

Imaging Studies of Urinary Tract

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I-Plain Film of Abdomen

A plain film of the abdomen, frequently called a KUB film, is the simplest urologic examination. It is usually taken with the patient supine. It may demonstrate osseous abnormalities, abnormal calcifications, or large soft-tissue masses.

II-Urography

The collecting structures of the kidneys, ureters, and bladder can be demonstrated radiologically with contrast media by the following methods:

A. Intravenous Urography (IVU)

also known as excretory urography (EU)), or intravenous pyelography (IVP). Following a preliminary plain film of the abdomen, additional radiographs are taken at timed intervals after the intravenous injection of iodine-containing contrast medium.

B. Cystography (voiding cystourethrography)

Direct instillation of contrast media into the urinary bladder via transurethral

catheter. cystography is used for focused examination of the bladder.

C. Urethrography

The urethra can be imaged radiographically by retrograde injection of contrast or in antegrade fashion with voiding cystourethrography.

III-Sonography

Ultrasound is commonly used for the evaluation of the kidney, urinary bladder, prostate, testis, and penis. Ultrasound is useful for assessing renal size and growth, detection of renal masses and cysts, renal stones, and, less commonly abscesses and hematomas.

Doppler sonography is useful for the evaluation of vascularity of urogenital organs.

Applications of bladder sonography include assessment of bladder volume and wall thickness, and detection of bladder calculi and tumors. Sonography is used in the detection of intratesticular and extratesticular pathology.

Advantages & Disadvantages

The main advantages of ultrasound are ease of use, high patient tolerance, non-invasiveness, lack of ionizing radiation, low relative cost, and wide availability. Disadvantages include limited field of view, and dependence on the operator's skill and the patient's habitus.

IV. Computed Tomography Scanning

Renal CT is most commonly used in the evaluation of acute flank pain, hematuria, renal infection (search for abscess) and renal trauma, and in the staging of renal neoplasm. CT evaluation of renal anatomy and pathology may require intravenous injection of iodinated contrast media. CT is used primarily in staging bladder tumors and in diagnosing bladder rupture following trauma. For prostate diseases, CT is used for detection of lymphadenopathy and to delineate prostatic abscesses. CT also used for detection of the abdominal location of suspected undescended testes, and for staging of testicular tumors.

Advantages & Disadvantages

The main advantages of CT include a wide field of view, good resolution, and operator independence. Disadvantages include radiation exposure, the need for contrast media, limited availability, and cost.

V. Magnetic Resonance Imaging

Applications for MRI in renal imaging include demonstration of congenital anomalies, diagnosis of renal vein thrombosis, and diagnosis and staging of renal cell carcinoma. MRI is used primarily to stage bladder tumors, prostatic tumors, and is applicable to the evaluation of undescended testis.

Advantages & Disadvantages

Advantages of MRI include direct imaging in any plane desired (though transverse, sagittal, and coronal), choice of large or small field of view, excellent soft-tissue contrast, imaging without exposure to ionizing radiation, and (as compared to ultrasound) less operator dependence. However, is not without drawbacks, the scanning time is relatively slow and image clarity is often inferior compared with CT.