Peritonitis

D/D, Assess, MnX

Primary
- Spontaneous peritonitis of childhood
- Spontaneous peritonitis of adult
- Tuberculous peritonitis
- Dialysis peritonitis

Secondary
- From intra abdominal source
  1. Hollow viscus perforation
     - Perforated duodenal gangrene, acute
     - Perforated peptic ulcer, acute
  2. Direct spread
     - Ac. Appendicitis
     - Ac. Cholecystitis-gangrenous
     - Ac. Neutritis Gastrica
  3. Penetrating injury
  4. Post operative peritonitis
  5. Paracentesis peritonitis
  6. Punt injury peritonitis

Assessment

C/F: Acute abdominal pain - cutting nature

- Persistent vomiting
- Pulse rate
- High grade fever and chills and rigors
- Tenderness - Cough, Ecchymosis (Blumberg)
- Quaddrup, rigidity
- Absent bowel sound
- End stage - Hippocratic Jaunies
Investigation
- CBC - High count
- Blood sugar
- Plain X-ray Abdomen
  - Gas under diaphragm - Perforation
  - Ground glass appearance - due to fluid
  - Air in bowel wall - Gangrene
  - Bowel shadow obliteration

- Abdominal USG - very useful
  - Free pus - Peritonitis older than 48 hrs.
  - Bile - green - duodenum, stomach, GB peri-
  - faeculant - Dark green - ileal perforation
  - Serous - exudative - TB, Pancreatitis
  - Haemorrhagic -
  - Food particles - Hollow viscus perforation
  - probe tenderness - RIF = Ac. Appenicitis
  - Anchovy sauce - Amoebic liver abscess

- Abdominal Tap - As above.

- CECT = Follow viscus perforation
  - Ischemic changes
  - Unsuspected lesions - diverticulum

- Diagnostic laparoscopy
  - Reconfirm and 5x aseptic
  - Toilet can be given
  - Tilt
  - Can detect Diaphragmatic Injury
1. Aspiration - Ryle's tube → 4 secretion, 4 Bact. load.
2. Bowel care and Blood
3. Charts - B, P, T.
4. Drugs - 3rd gen. Cephalosporin + MTZ
   (Culture sensitivity)
5. Exploratory Laparotomy
6. Fluids - CVP  Ringer lactate
7. Principles of Sx.
   - Generous Incision
   - Plus for C/S
   - Exploration and Establish Sx
   - Treat the cause - Control of sepsis
   - Peritoneal toilet - Saline (not antiseptic)
   - Drain - Subhepatic space and pelvic cavity
   - Closure - Tension sutures
   - Nonabsorbable sutures to do

Abdominal Compartment Syndrome →
- IAP > 20 mmHg
- Close monitoring
- Sx - Temporary Abdominal Closure
  - Definitive closure
  - Mesh
  - Bogota bag
  - Vacuum assisted closure
Q: Line Antitubercular drugs -

Complications:
- Severe shock
- Hypovolemic shock
- Septic shock
- Subacute intestinal obstruction
- Pelvic Abscess
- Subphrenic Abscess

* Pelvic Abscess
  
  **CLF** = high grade fevers
  - Discharge of mucus per rectum in Pt.
  - Recovery from peritonitis

  **DX** = Per rectal tenderness, boggy swelling in
  Ant. wall of rectum

  **USG**

  **CT**

  **MNX** = ↓ GA → Pecotorscopy → Nick in Ant.
  Wall of Rectum

  ∧ RT. Paracolic gutter edge
  omphalophrenic

  Subphrenic Abscess (Common on RT Side) sigm.

  **ELF** = fevers, chills, dehydration & hectic
  shoulder pain,\ decreased pulse
  Epigastric pain

  **IM** c/s, → X-ray, fluorescent radiography to
  assess absence of movement on right side

  **USG**, **CT** & **Scan**, Isotope imaging (**IRM**)

  **T/t** = Antibiotic, control of primary
  drainage - Pigtails catheter or open Drainage.
Special cases

1. Spontaneous Bacterial Peritonitis
   - Child: Malnutrition, Malignancy, chemotherapy
   - Adult: Cirrhosis, Nephrotic Syndrome, CRF

C/F = Classical
Irr = As usual
T/t = Conservative

>250 PM cells in Ascitic fluid
   - Albumin (In cirrhosis)
   - M/Gen. Cephalo + MTR.
   - Norfloxacin & Incidence of SEPs i.e. vascular
   - Instillation of antibiotic solution
   - Laparotomy as last resort $\Rightarrow$ wash.

2. Postoperative Peritonitis
   - Causes: Leakage from anastomotic line
   - Iatrogenic visceral trauma
   - Foreign bodies

How to suspect postoperative peritonitis
- Deleterious after 3-5 days of operation
- Delay in recovery
- Evidence of toxemia
- Free drainage of bile and fecal matter from drain site
- Oliguria

P/I = 1) Prevention of mop lifting
      2) Specific treatment
- Reoperate
- Confirm leak or abscess
- Exploration
- Drainage
- Antibiotics
- Peritoneal lavage
- Delayed closure of skin.

**Biliary peritonitis**

* C/f: As usual. biliary leak, Excitation
  High mortality

* T/t:
  - Most of fistula heal within 2-3 weeks
  with conservative line of man
  - If does not heal - Re explore

- Feeding jejunostomy is useful in
  reperoration of sutured duodenal ulcers
  or difficult duodenal ulcers closure.
Causes/Di of Hematuria

1. UTI
2. Pyelonephritis
3. Kidney, ureteric, or bladder stone
4. Enlarged prostate
5. Kidney disease + Glomerulonephritis
   Vascularitis
   IgA Nephropathy
   HSP, SLE
   PKD

6. Trauma
7. Tumour
8. Injection
9. Stone
10. Kidney
11. Ureter
12. Bladder
13. Vesithra
1. **Weine casts**
   - Fibrin clots
   - Wool-like
   - Flat disc
   - Weet'hea
   - Pieces of tumour
   - Papilloma bladder

2. **Weine microscopy**
   - Pyuria – UTI
   - Abacterial acid Pyuria – TB
   - RBC
   - Dysmorphic
   - Malignant cells

3. **Plain X-ray KUB**
   - Enlarged kidney – Polycystic kidney, RCC
   - Radio opaque – Renal stones, Weet'hea (stones, bladder stones)

4. **Cystoscopy**
   - Growth in bladder – Papilloma / TCC
   - Inflammation – Cystitis
   - Ulcer, golf hole weeter – TB

5. **Intra venous Pyelography**
   - Spider leg calyces – Polycystic kidney aus.
   - Irregular calyces – RCC
   - Missing calyces – TB

6. **USG**
   - RCC, PCKD, WF
   - Fatty – Nephrotic Syn.
   - Granular – Kidney
   - Hyaline – Dehydrat
   - Epithelial cell cast – Tubular damage
   - **Weine Cast**
Hematuria

Microscopic

Dysmorphic RBC
+ pus cells

Culture

D. RBC + pus cells

S10 glomerula

Urine

Pathological Causes

USG/IVU/CT + urology cytoLOGY

Therapy

Stones

Multiple >1/L

Cystine = Rare, due to newborn errors. Hard. Radiopaque.

Uric acid = In acidic urine, best response to lithotripsy

Tripe phosphates = Alkaline. Injection = Stagnated.

Xylocate = Irregular, (all others smooth). Infected urine

C/F = Pain, Colicky, Hematuria. Recurrent UTI, Gout, Seizure.
EXPLANATIONS

RENAL AND URETERIC CALCULI

1. Ans. b. Triple phosphate (Ref: Smith 11/e p219-254; Campbell 10/e p1296–1302; Bailey 25/e p1295-1300)

- Calcium oxalate
  - MC type of kidney stone (85%)
  - Risk factors are hypertonic urine, hypercalciuria, hyperparathyroidism
  - Have hard, small and jagged surface
- Uric acid stones
  - 5-10% of all kidney stones, MC radiolucent urinary calculi, formed in acidic urine
  - Patients with uric acid stones may have gout, myeloproliferative disorders or Lesch-Nyhan syndrome (hyperuricemia)

<table>
<thead>
<tr>
<th>Type of Renal Calculi</th>
<th>Management</th>
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<tbody>
<tr>
<td>Uric Acid Stones</td>
<td>Complete stone removal + Treatment of any metabolic abnormality + Correction of any anatomic abnormalities contributing to stasis.</td>
</tr>
<tr>
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<td>PCNL + ESWL (best treatment option)</td>
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<td>Upto 50% of patient have stone recurrences or UUT over 10 years follow up</td>
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- Struvite stones (Infection stones)
  - Composed of calcium, ammonium, magnesium phosphate (Triphosphat stones)
  - Tend to grow in alkaline urine, especially with Proteus infection and fill whole of the PCS, forming staghorn calculi
  - Formed in high urinary concentration of ammonia
  - More common in women (increased susceptibility for UTI)
  - Most of the staghorn calculi are silent and cause progressive destruction of renal parenchyma
  - Increased tendency to form struvite calculi is seen in: Foreign body in the urinary tract (Foley’s catheter) and Neurogenic bladder/Bladder dysfunction/Bladder outlet obstruction

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- Cystine
  - Extremely hard stone, formed in acidic urine
  - Relatively resistant to fragmentation by ESWL
  - Occur in cystinuria with typical "ground glass" appearance with a round smooth outline
  - Typical benzene or hexagonal cystine crystals in urine

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- Xanthine
  - Seen in xanthinuria, radiolucent
  - Stones are smooth, brick red colored, round and show lamination on cross section.
  - Management: High fluid intake (most effective therapy) and Allopurinol

- Indinavir
  - A protease inhibitor used in AIDS patients, resulting in radiolucent calculi in 6% patients.

- Silicate: Associated with long term use of antacids containing silica

- Triamterene: Antihypertensive medication, leading to radiolucent stones
2. Ans. c. Indinavir
3. Ans. d. Usually seen in acidic urine
4. Ans. b. Urinary stones (Ref: Campbell 10/e p1262-1263)

**Randall’s Plaques**
- Randall’s plaques are soft tissue calcifications found in the deep renal medulla skirting the surface of the epithelium of the papilla, where they act as nucleating elements for renal calculi or stones.

5. Ans. a. Phosphate
6. Ans. a. Ethylene glycol (Ref: Smith 17/e p248)

**Calcium Oxalate Crystals**
- Calcium oxalate crystals in the urine are the most common constituent of human kidney stones, and calcium oxalate crystal formation is also one of the toxic effects of ethylene glycol poisoning.
- Excessive oxalate may occur secondary to the accidental or deliberate ingestion of ethylene glycol (partial oxidation to oxalate). This may result in diffuse and massive deposition of calcium oxalate crystals and may occasionally lead to renal failure.

7. Ans. b. Phosphate

**RENA L AND URETERIC CALCULI CLINICAL FEATURES**

8. Ans. a. At pelvic brim (Ref: Smith 17/e p260-270; Campbell 10/e p1262-1263, 1371-1373; Bailey 26/e p1293, 25/e p1274, 1295-1300)

**Renal Calculi**
- Peak incidence 20-40 years, more common in males
- Infectious stones are more common in females
- For formation of stones, a period of abnormal crystalluria is required. Urine must be supersaturated with salt of the stone forming crystal (Supersaturation and crystallization)

**Clinical Features**
- MC symptom is pain
- The severity of pain is not related to the size of the stone
  - Stone in upper ureter or renal pelvis → pain referred to testis
  - Stone in mid ureter → referred along iliohypogastric nerve to iliac fossa, mimicking appendicitis
  - Stone in lower ureter → referred along ilioinguinal nerve to thigh, scrotum and perineum
- Stone approaching bladder → bladder symptoms (frequency, urgency and dysuria)
- Stone in the intramural ureter → strangury
- Drug of choice for ureteric colic is diclofenac (overan).

9. Ans. b. At pelvic brim

10. Ans. c. Dietl’s crisis (Ref: Bailey 26/e p1293, 25/e p1293)

**Dietl’s Crisis**
- Intermittent hydronephrosis (Dietl’s crisis): A swelling in the loin is associated with acute renal pain. Some hours later the pain is relieved and the swelling disappears when a large volume of urine is passed.

11. Ans. b. Increased peristalsis of ureter to overcome the obstruction (Ref: Smith's urology 17/e p31)
- The severity and colicky nature of ureteric colic pain are caused by the hyperperistalsis and spasm of smooth muscles of the ureter as it attempts to rid itself of a foreign body or to overcome obstruction.
PAIN FROM ACUTE OBSTRUCTION OF URETER (STONE OR BLOOD CLOT)

- Ureteral pain is typically stimulated by acute obstruction (passage of a stone or a blood clot).
- Back pain from renal capsular distention combined with severe colicky pain (due to renal pelvic and ureteral muscle spasm) that radiates from the costovertebral angle down toward the lower anterior abdominal quadrant, along the course of the ureter.
- The severity and colicky nature of this pain are caused by hyperperistalsis and spasm of this smooth muscle organ as it attempts to rid itself of a foreign body or to overcome obstruction.

### Stone in the upper ureter
- Pain radiates to the testicle.
- Since the nerve supply of this organ is similar to that of the kidney and upper ureter (T11-12).

### Stone in the middle ureter
- Pain is referred to McBumey's point and simulate appendicitis on right side.
- Left side, it may resemble diverticulitis or other diseases of the descending or sigmoid colon (T12, L1).

### Stone in the lower ureter
- Pain is referred to inner side of thigh or groin (L1, L2).

### Stones at the level of orifice
- Symptoms of vesical irritability such as frequency and urgency may occur.

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12. Ans. b. Proteus
13. Ans. b. Iliohypogastric
15. Ans. a. Oxalate stones (Ref: Bailey 26/e p1292, 25/e p1296)

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OXALATE STONES

- Oxalate stones are irregular in shape and covered with sharp projections, which tend to cause bleeding.
- The surface of the calculus is discolored by altered blood.
- A calcium oxalate monohydrate stone is hard and radiodense.

16. Ans. c. Voveran
17. Ans. b. Stillness of the patient
18. Ans. d. Diclofenac

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RENAL AND URETERIC CALCULI DIAGNOSIS AND TREATMENT

19. Ans. a. PCNL (Ref: Smith 17/e p260-270; Campbell 10/e p1287-1283, 1371-1373; Bailey 26/e p1293, 25/e p1274, 1295-1300)

### Renal Calculi

#### Laboratory Investigations
- Urine: pH, microscopic examination (RBCs, pus cells and crystalluria) and culture for splitting organisms
  - Acidic urine: CCU (Calcium oxalate, Cystine, Uric acid)
  - Alkaline urine: Calcium Phosphate, Struvite

#### Crystalluria: To determine the stone composition

<table>
<thead>
<tr>
<th>Crystal</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium oxalate monohydrate</td>
<td>Dumbbell or hourglass</td>
</tr>
<tr>
<td>Calcium oxalate dehydrate</td>
<td>Enveloped or bipyramidal</td>
</tr>
<tr>
<td>Calcium phosphate (apatite)</td>
<td>Amorphous</td>
</tr>
<tr>
<td>Brushite</td>
<td>Needle shaped</td>
</tr>
<tr>
<td>Struvite</td>
<td>Coffin lid</td>
</tr>
<tr>
<td>Uric acid</td>
<td>Multifaceted, irregular plates or rosettes</td>
</tr>
<tr>
<td>Cystine</td>
<td>Hexagonal or benzene ring</td>
</tr>
</tbody>
</table>

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Eckovation App Group Code: 87354
Surgery Essence

Radiographic Investigations
- X-ray KUB:
  - 90% are radiopaque
  - Radiolucent stones (X-rays): Triamterene, indinavir, xanthine and uric acid
- IVP:
  - Early films (AT 1 and 5 min for promptness of contrast excretion and any obstruction along urinary tract)
  - Delayed films (Identifies cause of delayed contrast excretion)
- Non-contrast spiral CT is the most sensitive investigation for renal/ureteric calculus.
- Retrograde pyelography (RGP):
  - Better delineation of anatomy. Especially useful if distal ureter not visualized well.
  - Excludes unsuspected additional ureteric calculi and allows assessment of coexistent ureteric disease such as stricture, which may complicate the operative and post-operative course.
- DMSA (Dimercaptosuccinic acid): Renal morphology (scar)
- DTPA (Diethylene Triamine Pentaaetide Acid): To assess perfusion (Effective renal plasma flow) and function (Total and differential GFR), less effective than MAG-3 for decreased renal function.

Metabolic workup should be done in young patients, with recurrent calculi, multiple calculi and in nephrocalcinosis, struvite stones, uric acid stones and cystine stones.

20. Ans. b. Uric acid

21. Ans. a. ESWL. (Ref: Campbell 10/e p 1302-1309; Bailey 26/e p 1294-1296, 25/e p 1297-1300)

The best treatment in this situation is PCNL. Since PCNL is not mentioned in the option, the best option is ESWL despite of size 2.5 cm, as it is preferred over other three for the management of renal stones.

Management of Renal and Ureteric Calculi

Indications of Conservative Treatment (for 4-6 weeks)
- Feature of stone likely to pass spontaneously
  - Single stone ≤ 5 mm
  - Stone in lower third of ureter
  - Ureter is undilated
  - Evidence of downward movement

Surgical Intervention
- ESWL (Extracorporeal shock wave lithotripsy)
- PCNL (Percutaneous nephrolithotomy)
- URS (Ureteroscopy)
- Laparoscopic stone surgery
- OSS (Open stone surgery)
  - The majority (80-85%) of simple renal calculi are treated satisfactorily with ESWL.
  - Rests are managed by PCNL/URS
  - OSS is the least common treatment modality now days.

(Ref: Smith 17/e p 269; Campbell 10/e p 1595, 1645; Bailey 26/e p 1294, 25/e p 1299)

Indications of Open Stone Surgery
- Anatomic abnormality requiring open operative intervention (e.g. PUJO)
- Nonfunctioning kidney with stone (nephrectomy)
22. Ans. 3. Calcium oxalate monohydrate (Ref: Smith 17/e p264-268; Campbell 10/e p1380-1381; Bailey 26/e p1294, 25/e p1298-1299)

- High energy shock waves are produced outside the patient’s body, which are focused on stones with the help of fluoroscopy or ultrasound.
- The change in density between the soft renal tissue and hard stone causes release of energy at the stone surface which causes compression induced tensile cracking of stones.
- Incoming shock wave result in fragmentation of stones from erosion and shattering.
- The stone fragments into small pieces and may pass down the ureter.
- Strongest or Gold standard lithotripter for ESWL is Dornier unmodified HM-3.

- Difficult (hard) stones for ESWL: Brushite, Hydroxyapatite, Cystine, Calcium oxalate monohydrate (BHC-2)

Factors responsible for decreasing the chances of stone free status:
- Stone burden: Multiple stones >2 cm and staghorn calculi
- (ESWL is best suited for stone <2 cm in renal pelvis or calyces with no distal obstruction)
- Reduced clearance: Lower calyceal location, marked hydronephrosis or scarring, calyceal diverticulum or horseshoe kidney.

Stone composition:
- Difficult: Brushite, Hydroxyapatite, Cystine, Calcium oxalate monohydrate (BHC-2)
- Breakable: Uric acid, struvite, Calcium oxalate dihydrate

Contraindications of ESWL

<table>
<thead>
<tr>
<th>Absolute</th>
<th>Relative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnancy</td>
<td>UTR</td>
</tr>
<tr>
<td>Bleeding disorder</td>
<td>Unrelieved distal obstruction</td>
</tr>
<tr>
<td></td>
<td>Cardiac pacemaker</td>
</tr>
<tr>
<td></td>
<td>Severe orthopaedic deformity</td>
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<tr>
<td></td>
<td>Uncontrolled hypertension</td>
</tr>
<tr>
<td></td>
<td>Weight &gt;300 pounds</td>
</tr>
<tr>
<td></td>
<td>Severe renal failure</td>
</tr>
<tr>
<td></td>
<td>Aneurysm</td>
</tr>
</tbody>
</table>
Complications of ESWL
- Acute injury to the renal parenchyma leading to hematuria and edema
- Chronic renal injury leading to accelerated rise in the systemic blood pressure, decrease in renal function and increase in rate of stone recurrence
- Lung parenchymal injury (if exposed)
- Extrasystoles
- Infection due to release of bacteria in fragment
- Steinstrasse (street of stones or columnation of stone gravel in ureter)

- Prompt drainage of hydronephrosis by J-stent drainage is the single best option to manage uremia in this patient with bilateral renal calculi, to allow recovery of renal function at the earliest.
- Hemodialysis may be used afterwards if renal recovery is prolonged necessitating removal of waste products.
- Prompt drainage of hydronephrosis by J-stent placement is the procedure of choice for hydronephrosis complicated with renal failure in the setting of urinary obstruction.
- Prompt drainage of hydronephrosis is indicated if renal function is compromised or urinary infection (UTI) is suspected, to preserve/salvage renal function.
- Prompt drainage can be achieved by placement of a ureteral stent or through percutaneous nephrostomy.

   - The drainage procedure of choice in emergent situations is cystoscopy with placement of internalized double J ureteral stent. This procedure has the advantage of being a completely internal drainage system.
   - Percutaneous nephrostomy may be used to allow urinary drainage if the stone is too impacted to allow passage of a guide wire for sent placement.

24. Ans. a. Hydrothorax (Ref: Smith 17/e p122, 269; Campbell 10/e p1399-1405; Bailey 26/e p1294, 25/e p1298-1299; Schwartz 9th p1472)
- PCNL done through the 11th intercostal space traverses the lower aspect of pleura and can result in significant hydrothorax from large amount of irrigative fluid.

   PCNL (PERCUTANEOUS NEPHROLITHOTOMY)
   - Removal of kidney stone via a 'track' developed between the surface of the skin and the collecting system of the kidney.
   - The posterior approach is most commonly used, through the posterior calyx rather than into the renal pelvis, as it avoids damage to the posterior branches of the renal artery, which are closely associated with renal pelvis.

   Indications of PCNL
   - Obstructive uropathy (contraindication for ESWL)
   - Large volume stone (≥2 cm), staghorn calculi
   - Other modalities failure (Ureteroscopic failure or ESWL failure)
   - Lower pole calyceal stone
   - Difficult (hard) stones for ESWL: Brushite, Hydroxyapatite, Cystine, Calcium oxalate monohydrate (BHC-2)

   Complications
   - Injury to other viscera like pleura (MC), colon, spleen
   - Bleeding, urinary extravasation
   - Retained fragments
   - Sepsis

25. Ans. d. Stone in a calyceal diverticulum (Ref: Smith 17/e p264-268; Campbell 10/e p1407-1411; Bailey 25/e p1298-1299)

26. Ans. d. Ureteroscopic retrieval (Ref: Smith 17/e p268-269; Campbell 10/e p1407-1411; Bailey 26/e p1297-1298)

   **URETEROSCOPY**
   - Ureteroscopic stone extraction is highly efficacious for lower ureteric calculi.
   - The use of small-caliber ureteroscopes and the advent of balloon dilatation or ureteral access sheaths have increased stone-free rates (66%-100%) dramatically.
27. Ans. a. Endoscopic removal (Ref: Campbell 10/e p1375-1379; Bailey 25/e p1295-1296, 1330-1331)

**Proximal and mid-ureteral Stones**

- Stone ≤ 1 cm: ESWL is primary approach. Ureteroscopy is preferred in failed ESWL, distal obstruction or impacted stones.
- Stone >1 cm: Ureteroscopy in primary approach. PCNL for large proximal stones or impacted calculi.
- Distal ureteral stones
- Stone ≤ 1 cm: ESWL and Ureteroscopy equally successful. Ureteroscopy is the primary approach.
- Stone >1 cm: Ureteroscopy

Remember: For all ureteric stones, ureteroscopy is the primary approach except ≤ 1 cm proximal and mid-ureteral stones.

28. Ans. d. Ureteric obstruction due to fragments in ureter

29. Ans. b. Its use for uric acid stones has caused deaths due to generation of cyanide (Ref: Smith 17/e p130; Campbell 10/e p198-199, 1380-1391)

**INTRACORPOREAL LITHOTRIPSY**

**Techniques**

- Electro hydrostatic lithotripter (EHL)  
  - Narrow safety margin, may damage ureteral mucosa but least expensive  
  - Suitable for bladder calculi.
- Succesfuly fragments 90% of calculi.
- Ultrasonic lithotripter
- Ballistic lithotripter
- Laser lithotripter (Holmium-YAG laser)
  - Ho-YAG is the best laser source for intracorporeal lithotripsy, primarily through a photothermal mechanism that causes stone vaporization.
  - Most effective and versatile with good safety margin
  - Fragments all stones regardless of composition. It can cut through the metal. So, caution must be exercised while using a basket.
  - Potential side effect is production of cyanide when uric acid stones are treated. This has been reported in vitro. The clinical experience has suggested no significant cyanide toxicity.
  - Major disadvantage is initial high cost of the device and the laser fibers.

30. Ans. a. Cysteamine (Ref: Harrison 18/e p3221; Smith 17/e p249-254; Campbell 10/e p1296-1302; Bailey 25/e p1295-1300)

- Patient with cystinuria with multiple renal stones should be treated with increase urine volume (high fluid intake), alkanilization of urine, Penicillamine and tiopronin.

- Ans. d. Uric acid, e. Xanthine

**RENUAL STONES**

- Renal stones: 90% are radiopaque
- Radiolucent stones (TIXU): Triamterene, indinavir, xanthine and uric acid
32. Ans. c. 90° (Ref: Smith 17/e p 261-262)

**IMAGING OF URETERIC COLUM (CALCULUS)**

- A plain film of the abdomen and renal ultrasound examination will diagnose most stones.
  - Spiral CT (Non-contrast CT) has become the study of choice in emergent situations, as the entire urinary tract can be scanned rapidly and without contrast injection.
  - Calculi can be readily identified and distinguished from clot or tumor.

- About 90% of calculi are radiopaque (calcium, cystine).
- Excretory urography is necessary to verify their location within the urinary tract and also affords a qualitative measure of renal function.
- An acutely obstructed kidney may show only increasing density of renal shadow without significant radiopaque material in calcines.
- A non-opaque stone (uric acid) will be seen as a radiolucent defect in the opaque contrast media.

33. Ans. d. Lower 1/3rd of ureter
34. Ans. a. Urine is always infected, b. Should be removed immediately
35. Ans. c. Uric acid
36. Ans. a. ESWL
37. Ans. c. High calcium intake
38. Ans. d. Uric acid stones are resistant to ESWL
39. Ans. b. Phosphate
40. Ans. a. Endoscopic removal
41. Ans. c. Renal stones (Ref: Bailey 25/e p 1297; mededconnect.com)

**X-Ray KUB**

- Kidney stones should be looked opposite to second lumbar vertebra.
- In a lateral X-ray of abdomen gallstones are anterior and renal and ureteric stones overlap the lumbar spine.

<table>
<thead>
<tr>
<th>Opacities on a plain X-ray that may be confused with renal calculus</th>
<th>Phleboliths: calcification in the walls of veins, especially in the pelvis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallstones or concretion in the appendix</td>
<td>Calcified tuberculous lesion in the kidney</td>
</tr>
<tr>
<td>Tablets or foreign bodies in the alimentary canal (e.g. cyclophosphamide)</td>
<td>Calcified adrenal gland</td>
</tr>
<tr>
<td>Osseous tip of the 12th rib</td>
<td></td>
</tr>
</tbody>
</table>

42. Ans. d. Restricted calcium intake (Ref: Harrison 18/e p 1812; Smith 17/e p 271)

A source of calcium at each meal may actually help prevent oxalate stones from forming as the calcium binds with oxalate in food and thus prevents the oxalate from being absorbed into the body.

**Dietary Modification in Stone Disease**

- Increase Intake of:
  - Fluid
  - Dietary calcium
  - Potassium and phytates
  - Vitamin C

- Decrease Intake of:
  - Oxalate
  - Animal protein
  - Sucrose
  - Fructose
  - Sodium
<table>
<thead>
<tr>
<th>Primary Bladder Calculi</th>
<th>Vesical Calculus</th>
<th>Secondary Bladder Calculi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop in absence of any known functional, anatomic or infectious factors</td>
<td>Develop in concert with bladder outlet obstruction, infection, impaired bladder emptying or a foreign body</td>
<td></td>
</tr>
</tbody>
</table>

**Primary Bladder Calculi (Endemic Bladder Calculi)**

- Mainly seen in underdeveloped countries (North Africa, Thailand, Burma, Indonesia), in pediatric age group.
- Most common in children <10 years, with a peak incidence at 2 to 4 years of age.
- More common in boys than in girls.
- Common in Rajasthan, Andhra Pradesh and some north-eastern states of India.
- Related to chronic dehydration and low protein, low phosphate, exclusive milk and high carbohydrate diet.
- Low phosphate diet increases urinary ammonium excretion leading to ammonium urate stones.

**Diagnosis**

- USG bladder: Identifies the stone with its characteristic shadowing and stone moves with changing body position.

**Treatment**

- Small stones: Removed or crushed transurethrally (Cystolitholapexy).
- Larger stones: Disintegrated by transurethral electrohydraulic lithotripsy or Cystolithotomy.

**Primary bladder calculi rarely recur after treatment.**

- These foods are low in phosphorus, ultimately leading to stones.
- These children also usually have a high intake of oxalate-rich vegetables (increased oxalate crystalluria) and animal protein (low dietary citrate).

**Vesical calculi** may be single or multiple, especially in the presence of bladder diverticula, and can be small or large enough to occupy the entire bladder. They range from soft to extremely hard, with surfaces ranging from smooth and facetted to jagged and spiculated ("jack" stones).

**Secondary Bladder Calculi**

- Most bladder stones are secondary, more common in older males (>50 years), usually because of bladder outlet obstruction.
- MC type: Uric acid (sterile urine) > Struvite stones (Infected urine)
- Bladder stones are usually solitary, multiple in 25% patients.

**Etiology**

- Bladder outlet obstruction (MC cause)
- Neurogenic bladder
- Foreign body (Foley’s catheter, forgotten DJ stents)
- Bladder diverticula

**Clinical Features**

- Typical symptoms are intermittent, painful voiding and terminal hematuria with severe pain at the end of micturition.
- Pain may be referred to the tip of the penis or to the labia majora.

**Diagnosis**

- A large percentage of bladder stones are radiolucent (uric acid). 
- USG bladder: Identifies the stone with its characteristic shadowing and stone moves with changing body position.

**Treatment**

- Small stones: Removed or crushed transurethrally (Cystolitholapexy).
- Larger stones: Disintegrated by transurethral electrohydraulic lithotripsy or Cystolithotomy.
ECTOPIA VESICA

1. Ans. d. Iliac bone (Ref: Smith 17/e p574-575; Campbell's 10/e p3228-3236; Bailey 26/e p1310, 25/e p1314)
   Posterior iliac osteotomy is done in ectopia vesica.

   **Extrrophy of Bladder (ECTOPIA VESICA)**
   - Extrrophy of bladder is complete ventral defect of Urogenital sinus and the overlying skeletal system.
   - Defect in the infraumbilical part of the anterior abdominal wall, associated with incomplete development of the anterior wall of the bladder.

   **Embryology**
   - The basic defect is abnormal overdevelopment of the cloacal membrane and its rupture.
   - The timing of this rupture of this defective cloacal membrane determines the variant of the extrrophy-epispadias complex that results.

   **Clinical Features**
   - The posterior wall of the bladder protrudes through the defect with mucosal edges fixed with skin and urine spurs onto the abdominal wall from the ureteral orifices.
   - The rectus muscles which are inserted on the pubic rami are also widely separated.
   - An umbilical hernia though usually small is present along with extrrophic bladder.
     - In males, complete epispadias with a wide and shallow scrotum. Undescended testis and inguinal hernias are common.
     - Females also have epispadias with bifid clitoris and wide separation of the labia.
   - The anus is displaced anteriorly in both sexes and there may be rectal prolapse.

   **Complications**
   - The consequences of untreated bladder extrrophy are total urinary incontinence and an increased incidence of bladder cancer, usually adenocarcinoma.
   - Many untreated extrrophy of bladder reveal fibrosis, derangement of muscularis mucosa and chronic infection leading to hydroureter.

   **Treatment**
   - Enterocystoplasty is the method of choice to augment bladder capacity and aid in reservoir function.
   - Urinary diversion with cystectomy is treatment of choice for small, fibrotic or inelastic bladder.
   - Complete reconstruction is achieved by:
     - Bladder closure with sacral osteotomy and lengthening of penis (Posterior iliac osteotomy is done in ectopia vesica).
     - Antireteral reflex procedure with bladder neck reconstruction.
     - Repair of epispadiac penis.

2. Ans. a. Hypospadias
3. Ans. b. Cloacal membrane is present
4. Ans. c. Hypospadias
5. Ans. b. Ventral curvature of penis
6. Ans. b. Iliac bone

**URINARY BLADDER STONES**

7. Ans. b. Uric acid stones are dropped from above (Ref: Smith 17/e p272-273; Campbell 10/e p2521-2527; Bailey 26/e p1320-1322, 25/e p1323-1325)
Special + B/L. Stones = Kidney with better functions first. Seek's later the other.

- Stone & Pyonephrosis = Nephrostomy → Drainage
  - After clearance of pus
  - Assessment of kidney functions
  - Nonfunction → Function
  - Assessing of kidney function
  - Nephrectomy
    - ESWL
    - PCNL
    - Open.

Ureteric Stones → See in book notes

- Upper - ESWL or flexible ureteroscopy + lasers
- Middle - ESWL or Basketing or Ureterolithotomy
- Lower - Ureteroscopy + removal + lasers, US etc.
- Vesicoureteric - Ureteroscopic removal or endoscopic meatotomy +
- Impacted = Open ureterolithotomy.
Renal mass
- Moves with respiration
- Enlarge in upward and downward direction
- Bimanually palpable and ballottable
- Obt.
- Upper border, not palpable.

1. PKD
   - ECF = manifest at 40 yrs, not of child
   - Dull pain
   - Hematuria, HTN, B/L Renal mass
   - Im = IVU = Spider leg deformity.
   - More

- Asymptomatic
- Follow up
- E HTN
- Drugs - Antibiotics
- Nephrectomy
- t - transplant

2. Hydronephrosis
   - Aseptic dilatation of renal pelvis or part of the pelvi-calyceal system.

Causes
- Child: Phimosis, meatal stenosis, PUV, B/L VUR reflux
- Young adult: Stretcher, sepsis, B/L aberrant vessels
- Middle age: BPH, bladder neck contracture, Ormond's
- Physiological: Pregnancy
4. **Therapeutic embolisation**
   - This can be used as a palliative measure in advanced carcinoma to relieve symptoms. This can also be used preoperatively to regress the size of the large tumour.
   - A catheter is placed in the renal artery and substances such as gel foam, blood clot, crushed muscle are injected.
   - They block the lumen of the vessel and reduce size of the tumour so that radical nephrectomy can be undertaken later.

5. **Radiotherapy**
   - Not of much use. However, it is a good form of palliation for secondaries in the lung, bone and brain.

6. **Immunotherapy**
   - Administration of interferon or interleukin-2 has been found to improve the survival rate.

---

**RENAL MASS IN SURGICAL WARD** (Table 39.2)

**Clinical features of kidney mass**
- Moves with respiration because the fascia of Gerota encloses the kidney and fuses above with the diaphragm.
- Kidneys enlarge in the upward and downward direction.
- Bimanually palpable and ballotable. It is ballotable because of renal pedicle and perirenal pad of fat.
- Colonic band of respiration is obliterated when the kidney enlarges, as the colon is pushed laterally.
- Upper border is not palpable because it is under the 12th rib.

**Table 39.2 Renal mass in surgical ward**

<table>
<thead>
<tr>
<th></th>
<th>Hypernephroma</th>
<th>Hydronephrosis</th>
<th>Polycystic kidney</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chief symptoms</strong></td>
<td>Haematuria, pain in the loin, renal mass</td>
<td>Asymptomatic, distension</td>
<td>Mass abdomen, hypertension, haematuria</td>
</tr>
<tr>
<td><strong>Age of the patient</strong></td>
<td>Over 50 years</td>
<td>Abdomen pain</td>
<td>30–40 years</td>
</tr>
<tr>
<td><strong>Sex incidence</strong></td>
<td>Common in males</td>
<td>Common in females</td>
<td>Common in females</td>
</tr>
<tr>
<td><strong>Anaemia</strong></td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td><strong>Features of renal failure</strong></td>
<td>Absent</td>
<td>Can be present in bilateral cases (rare)</td>
<td>May be present</td>
</tr>
<tr>
<td><strong>Renal mass</strong></td>
<td>Unilateral, nodular, hard, may be fixed, nontender</td>
<td>Can be bilateral, smooth, cystic, feels firm</td>
<td>Bilateral, bosselated, nodular, not fixed, nontender</td>
</tr>
<tr>
<td><strong>Features of kidney mass</strong></td>
<td>May not have free mobility due to fixity</td>
<td>Not fixed, nontender</td>
<td>Present</td>
</tr>
<tr>
<td><strong>IVU</strong></td>
<td>Irregular calyces</td>
<td>Gross dilatation of pelvicalyceal system</td>
<td>Gross dilatation of pelvicalyceal system</td>
</tr>
<tr>
<td><strong>CT Scan</strong></td>
<td>Enhancing mass</td>
<td>Dilated pelvicalyceal system with uniform filling of contrast</td>
<td>Kidney-leg deformity of calyces</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>Radical nephrectomy</td>
<td>Pyeloplasty</td>
<td>Multiple hypodense areas without enhancement</td>
</tr>
</tbody>
</table>

---

**PYONEPHROSIS**

In this condition, the entire kidney is converted into a sac containing pus or purulent urine—almost always the renal parenchyma is destroyed totally.

**Causes**
1. **Renal calculous disease** is the most common cause of pyonephrosis.
2. **Acute pyelonephritis** is more common in children and in females. Inadequately treated cases may develop into pyonephrosis, especially when pyelonephritis is associated with urinary tract obstruction.
3. **Infection** of a hydromelepithrosis.

**Clinical features**
- Anaemia and fever
- Renal swelling
- Large swelling with high grade fever with chills and rigors suggest an imminent danger of septicemia and calls for an immediate drainage of the pus.

**Investigations**
- Urine examination may be positive for coliforms and other gram-negative organisms.
- Plain X-ray KUB may reveal a stone or an enlarged renal outline.
- Ultrasound can confirm hydronephrosis.
Intravenous urogram demonstrates poor function of the kidney on the diseased side. As a rule the opposite kidney is normal.

Treatment
- Broad-spectrum antibiotics (parenteral) should be started immediately once the urine and blood is sent for culture and sensitivity.
- Ultrasound-guided aspiration of pus or a percutaneous nephrostomy (better), and drainage of pus greatly improves the general condition of the patient.
- If any obstruction or causative agent such as a stone is found, it should be removed.
- Nephrectomy should be considered if the kidney is non-functioning with significant damage.

**PERINEPHRIC ABSCESS**
It refers to the collection of pus in the perirenal area.

**Causes**
- Infection in a perirenal haematoma
- Hyonephrosis when it ruptures
- Tubercular perinephric abscess
- Pus from retrocecal appendicitis can extend into loin, perinephric area and may present as abscess.

**Clinical features**
- High swinging temperature
- Rigidity, tenderness, fullness in the loin
- Oedema in the loin

**Investigations**
- Total count: Raised above 20,000 cells/mm³
- Urine analysis: No organisms are usually found

- X-ray spine: Scoliosis with concavity towards abscess
- Screening chest: Diaphragm is immobile and elevated on the diseased side.

**Treatment**
- Pus is drained by an incision in the loin, breaking all the loculi.
- Dialysis and renal transplantation are discussed in page 1111.

**MISCELLANEOUS**

**INTERESTING MOST COMMON FOR RENAL CELL CARCINOMA**
- Most common renal cancer in adults are adenocarcinomas.
- Most common site is upper pole of the kidney.
- Most common presentation of renal cell carcinoma is with mass abdomen.
- Most common investigation of choice is contrast enhanced CT scan.
- Most common method of spread is by haematogenous route.
- Most common intra-abdominal malignancy which spreads within vena cava and into atrium is renal cell carcinoma.
- Most common cell of origin is proximal renal tubular epithelium.

**WHAT IS NEW IN THIS CHAPTER? RECENT ADVANCES**
- All the topics have been updated.
- New photographs and key boxes have been added.

**MULTIPLE CHOICE QUESTIONS**

1. Following is not the feature of adult polycystic kidney:
   A. It can give rise to renal failure
   B. Hypertension is seen in about 75% patients
   C. It is autosomal recessive
   D. It is always bilateral

2. Relationships of right kidney include following except:
   A. Posteriorly are muscles
   B. Anteriorly pyloric antrum
   C. Lateral ascending colon
   D. Medial adrenals

3. Which of the following is the feature of horseshoe kidney?
   A. Classically it is the upper polar fusion of both kidneys
   B. It does not cause angulation of the ureter causing hydronephrosis
   C. It can be associated with Down's syndrome
   D. Hyperextension of the spine results in pain, nausea and vomiting

4. Gout results in:
   A. Calcium stones
   B. Cystine calculi
   C. Phosphate stones
   D. Uric acid stones
C/FR- Painless renal mass

Dull pain in the loin
RARELY HTN, HEMATURIA
DIETL'S CRISIS- IN CALCULOUS HYDRENEPHROSIS

Investigation- x-ray, USG, CT-SCAN

- Calyx (NORMAL) PLATTENED
- DTPA SCAN TO KNOW THE ANATOMY & PERCUSSION
- RETROGRADE PYELOGRAPHY

T/T- 1. TREAT THE CAUSE
2. FOR TREATMENT OF HYDRENPHROSIS PARTICULAR
   - NON FUNCTIONING KIDNEY WITHOUT CORTEX- Nephrectomy
   - IF CORTEX > 0.5 CM- Nephrectomy

   - DECOMPRESS THE SYSTEM
   - REASSESSMENT

   - IMPROVED
   - NOT IMPROVED

   - DEFINITIVE SX- Nephrectomy
   - FOR BLA- BETTER KIDNEY FIRST

3. FOR CONGENITAL HYDRENEPHROSIS
   - MULTICULTE- MEDICAL & SURGICAL TREATMENT
   - SEVERE= CONSERVATIVE
   - MODERATE= NPH & CONSERVATIVE MONITORING
   - SEVERE= > 35 MM- ANDERSON-Hynes PYELOPLASTY
3. Renal Neoplasms

Benign
- Adenoma, Papilloma
- Hemangioma

Malignant
- Nephroblastoma
- RCC
- SCC

1. Nephroblastoma (WT) ⇒ Epithelial and mesenchymal components

- Young females > males, 2-4 years
- Abdominal mass (5/10 = Neuroblastoma)
- Hematuria (if present is a bad sign)
- Low-grade fever

5/10 = Neuroblastoma
Adrenal tumours, extraperitoneal tumour

Investigations:
- USG, CT, IVP, PNAC

WT ∨/s Neuroblastoma

Calcification: Less
Intraspinal extension: +
Aorta & IVC invasion: -
Location: Intrarenal
Midline crossing: -
4V4/VMA
WILM’S TUMOR

Kidney and Ureter

124. Ans. b. Abdominal lump (Ref: Deccit 9/e p1766-1769; Nelson 18/e p2140; Smith 17/e p339-343; Campbell 10/e p3714-3722; Bailey 26/e p1304.

- Wilm’s tumor: MC primary renal tumor of childhood (2-5 years).
- Wilm’s tumor: 2nd MC malignant abdominal tumor in children (MC is neuroblastoma).
- Arise from kidney, composed of three elements- blastema, epithelium and stroma.
- MC presenting feature is asymptomatic abdominal mass or swelling.
- Mostly unilateral.
- Characterized by triad of abdominal mass, fever and microscopic hematuria.
- Fever typically resolve after tumor resection.

Associated malformations
- WAGR Syndrome: It consists of aniridia, genital anomalies and mental retardation. The risk of Wilm’s tumor is increased by 100% in this syndrome.
- Denys-Drash Syndrome: It consists of gonadal dysgenesis (Male pseudotohypopofroimia, nephropathy leading to renal failure. Majority of patients with this syndrome have renal failure.
- Beckwith-Wiedmann Syndrome: It consists of enlargement of body organs, hemi-hypertrophy, renal medullary cysts and abnormal large cells in renal cortex, macroglossia, omphalocoele, hepatoblastoma.

Diagnosis
- USG (first investigation) or CT abdomen for staging.
- MRI is superior to other imaging modalities in delineating nephroblastomatosis elements.
- Calcification tends to be more crescent shaped, discrete and peripheral in comparison of finely stippled calcification of neuroblastoma.

Treatment
- Surgical excision (transperitoneal radical nephrectomy) is treatment of choice.
- Routine exploration of contralateral kidney is not necessary if imaging is satisfactory and doesn’t suggest bilateral process.
- In unfavorable histology, Radiation therapy should be started within 10 days after nephrectomy. Chemotherapy should be started 5 days after any surgery.
- Chemotherapy: VAC (Vincristine + Cyclophosphamide + Doxorubicin or daunorubicin)
- Whole liver radiation is recommended for pulmonary metastasis.

Preoperative treatment should be considered
- Solitary kidney.
- Bilateral renal tumors.
- Tumor in horseshoe kidney.
- Tumor thrombus in IVC above the level of hepatic veins.
- Respiratory distress due to metastatic disease.

Prognosis
- The histology of Wilm’s tumor and tumor stage is identified as most important determinant of prognosis (Histology > Stage).

<table>
<thead>
<tr>
<th>Pediatric Tumors</th>
<th>Neuroblastoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC malignant tumor of infancy</td>
<td></td>
</tr>
<tr>
<td>MC extracranial solid tumor in children</td>
<td></td>
</tr>
<tr>
<td>MC abdominal malignancy in children</td>
<td></td>
</tr>
<tr>
<td>MC primary malignant renal tumor of childhood</td>
<td>Wilm’s tumor</td>
</tr>
<tr>
<td>MC renal tumor of infancy</td>
<td>Congenital mesoblastic nephroma</td>
</tr>
<tr>
<td>MC soft tissue tumor in infants and children</td>
<td>Rhabdomyosarcoma</td>
</tr>
<tr>
<td>MC solid tumor of childhood</td>
<td>Brain tumor</td>
</tr>
<tr>
<td>MC cancer of childhood</td>
<td>Leukemia (30%) &gt; Brain tumors (22%)</td>
</tr>
</tbody>
</table>
666 Surgery Essence

125. Ans. a. Bone metastasis
126. Ans. c. Histology
127. Ans. a. Within 10 days
128. Ans. c. Same location
129. Ans. c. Abdominal mass
131. Ans. c. Hematuria almost always present
132. Ans. b. Less than 1 year
133. Ans. a. Pre-operative use of actinomycin D
134. Ans. b. Lungs
135. Ans. b. International society of Pediatric Oncology (SIOP) (Ref: Devita's 8/e p2051, Schaitz 8/e p1509)

The post-chemotherapy based staging system is the ‘SIOP’ staging system developed by the International society of oncology.
Two Staging Systems are currently being used for the staging of Wilm’s Tumor.

<table>
<thead>
<tr>
<th>Pre-chemotherapy Staging System</th>
<th>Post-chemotherapy Staging System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed by the National Wilm’s Tumor staging Group (NWTSG - Staging system)</td>
<td>Developed by the International Society of Pediatric Oncology (SIOP - Staging system)</td>
</tr>
<tr>
<td>This staging system is widely used in North America and Canada</td>
<td>This staging system is widely used in Europe</td>
</tr>
<tr>
<td>NWTSG approach involves employment of ‘primary surgery’.</td>
<td>SIOP approach involves employment of preoperative chemotherapy without histological confirmation of Wilm’s tumor.</td>
</tr>
<tr>
<td>Chemotherapy with or without Radiation therapy is given after surgery</td>
<td>Primary chemotherapy for all patients regardless of extent</td>
</tr>
<tr>
<td>Staging is done at time of surgery (Pre-chemotherapy)</td>
<td>Staging is done at time of surgery (Post-chemotherapy)</td>
</tr>
</tbody>
</table>

136. Ans. c. Arthrogyrosis multiplex congenita
137. Ans. b. Open nephroureterectomy (Ref: Sabiston 18/e p2082)

- The treatment of choice for stage I Wilm’s tumor is transperitoneal radical nephrectomy (radical nephroureterectomy) followed by chemotherapy with or without radiotherapy depending upon tumor histology.

TUMORS OF RENAL PELVIS

138. Ans. a. Transitional cell carcinoma (Ref: Smith 17/e p320-323; Oxford Handbook of Urology 2nd/244-245; Campbell 10/e p1516-1524; Bailey 23/e p3111)

CARCINOMA RENAL PELVIS

- Transitional cell carcinoma accounts for 90% of upper urinary tract cancers.
- Urothelial cancer often presents as a widespread urothelial abnormality: Patients with a single upper-tract carcinoma are at risk for developing bladder carcinoma (30-50%) and contralateral upper urinary tract carcinoma (2-4%).
- More common in males

Etiology
- Smoking
- Industrial dyes or solvents
- Excessive analgesic (Phenacetin) intake
- Balkan’s nephropathy
1. TTF = ① Anemia correction
② Tumour confined to capsule = Radical nephrectomy + Chemo. - Daunorubicin + Vinoreline for 6 months.
③ Radio based on histology
④ Tumour beyond capsule:
- Nephrectomy
- Chemo - (D+V) - 15 months
- Radio
⑤ Unresectable tumour - First Chemo
- Radio
- Regression
- laparoscopic Nephrectomy
- Chemo - D+Doxorubicin

2. B/L WT = Radical neph. on larger side
Partial nephrectomy on smaller side
If sx not possible than Chemotherapy + Radio

RCC
Adenocarcinoma
- on upper pole
- WT - on lower pole
- Reniform side of kidney maintained
- (WT - it losses easily)