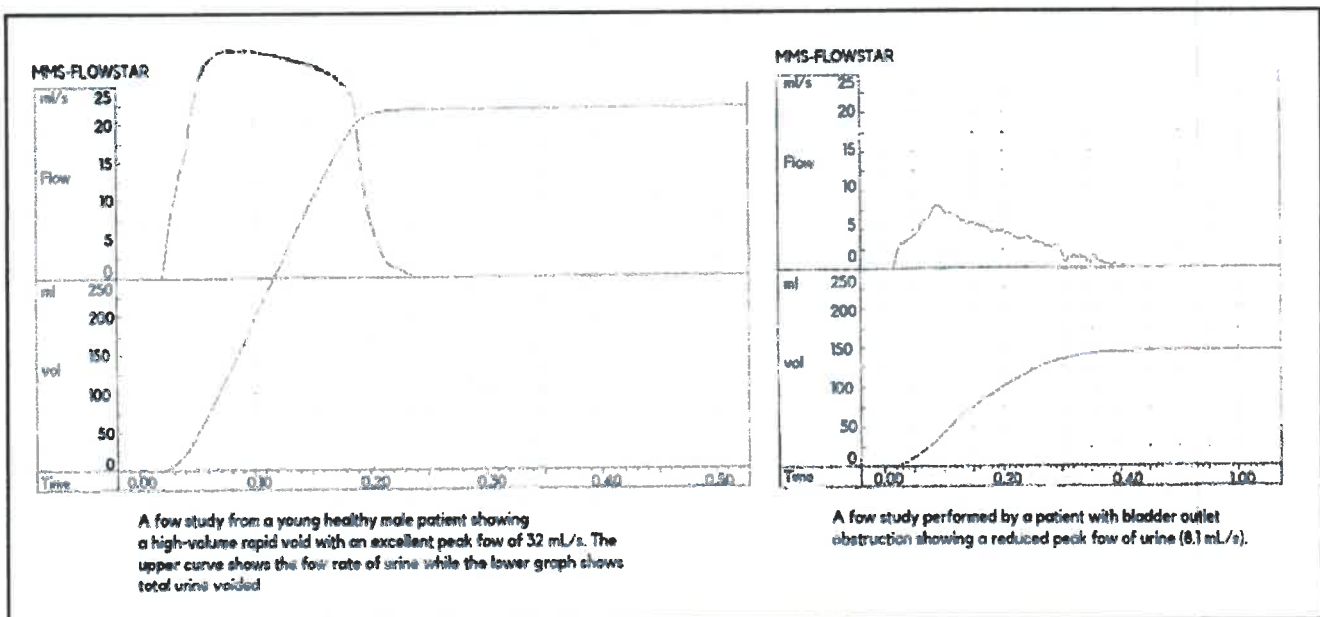
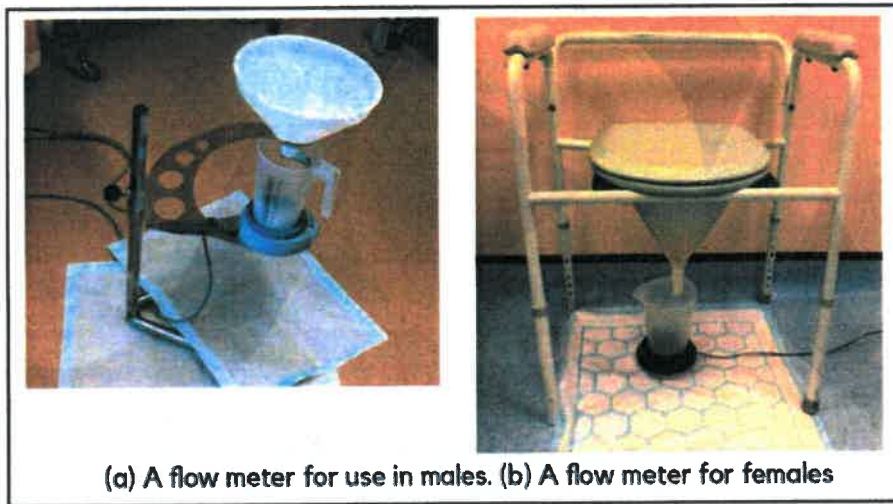
Bladder Function Assessment

00:54:37

- Flow rate and ultrasound scan residual urine
- Men with LUTs and women with recurrent UTIs or LUTs are investigated with a flow rate and a USS residual urine.
- A peak flow rate (QMAX)
- >15 ml/s suggests that significant BOO is not present
- Flow rate of <10 ml/s suggests that BOO is present.
- A very low flow rate with a very protracted pattern of voiding is suggestive of a urethral stricture.
- Caution is required when interpreting the significance of a single high USS residual volume;
- Repeated tests often give a more representative picture of the degree of bladder emptying.

Uroflow Rate Studies

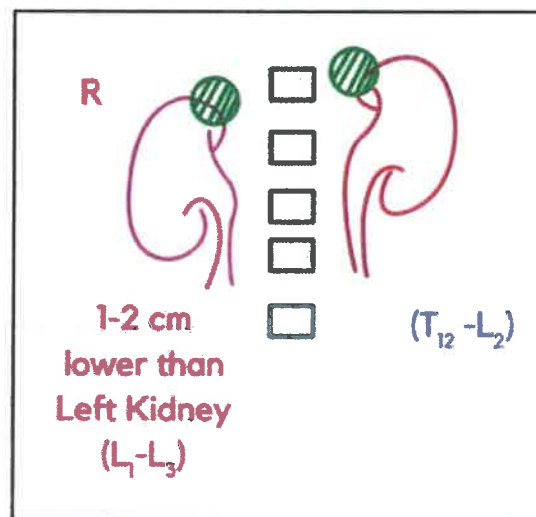
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SURGICAL ANATOMY OF KIDNEYS

Surgical Anatomy

- Kidneys are retroperitoneal
- Paired organs
- T₁₂ – L₃
- Excretory organs
- Lie on the psoas muscle
- Longitudinal axis is oblique.
- Left kidney is slightly at higher level. Right kidney (L₁-L₃) is 1-2 cm lower than left kidney. (T₁₂-L₂)
- Supra renal glands lie on the superomedial aspect of both kidneys

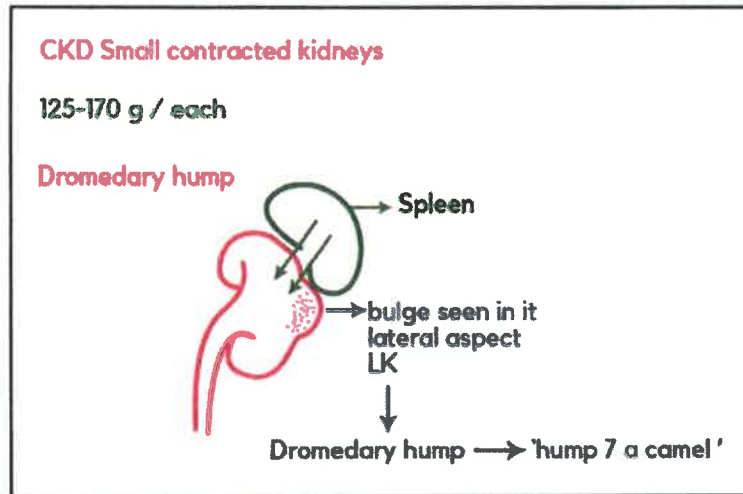


Measurements of kidney:

- 10-12 cm in length
- 5-7 cm in breadth
- 2-3 cm in thickness
- CKD - small contracted kidney
- Each kidney weigh about 125-170gm each.

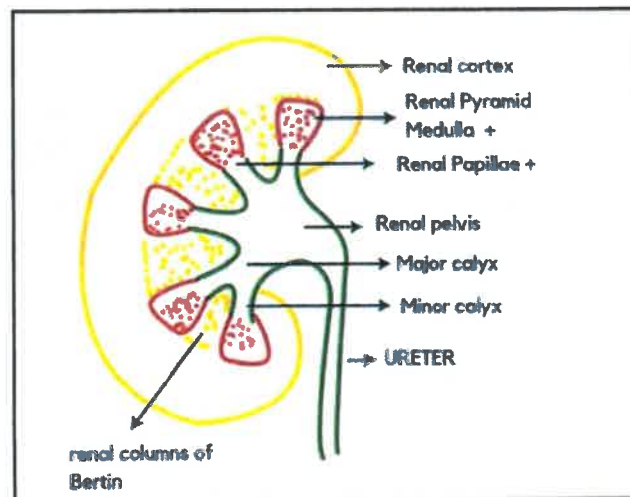
Dromedary hump:

- It is a normal anatomical variant.
- Bulge seen in the lateral aspect of the left kidney.
- Resembles like a hump of a camel.
- During development due to growing spleen, it has a downward development of left kidney.



Cross section of kidney.

- Kidney is made up of outer cortex and inner medulla. Cortex:
- pale outer region
- 1cm in thickness



In CKD - corticomedullary differentiation is lost.

- Major calyces are 2-3 in number, minor calyces 5-14 in number
- Renal pyramid is 8-18 in number
- Capacity of renal pelvis - 3-10ml
- Divided into intrarenal/extrarenal pelvis

