Hyperechoic renal masses

Jean-Yves Meuwly, MD
Department of Diagnostic and Interventional Radiology, University Hospital Lausanne, Switzerland
Renal masses in the adult patient

- Increased frequency of discovery because increasing use of imaging modalities
- Increased incidence of renal cell carcinoma
- Substantial fraction of solid renal masses are benign
  - 25% of masses smaller than 3 cm
  - 30% of masses smaller than 2 cm
  - 40% of masses smaller than 1 cm

Benign solid tumors

• **Angiomyolipoma**
  - Most common benign solid renal tumor
  - Almost always diagnosed by using imaging alone
  - Hypervascular and contain fat

• **Oncocytoma**
  - Presence of a prominent central scar
  - Spoke-wheel pattern on angiographic images

• **Metanephric adenoma**

• **Leiomyoma**

• **Adenoma**
Angiomyolipoma

• **US pattern**
  - Well defined hyperechoic mass
  - Small to huge size
  - Hypervascular when large

• **CT pattern**
  - Hypodense on non-enhanced scan in 95.5% of cases
  - Homogeneous enhancement
  - Prolonged enhancement pattern

• **MRI pattern**
  - Hyperintense on T1 weighted images
  - Hypointense on T2 weighted images
  - Loss of signal in chemical shift imaging (in phase – out of phase)

Typical angiomyolipoma
Typical angiomyolipoma?

Papillary carcinoma!
Angiomyolipoma?
Angiomyolipoma?
Density measurement

Area: 0.2 sq.cm
Mean: -51.3 HU
Std.Dev.: 28.2 HU

Angiomyolipoma!
Angiomyolipoma?
Angiomyolipoma?
Angiomyolipoma?
Densitity measurement

Angiomyolipoma!
Angiomyolipoma?
Angiomyolipoma?
MRI

T2

T1 fat saturated

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Chemical shift imaging

In phase

Out of phase

Angiomyolipoma!
Angiomyolipoma?
Enhanced CT
MRI

- haste
- T2 fat sat

In phase
Out of phase

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Contrast enhanced MRI

Complicated cyst
Angiomyolipoma?
Angiomyolipoma?
Angiomyolipoma?
Angiomyolipoma?
CT

No fat density
What to do?

Combien de pattes a cet éléphant?
US guided biopsy
Epithelioid cells

Adipocytes

Courtesy from Dr Letovánek
Percutaneous biopsy

He has performed percutaneous biopsy of renal masses
Percutaneous biopsy

• Sensitivity for diagnosis of malignancy 80-92%
• Specificity 83-100%
• Seeding of the needle track is possible
  – Extremely rare (estimated at less than 0.01%)
  – Six cases described
• Major complications rare
  – Hematuria may occur
  – Self-limited bleeding frequent


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Hyperechoic mass
No characterization
US guided biopsy
Renal cell carcinoma
Angiomyolipoma?
Angiomyolipoma?
Enhanced CT
US guided biopsy

Renal cell carcinoma
Percutaneous biopsy

**Established indications**
- Patients with a renal mass and known extrarenal primary malignancy
- Patients with a renal mass and imaging findings that suggest unresectable renal cancer
- Patients with a renal mass and surgical comorbidity
- Patients with a renal mass that have been caused by an infection

**Emerging indications**
- Patients with a small (< 3 cm) hyperattenuating, homogeneously enhancing renal mass
- Patients with a renal mass considered for percutaneous ablation

Percutaneous radiofrequency ablation

• Thermal ablation technique
  – Temperature in excess of 48-50°C
  – Coagulation necrosis and cellular death

• Indications
  – If radical nephrectomy would render the patient anephric
  – Presence of significant comorbidities
  – Tumor size strong predictor of outcome (<4cm)
  – Exophytic tumors

• Complications
  – Lower as compared to partial or radical nephrectomy (0-11%)

Radiofrequency ablation
Immediate post-treatment control
3 months post-treatment
Small solid mass
Non enhanced CT
Contrast enhanced CT

Arterial phase

Venous phase
MRI

Haste

Axial T2
MRI in/out of phase
Fat poor angiomyolipoma

Conclusion

• Many hyperechoic solid renal masses are AML
  but...
• Some hyperechoic solid renal masses are RCC
• These masses need further characterization
  – CT
  – MRI
• When CT or MRI fail to characterize the lesion

Percutaneous biopsy