• Acute bacterial pyelonephritis
• Renal Abscess
• Emphysematous Pyelonephritis
• Pyohydronephrosis
• Xanthogranulomatous Pyelonephritis
Acute Bacterial Pyelonephritis

- Infection of collecting system and parenchyma

- Ascending: *Escherichia coli*
- Hematogenous: *Staphylococcus aureus*

- Flank pain and fever

Usually a clinical diagnosis
Imaging of Acute Pyelonephritis: Indications

- Diagnostic uncertainty
- Very ill patients
- Persistent symptoms despite treatment
- Recurrent renal infection
Imaging of Acute Pyelonephritis: Modalities

- Intravenous Urography
- Ultrasound
- Computed Tomography (CT Scan)
- Nuclear Scanning
Intravenous Urography

• X-ray with IV contrast
• Historically method of choice
• Not very sensitive
• Normal in 75% of pyelonephritis cases

No longer used in most situations
Ultrasonography

• Lower sensitivity than CT or nuclear scans
• Modality of choice in pregnant women

Positive Findings:
• Enlargement of entire kidney
• Hypoechoic cortex: edema
• Focal hyperechoic areas: early abscess
Sonogram: Acute Pyelonephritis

Hyperechoic kidney with perinephric extension

Radiology Clinics of North America 34:5, p.968
CT Scanning

- Sensitive and accurate
- Demonstrates Anatomic changes
- Demonstrates Functional deficits

Modality of choice in most patients
Non-Contrast CT

Film Findings

• Focal swelling
• Irregularity of calyces
• Perinephric fat stranding
• Thickening of Gerota’s Fascia
Non-Contrast CT: Pyelonephritis

Enlarged right kidney

BIDMC PACS System
CT with Contrast: Nephrogenic Phase

Film Findings:

Cortical perfusion defects:
- Areas of decreased attenuation
- Often wedge-shaped
- May indicate early abscess formation
- Striated nephrogram
Contrast CT: Pyelonephritis

Focal perfusion deficit
Contrast CT: Pyelonephritis

Focal perfusion deficits
Contrast CT: Pyelonephritis

Focal perfusion deficits

Courtesy of Michelle Swire, MD
Contrast CT: Pyelonephritis

- Focal perfusion deficit
- Renal cyst
Contrast CT: Pyelonephritis

Focal perfusion deficit

Fat stranding and fascial thickening

BIDMC PACS System
Contrast CT: Pyelonephritis

Focal perfusion deficits

BIDMC PACS System
Coronal Reconstruction

Focal perfusion deficit
Differential Diagnosis for Perfusion Deficits on CT

- Acute pyelonephritis
- Infarct
- Emboli
- Lymphoma
Differential Diagnosis for Striated Nephrogram

- Acute pyelonephritis
- Acute obstruction
- Renal vein thrombosis
- Infantile polycystic disease
- Medullary sponge kidney
Radionuclide Imaging

- **Infection-seeking agents**
  - Gallium citrate (GA-67)
  - Indium-111-labeled white blood cells (IN-111-WBC)

- Concentrate within areas of inflammation which are “hot” spots
- Can localize occult sites of infection
- Alternative to CT
Radionuclide Imaging

• **Kidney-seeking agents**
  – Technetium Tc-99m glucoheptonate (Tc-99m GH)
  – Technetium Tc-99m dimercaptosuccinic acid (Tc-99m DMSA)

• Concentrate in renal cortex, area of infection is therefore a “cold” spot

• Children: most sensitive modality

• Adults: functional studies post-infection
TC-99m-DMSA Scan (Kidney Seeking)

Cortical Loss

Radiologic Clinics of North America 34:5  p. 974
Renal Abscess
Emphysematous Pyelonephritis

http://www.bbmeradiology.org/CasesoftheMonth/Casejan99/COM2dec98.home.html

Life-threatening Infection in Diabetic Patients
Pyohydronephrosis

- Infection of obstructed kidney

- CT with contrast is modality of choice

- Radiologic presentation:
  - Pyelonephritis
  - Obstruction
Xanthogranulomatous Pyelonephritis

www.eurorad.org
Review of imaging recommendations for renal infection

- Modality of Choice: CT with IV Contrast

Findings: Focal Perfusion Deficits

- Pregnant women: Ultrasound
- Children: Radionuclide scans
References


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