

URORADIOLOGY

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How to choose the proper method

- Course diagnosis- consultation with radiologist
- Patient history and condition
- ALARA
- Accessibility
- Cost/Benefit

Contrast enhanced genitourinary imaging

- CT,DSA
- Non ionic iodinated agents
- Isosmolar
- Renal elimination
- MRI
- Compounds with special magnetic features
- Low complication risk
- High risk:
 - -allergy, asthma bronchiale
 - -cardiovascular diseases
 - -previous severe adverse effect
- Renal insufficiency
 - Lower risk:
 - diabetes
 - dehydration
 - hemoglobinopathy
 - hypoproteinaemia

Check before order an examination using iodinated contrast material

- History of patient
- Hydration
- Metformin type antidiabetics
- Creatinin level < 130mmol/l, GFR >60ml/min 30-60 ml/min: <30 ml/min!
- www.nephrológia.hu
- Hyperthyreosis

Congenital anomalies of the renal parenchyma

- Unilateral agenesis
- Supernumerary kidney
- Horseshoe kidney
- Ectopic kidney
- Crossed renal ectopy
- Renal cysts –policystic kidney, multicystic kidney
- Medullary sponge kidney

Congenital anomalies of pelvi-calyceal system

- Calyceal diverticulum , calyx cyst
- Congenital hydronephrosis
- Pyelon et ureter duplication, bifid ureter
- Megaureter
- Ectopic ureter aperture
- Ureterocele
- Urinary bladder diverticulum

Renal tumors

Benign:

- adenoma
- oncocytoma
- angiomyolipoma
- mesenchymal tumors
- multicystic nephroma

Angiomyolipoma

Typical MR T1 hyperintens, T2 isointense to perirenal fatty tissue
in phase out of phase can be useful to demonstrate very low fatty content

Malignant renal tumors

- Hypernephroma
- Wilm's tumor
- Lymphoma
- Leukemia
- Metastasis

The role of conventional radiography in the diagnosis of RCC

- Intravenous urography
- Sens 67% - non specific sign of an expansile renal mass
- Margins compression
- Lack of contr. Mat. Filling
- Displaced calyces

The role of ultrasound in the diagnosis of RCC

- **B-mode; Doppler-mode**
- Sens.: 79%
- Hypo - iso -hyper echogenic solid tumor
- Central necrosis
- Hypervascularisation

High sensitivity in cases of renal vessels infiltration

MDCT in RCC

- **GOLD STANDARD !**
- Unenhanced images: density ~ surrounding parenchyma (30-50 HU)
- In arterial phase (transient hyperdense blush)
- Parenchymal phase hypodense lesion

Simple cyst or cystic cancer

- Solid component?
- Hyperdense?
- Calcification pattern?
- Wall thickness?
- Contrast enhancement?
- Multilobulation?
- Nodule within?

Bosniak classification I-IV

I simple cyst

II follow up

III malignant in 50%

IV malignant in 100%

Nephrolithiasis

Ureterolithiasis

Best diagnostic method low dose CT examination

Following CHAPTERS SEEN BELOW...

Ultrasound in acute and chronic pyelonephritis
CT in acute and chronic pyelonephritis

Fibromuscular hypertrophy
Atherosclerosis
Arterial malformations
Transplantated Kidney
Imaging of the pelvis

Diagnostical methods:

- Ultrasound
- transabdominal
- transrectalis, transvaginalis
- MRI
- CT

Prostate zonal anatomy

Chronic prostatitis

- Diff. Diagnostical probl.
hypoechoogenicity in peripheral zone
- Small hyperechoic foci with acustic shadowing
- Coarse intraprostatic calcification

Malignant prostate tumors

Diagnostic methods

- Transrectalis UH
- MRI

New methods

TRUS (transrectal) biopsy

MRI of prostate cancer

- Multiplanar HR T2: localization, size, local invasion can be well assessed
- T1: pelvic bone / lymph node metastases, post-biopsy bleeding well seen

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MR-spectroscopy

Significant changes in metabolite concentrations in prostatic cancer as compared to normal parenchyma:

- Choline markedly ↑
← cell proliferation ↑, cell density ↑
- Citrate markedly ↓
← cancer cells begin to oxidize citrate ← high energy demand

Curve and image

Image fusion (color coded)

UH guided brachytherapy

MR guided brachytherapy

Testis sonography

- High frequency (7.5–10 MHz) probes
- Always bilateral comparison
- Technical parameters set to normal side
- Most important: longitudinal section
- Transversal sections used for localizing pathology
- Routine Color Doppler, dynamic maneuvers
- Complementary pelvic US if necessary (e.g. inflammatory condition)

Normal sonogram of testis

- Wide variation in size
 - Most confident parameter in the adult is maximal thickness on longitudinal sections (>20 mm)
- Testicular mediastinum
- Head (cranially ~10 mm) and tail of epididymis depicted as echogenic structures (~5 mm) below testis
- Normal body of epididymis, efferent ductuli of testis, or ductus deferens not discernible
- Testicular serous cavity

Hydrocele Septated hydrocele

Orchitis and scrotal abcess

Testicular tumors

- Most frequent malignant tumors in males of 25–34 ys
- 1–2% of all malignant tumors
- Risk factors: family history, Caucasians, cryptorchism
- Types:
 - Germ cell tumors (95%)
 - Seminoma (60%)
 - Non-seminomas (40%): embryonal cell tumor, teratomas, choriocarcinoma, yolk-sac tumor
 - Stromal tumors (3%): Leydig cell and Sertoli cell tumors
 - Metastasis
 - Lymphoma, leukemia

Seminomas

- Most common in 30–40 ys of age
- Hypoechoic, homogeneous
- Metastasis (lung) present at time of diagnosis in 25%
- AFP normal, BHCG ↑
- Sensitive to radio- and chemotherapy
- 10-year survival 75–85%
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Non seminomas

- US: mixed echogenicity
 - ← bleeding, fibrosis, calcification
- Embryonal cell cancer:
 - Ages of 20–30ys and <2ys
 - Very aggressive, early visceral metastatization
- Teratoma:
 - Benign in boys
 - But can transform to malignant in adulthood
- Choriocarcinoma:
 - Most common in 20–30ys of age
 - Early metastases mostly to lungs, often when primary tumor hardly detectable

Choriocarcinoma Lymphoma / Leukemia

- 7% of all testis tumors
- Most frequent >50ys
- Bilateral in 40%
- Hypoechoic areas diffusely or focally in the lesion
- Entire testis may be involved in leukemia

Tumors of female pelvis

- Benign tumors
- Endometrium CC
- Cervix CC
- Ovarium CC UH, MR, CT

Urinary Bladder Cancer MRI

- Endorectal and surface coils allow good assessment of bladder wall (including base and neck), prostate, and seminal vesicles
- Bladder wall, lesion, and intravenous contrast agent can be well differentiated on both T1- and T2-weighted images

Virtual cystoscopy

Postoperativ conditions, injuries

- Goal of diagnostic imaging:
 - Accurate description of complications

Trauma

Bladder Ruptures toward Peritoneal Cavity or infraperitoneally
Kidney injurie

Take home message radiologist=consultant

- Exact diagnostic question
- Adequate imaging modality
- Inform the patient and prepare for the examination correctly
- Compare the results with earlier outcomes
- Order more imaging methods if its necessary