New Frontiers in Urologic Oncology: Revisiting the Role of Percutaneous Renal Biopsies in Kidney Cancer: When, Why and How?

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Disclosures

None
Learning Objectives

• Current indications for percutaneous biopsy
• Pre and post-procedural care and technique
• Complications
• Accuracy of percutaneous biopsy
• Prior and emerging indications for percutaneous biopsy
Small Renal Masses

- Increased cross-sectional imaging in the past decades has brought with it increased diagnosis of incidental small renal masses
  - Up to 60%\(^1\) of RCC is diagnosed incidentally
  - Increased incidence of RCC as well as benign renal masses
  - Larger the mass, higher the likelihood of malignancy
    - Up to 30% of masses < 2cm are benign\(^2\)
  - Discordance of imaging and surgical pathology
    - 8-27% of surgically resected solid renal masses were benign\(^3\)
  - Does biopsy help?

\(^1\) Hollingsworth JM, Miller DC, Daignault S, Hollenbeck BK. Rising incidence of small renal masses: a need to reassess treatment effect. J Natl Cancer Inst 2006;98(18):1331–1334


\(^3\) Beland MD, Mayo-Smith WW, Dupuy DE, Cronan JJ, DeLeiris RA. Diagnostic yield of 58 consecutive imaging guided biopsies of solid renal masses: should we biopsy all that are indeterminate. AJR Am J Roentgenol 2007; 188: 7927. doi:10.2214/AJR.06.0356. PMid:17312070
Current Biopsy Climate

• 2009 AUA survey of 759 urologists\textsuperscript{1} regarding small renal masses
  • Few respondents selected biopsy for work-up, except:
    • Suspicion of non-RCC mass
    • Surgical co-morbidities
    • Increased patient age
    • Intention to conduct active surveillance
• Why biopsy is not favored?
  • Perceived risk of biopsy
    • Hemorrhage and tract seeding
  • Question of ability to obtain final diagnosis
    • Benign vs. malignant
    • Malignant sub-typing, Fuhrman grade

Biopsy Technique

• Pre-procedure
  • INR < 1.5
  • Platelets > 50k
  • ASA/Plavix: 5 day hold*
    • ? necessary
  • Heparin/Lovenox: 24 hour hold
  • No Abx
  • Moderate sedation with Versed and Fentanyl

• Post-procedure
  • Monitor for 4 hours
  • Restart anticoagulation after 24 hours
Biopsy Technique

• Guidance
  • CT almost exclusively
  • Usually no IV contrast administered
• Needle choice
  • Coaxial 18 or 20 G (typically 18)
    • Improves biopsy success rate while decreasing procedure time
    • ± 22-25G FNA (value in cystic lesions?)
    • 2-3 of each, depending on expected underlying subtype
• Cytotechnologist on site to confirm adequacy of specimen
• Gelfoam for persistent back-bleeding

Biopsy Technique
Biopsy Risk

• Biopsy Risk
  • Bleeding/vascular injury\(^1\)
    • Up to 2% risk of major bleeding
    • 0.4% required embolization
    • In interventional literature, “complication” rate of \(\sim 1\%\)^2
  • Typically self-limited subcapsular or perinephric hematoma

• Seeding
  • Case reports in literature\(^3\) but no cases reported when using co-axial technique

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Needle Size and Biopsy Risk

## Diagnostic Performance

<table>
<thead>
<tr>
<th>Authors</th>
<th>No renal biopsy</th>
<th>Mean tumour size (mm)</th>
<th>Overall % nondiagnostic biopsy</th>
<th>% solid lesion</th>
<th>% non diagnostic solid lesion</th>
<th>% cystic lesion</th>
<th>% nondiagnostic cystic lesion</th>
<th>% benign lesion</th>
<th>% malignant lesion</th>
<th>Accuracy for malignancy</th>
<th>Accuracy for RCC subtype</th>
<th>Accuracy for Fuhrman grade</th>
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<tr>
<td>Schmidbauer et al</td>
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NR: Not recorded.
## Diagnostic Performance

### Table 2 – Outcomes of needle core biopsies of renal masses in recent series

<table>
<thead>
<tr>
<th>Study</th>
<th>No. of tumours biopsied</th>
<th>Mean tumour size, cm</th>
<th>No. of pathologically confirmed tumours</th>
<th>Image guidance</th>
<th>Needle size, gauge</th>
<th>No. of biopsies taken</th>
<th>Diagnostic biopsies, %</th>
<th>Accuracy for malignancy, %</th>
<th>Accuracy for RCC subtyping, %</th>
<th>Accuracy for grading, %</th>
<th>Impact on management, %</th>
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<td>97</td>
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RCC = renal cell carcinoma; CT = computed tomography; US = ultrasound; NR = not reported.

* Retrospective evaluation.

** Four-tiered Fuhrman classification/two-tiered simplified Fuhrman classification (Fuhrman I-II = low grade; Fuhrman III-IV = high grade).
Diagnostic Performance

• Many definitions
  • Ability to differentiate benign versus malignant
    • 91-100% accurate\textsuperscript{1,3}
  • Ability to correctly subtype malignancy
    • 87-97% accurate\textsuperscript{1,3}
  • Ability to grade tumors
    • 58-74% accurate\textsuperscript{1,3}
    • Perhaps due to intra-tumoral grade heterogeneity
    • Improved accuracy if Fuhrman grade is dichotomous – low (I and II) and high (III and IV)\textsuperscript{2}

Diagnostic Performance

• Non-diagnostic biopsy
  • Insufficient material (e.g. necrosis) or normal renal parenchyma
  • Most occur in cystic/necrotic or small masses
  • On-site cytotech can help improve this
    • Target areas at edge of mass, and different areas of the mass
• Improving diagnosis
  • Tumor size
  • Lack of contrast enhancement
  • Skin to tumor distance
  • “Phytic-ness”, position, polarity, modality of guidance, needle size, operator experience have not been shown to matter
• Repeat biopsy
  • Can lead to histologic dx in up to 83% of repeat cases
  • Therefore “non-diagnostic” biopsies should be regarded with caution

Oncocytoma

- Oncocytoma versus chromophobe RCC (crRCC)
  - Hale’s colloidal iron stain
    - Positive stain for crRCC
  - Cytokeratin 7
    - Positive stain for crRCC
  - S100A1
    - Positive stain for crRCC
- More work to be done for distinguishing oncocytoma from crRCC
Indications for Biopsy: Prior

- Extra-renal primary
- Unresectable renal cancer (e.g. immunotherapy/trials)
- High risk surgical candidates
- Multiple solid renal masses
- Possible infection
- Small hyper-dense masses
- Prior to ablation – up to 37% of masses benign\(^1\)
- ?Bosniak 3 lesions (risk of hemorrhage outweighs benefit of diagnosis)

Indications for Biopsy: Future Directions

• Consensus:
  • Perform a biopsy when results might change management
• Small renal masses (< 4cm)
  • Confirm malignancy and subtype to inform therapeutic options and for predicting disease-specific survival
    • Active surveillance
    • Ablative techniques
  • Additional immunohistochemical staining for guiding personalized management
• After thermal ablation
Conclusions

• Size is proportional to likelihood of malignancy
• Risks of percutaneous biopsy are minimal
• Diagnostic accuracy of percutaneous biopsy is excellent
• Most important indications for biopsy:
  • Small renal mass (< 4 cm)
    • Confirm malignancy
    • Subtype and grade will inform therapy
  • Prior to and after thermal ablation
  • Extra-renal primary
  • Research
  • Cytotech on site if possible
Conclusions

Management of the Incidental Renal Mass on CT: A White Paper of the ACR Incidental Findings Committee

Brian R. Herts, MD\textsuperscript{a}, Stuart G. Silverman, MD\textsuperscript{b}, Nicole M. Hindman, MD\textsuperscript{c}, Robert G. Uzzo, MD\textsuperscript{d}, Robert P. Hartman, MD\textsuperscript{e}, Gary M. Israel, MD\textsuperscript{f}, Deborah A. Bauerngarten, MD, MPH\textsuperscript{g}, Lincoln L. Berland, MD\textsuperscript{h}, Pari V. Pandharipande, MD, MPH\textsuperscript{i}
References


Beland MD, Mayo-Smith WW, Dupuy DE, Cronan JJ, DeLellis RA. Diagnostic yield of 58 consecutive imaging guided biopsies of solid renal masses: should we biopsy all that are indeterminate. AJR Am J Roentgenol 2007; 188: 7927. doi:10.2214/AJR.06.0356. PMid: 17312070


