Ultrasound for General Practitioners

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Acknowledgement

• Dr. Michael Phelan, MD – Cleveland Clinic Emergency Services
Objectives

- Discuss general principles
- Review common applications of ultrasound in the general practice setting
- Highlight foreseeable pitfalls

Equipment
Applications in Trauma

- Abdominal Trauma - FAST Exam
- Hemoperitoneum – has replaced diagnostic peritoneal lavage
- Penetrating Cardiac Wounds - Cardiac US - Hemopericardium
Organ Involvement in Blunt Trauma

- Spleen: 38-46%
- Liver: 23-56%
- Mesentery: 10-15%
- Small Intestine: 9-16%
- Kidney: 9-15%
- Colon: 2-13%
- Pancreas: 1-6%
- Diaphragm: 1-3%

US vs DPL vs CT in Blunt Abd Trauma

<table>
<thead>
<tr>
<th></th>
<th>Time</th>
<th>Sens</th>
<th>Spec</th>
<th>Pts</th>
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</thead>
<tbody>
<tr>
<td>US</td>
<td>Rapid Sec- min</td>
<td>Inter med 86-98%</td>
<td>High 94-100%</td>
<td>All</td>
</tr>
<tr>
<td>DPL</td>
<td>5-20 min</td>
<td>High</td>
<td>Low</td>
<td>All</td>
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<tr>
<td>CT</td>
<td>Delay</td>
<td>Inter med-High</td>
<td>High</td>
<td>Stable</td>
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Pericardial Assessment
Right Upper Quadrant Sonography

- Cholelithiasis - 10-20% of US adults
- Cholecystitis - typically within women between 30-50

Accuracy for diagnosis of gallstones is >95%
Sensitivity for diagnosis of acute cholecystitis is 85% with specificity of 80%
Cholescintigraphy has a sensitivity of 95% and a specificity of 73-99%

Intraluminal Abnormalities

- Mobile/shadowing = stone
- Mobile/non-shadowing = small stone vs. sludge
- Non-mobile/non-shadowing = polyp

Rybicki F J Radiology 2000;214:881-882
Common Bile Duct

6 – 7 mm is upper limits of normal in size

Cholecystitis

- Wall thickening greater than 3mm
- Gallbladder enlargement
- Pericholecystic fluid
- Sonographic Murphy’s sign
Cholecystitis

Gallbladder Wall Thickening
Pericholecystic Fluid

Gangrenous GB
Checklist

• Limited hepatic scan (also used to set gain, etc)

• Assess size/shape of liver

• Assess for intrahepatic ductal dilatation

Checklist

• Assess GB for size, wall thickness, gallstones, a Sonographic Murphy’s sign (PPV 92%) and pericholecystic fluid

• If stones cannot be visualized, patient should be placed in left lateral decubitus position
GB Summary (Cholecystitis)

- Exam will indicate the presence of stones (95%)
- Exam will reveal associated findings of cholecystitis
- GB disease is likely not present if no abnormalities are found and the GB is not focally tender

Pearls / Pitfalls

- Missing an impacted stone in the gallbladder neck
- Misdiagnosing edge artifact as a stone
- Failure to identify small, nonshadowing stones
- Failure to scan patient in two positions
Renal Ultrasound

• Obstructive uropathy

Hydronephrosis
With Large Stone in Pelvis
Sonographic Findings: Abnormal

• Hydronephrosis: an area of anechoic dilatation of the renal pelvis

• Presence is more significant than the degree noted

• Other kidney must be scanned if hydronephrosis present

Renal Cyst
Renal Mass

- Failure to recognize minimal/mild hydronephrosis
- Failure to scan both kidneys
- Confusing renal cysts or an extrarenal pelvis with hydronephrosis
- Search for echoes within the dilated collecting system – the presence of debris signifies pyonephrosis (pus within the collecting system) which is a life threatening emergency

Pearls / Pitfalls

- Failure to recognize minimal/mild hydronephrosis
- Failure to scan both kidneys
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**AORTA**

- Mortality associated with leaking or ruptured AAA is @90%
- Only about 50% of patients will have the classic triad of back pain, hypotension, and a pulsatile mass
- Common misdiagnoses include ureterolithiasis, appendicitis, diverticulitis and mechanical low back pain

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**Sonographic Findings:**

**Normal**

- Less than 3cm in diameter at any point
- Tapers distally
- Maximum diameter of the common iliac artery in men is 1.5cm and 1.2cm in women
- Transmitted pulsations can be seen in the IVC
Normal Aorta

Abdominal Aortic Aneurysm
AAA: Long Axis

AAA: Short Axis
Aorta: Pitfalls and Pearls

- Failure to scan to bifurcation
- Ultrasound is insensitive for the detection of leaking or rupture
- Ultrasound is insensitive for the detection of retroperitoneal hemorrhage