Imaging in Genitourinary malignancies
• The evolution of imaging techniques.

• Imaging techniques used as tools for
  • Diagnosis
  • Staging
  • Follow up
• Diagnostic tool - Clinically efficient & cost effective manner.

• The ultimate goal of imaging –
  – Safe and effective examination.
  – Clinically relevant information for the treatment.
Imaging modalities

• Plain skygram
• Intravenous urography
• Ultrasound
• Computed tomography
• Magnetic Resonance Imaging
• Positron emission tomography
• Strengths and weakness
Evaluation of GU neoplasm

• Combination of clinical and diagnostic imaging methods
• Role of imaging are :-
  • Detecting & Characterizing mass.
  • Supplementing clinical staging
  • Pre-operative planning
  • Assessment of Tumor recurrence.
Kidneys

- Sky gram KUB
- Bean shaped retroperitoneal organs
- Location D12-L1 level
Ultrasonography

• Extensively used and widely available method.

• Often first step in diagnostic workup.

• Sensitivity is less than CT. Still questions can be answered.
Ultrasonography

- Solid mass
- Cystic lesions diagnosis is based on Bosniak Classification System
Kidney tumour

• Diagnostic Modality of choice MDCT (multiphase contrast enhanced CT)

• Staging of tumour.

• Digital elements and post processing features. (multiplane reconstruction. 3D or virtual urography images can be generated any time from the primary database)
Renal mass invading left renal vein
Renal mass
MRI

- Can be used with similar diagnostic efficacy

- Advantages and disadvantages
Radiological diagnostics of collecting system disease, Ureters and urinary bladder
Ureters

- Physiological stenosis
- Ureters are in retroperitoneum
- Cross superficial to iliac arteries
- Crosses posterior to the testicular artery/ovarian artery
- Also pass dorsally to uterine artery and spermatic cord
Radiologic imaging

- Needs contrast filling of the ureters
- It is achieved by anterograde or retrograde filling of the ureters by catheter insertion

In cross-sectional imaging technique (CT, MR) timed image acquisition is conducted in excretory phase (app 8-10 minutes)
Urinary Bladder

• Is Pelvic Organ in undistended condition
• Extends to abdomen when fully distended
• Divided into Vertex, Corpus and fundus
• Ureters enter the bladder through the posterocaudal part of the fundus (vesical trigone)
Radiographic imaging

• Definitive diagnosis can be established with Cystoscopy and biopsy.

• Imaging plays an important role in early detection and staging of the disease.
IVU

- Bladder mass
Ultrasound

- Pre requirement is full distention of lumen

- Normal wall thickness is 3mm.
MDCT & MRI

- Extent of propagation of disease
- Nodal involvement
- Distant metastasis
- Virtual endoluminal images can be reconstructed from excretory phase series
Urinary bladder mass
Urinary bladder mass
Urinary bladder mass
Prostate (USG)

- The base line imaging modality
- It is performed
  - Perabdominal
  - Transrectal route (TRUS)
- Elastography
- TRUS guided biopsy
PROSTATE

• Familiarity with Zonal classification of prostate is necessary for the understanding of basic clinical and radiological concepts of prostatic disease.
Prostate
Prostate

A, Transverse view.

AFS: anterior fibromuscular stroma; CZ: central zone; DV: dorsal vein complex; EJD: ejaculatory ducts; NVB: neurovascular bundle; L: levator muscles; PZ: peripheral zone; TZ: transition zone; U: urethra.
CT Scan

• Poor in delineating zonal anatomy

• Strength is in evaluating regional and distant metastasis
MRI

- Delineates zonal anatomy well
- Provides most accurate information to date about anatomy and location of tumour.
- Capsule invasion
- Seminal vesicle invasion
- Bony metastasis
Normal MRI appearance of Prostate

- Normal prostate has homogenous low signal on T1WI
- Zonal anatomy is best demonstrated on T2WI
- Comprise of low signal central zone and higher signal peripheral zone
- TZ and CZ appears similar in SI and loosely termed the central gland
Normal T2 appearance of Prostate
Strength of MRI

• Contrast enhanced dynamic scan

• MRS

• Diffusion Imaging

• Biopsy
50-year-old male with prostate cancer.
Axial T2WI showing a right anterior transitional zone tumor within the midgland with the tumor creating a slight anterior bulge.
Multifocal peripheral zone tumors
MR SPECTROSCOPY OF PROSTATE

NORMAL METABOLITES OF PROSTATE

• **Citrate** : Produced by normal epithelial cells of prostate
  
  Normal Peak at 2.6 ppm

• **Choline** : Precursor of phospholipids cell membrane
  
  Normal Peak at 3.2 ppm

• **Creatine** : Involved in cellular energy
  
  Normal peak at 3 ppm
Normal MR Spectroscopy

At 1.5 T

At 3 T
Radionuclide Scintigraphy

• For metastatic work up
Testicular Imaging

• Ultrasonography is the best modality for rapid and accurately assessing scrotal masses
• Can determine truly intra or extra testicular masses
• Facilitates testicular examination in presence of hydrocele
chest skygram/CT/MRI

- 85-90% of lung metastasis is detected by skygram
- CT is the modality for evaluation of retropertoneum
- MRI has no additional value
PET Scan

• Beneficial in evaluation of residual masses after treatment particularly viable carcinoma.
Uterus

- Ultrasound
- CT
- MRI
uterus
Uterus CT Scan
Endometrial carcinoma

MDCT :

- Thin slices, isotropic database & reconstruction in multiple user defined planes.
- Can detect myometrial invasion.
- Assessment of nodes.
- Distant metastasis
- Recurrence.
Uterine Cervical Carcinoma

- Lesion size
- Extension into the uterine corpus.
- Depth of stromal invasion.
- Parametrial spread.
- Loco-regional spread.
- Pelvic lymphadenopathy
- Distant metastasis
Ovarian tumors

- Adnexal masses are common findings and the key is to distinguish benign from potentially malignant.

- C.T is used to
  - Characterize an adnexal mass
  - Assess for metastatic disease
  - Stage patient for metastatic disease.
Conclusion

• Imaging is the key to evaluate the clinically diagnosed mass

• All modalities have their strength and weakness. We need to understand them.

• We have to be wise enough to use various modalities judiciously for ultimate benefit of the patient
Thank You!