Disclosures

• I, Jeffrey Mullins, do not have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.
Outline

- Understanding a Clinical Dilemma
- Renal Mass Biopsy Overview
- Guideline Based Recommendations
A Developing Clinical Dilemma
“Treatment Disconnect”

Incidence of RCC has increased steadily
- Increased use of imaging

Mortality has not decreased with increased detection (treatment)

Smaldone et al. Med Care 2017
A Developing Clinical Dilemma
“Treatment Disconnect”

Increased incidence mostly due to increasing number of small renal mass (<4cm)

Kane et al. Cancer 2008
A Developing Clinical Dilemma
“Treatment Disconnect”

Shah et al. JUrol 2018

Incidence = Treatment

- Improved Treatment Options (Robotic Partial Nephrectomy)

Treatment ≠ Mortality

Overtreatment of Small Renal Masses is a Concern

Shah et al. JUrol 2018
Outcome Dilemma

• 95% CSS after treatment of localized RCC\textsuperscript{1}
• Median OS in metastatic RCC : < 2 years\textsuperscript{2}

\textsuperscript{1}Pierorazio et al. Management of renal mass and localized kidney cancer. AHRQ Comparative Effectiveness Reviews
\textsuperscript{2}Hutson et al. Axitinib Versus Sorafenib in First-Line Metastatic Renal Cell Carcinoma: Overall Survival From a Randomized Phase III Trial.
Kidney Cancer
Treatment Dilemma

New Renal Mass Diagnosis
How will it behave??

Can Biopsy answer this question?
Kidney Cancer

Management and Diagnostic Debate Centered around the Small Renal Mass (4cm)
Renal Mass Biopsy Overview

- Contemporary Outcomes
  - Diagnostic Accuracy
  - Complications
- Concerns regarding percutaneous biopsy
  - Non-Diagnostic Biopsy
  - Tumor Heterogeneity
  - Oncocytic Neoplasms
- Clinical Utility
Small Renal Mass Biopsy

Contemporary Outcomes of Diagnostic Biopsies Compared to Surgical Pathology (Meta-Analysis)

- Detection of Malignancy
  - Sensitivity and Specificity > 95%
- Histologic Subtype
  - 96% concordance rate between biopsy and surgical specimen
- Tumor Grade Accuracy
  - 62.5%

Bottom Line:
When Diagnostic, renal mass biopsy is excellent at determining malignancy and histology.
Small Renal Mass Biopsy Complications

Table 1 – Complications of needle core biopsies of renal masses in recent series

<table>
<thead>
<tr>
<th>No. of tumours biopsied</th>
<th>Image guidance</th>
<th>Needle size, gauge</th>
<th>No. of biopsies taken</th>
<th>No. of significant complications* (%)</th>
<th>No. of seeding (%)</th>
<th>No. of significant bleeding** (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuzillet et al. [8]</td>
<td>CT</td>
<td>18</td>
<td>≥2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Shannon et al. [9]</td>
<td>CT/US</td>
<td>18</td>
<td>1-4</td>
<td>2 (0.9)</td>
<td>0</td>
<td>2 (0.9)</td>
</tr>
<tr>
<td>Schmidbauer et al. [10]</td>
<td>CT</td>
<td>18</td>
<td>2-3</td>
<td>1 (1.3)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lebret et al. [11]</td>
<td>CT/US</td>
<td>18</td>
<td>1-4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maturen et al. [12]</td>
<td>CT/US</td>
<td>18</td>
<td>2-4</td>
<td>2 (1.3)</td>
<td>0</td>
<td>2 (1.3)</td>
</tr>
<tr>
<td>Volpe et al. [13]</td>
<td>CT/US</td>
<td>18</td>
<td>≥2</td>
<td>1 (1)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wang et al. [14]</td>
<td>CT/US</td>
<td>18</td>
<td>≥2</td>
<td>2 (1.8)</td>
<td>0</td>
<td>1 (0.9)</td>
</tr>
<tr>
<td>Veltri et al. [15]</td>
<td>US</td>
<td>18</td>
<td>1-2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Leveridge et al. [16]</td>
<td>CT/US</td>
<td>18</td>
<td>≥2</td>
<td>1 (0.3)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

CT = computed tomography; US = ultrasound.
* Complications requiring active treatment or hospital admission.
** Bleeding requiring active treatment, including transfusions or hospital admission.

TAKE HOME POINTS

1. Overall Rate of Significant Complication: <2%
2. Risk of significant bleeding: <1%
3. Risk of pneumothorax: <1%
   1. 0% with subcostal approach
### Small Renal Mass Biopsy Concerns

#### Tumor Biology

<table>
<thead>
<tr>
<th>Renal Biopsy Results</th>
<th>Has the disease</th>
<th>Does not have the disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>True Positives (TP)</td>
<td>False Positives (FP)</td>
</tr>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>Negative</td>
<td>False Negatives (FN)</td>
<td>True Negatives (TN)</td>
</tr>
<tr>
<td></td>
<td>c</td>
<td>d</td>
</tr>
</tbody>
</table>

#### Non-Diagnostic Biopsy

- Oncocytic Neoplasms
- Tumor Heterogeneity

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**CHI Memorial**
Renal Mass Biopsy

Concerns

- Non-Diagnostic Rates: 20%
- 25% of tumors have heterogeneity
- Determination of tumor grade remains poor
  • Biopsy may not be reliable

Halverson. JUrol 2013
Renal Mass Biopsy Concerns

Oncocytic Neoplasm ≠ Benign

Clear Cell RCC

Chromophobe RCC

Papillary RCC

Oncocytoma

Halverson. JUrol 2013
Renal Mass Biopsy

Summary

• Safe
• High Diagnostic Rate
• Well defined concerns/limitations

So Why Don’t We Biopsy Every Patient??
Renal Mass Biopsy

Does Renal Mass Biopsy Change Clinical Management?

- Young and fit patient: No
- Large Mass + Surgical Candidate: No
- Small Mass + elderly/frail: No
- Active Surveillance + Surgical Candidate: YES!
- Concern for mets, lymphoma, or infection?: YES!

Concern for mets, lymphoma, or infection? YES!
Renal Mass Biopsy
Does Pathology Always Matter?

- Non-Diagnostic ≠ Benign
- Malignant Diagnosis (80% are malignant)
  - Grade on biopsy unreliable / Tumor Heterogeneity
  - Most patients unwilling to observe active malignancy with divergent outcomes (localized vs. metastatic)
- Oncocytoma
  - Most common benign tumor
  - Long term surveillance outcomes unknown
  - Growth may compromise nephron sparing outcomes
Renal Mass Biopsy
When Does Pathology Matter?

- Active surveillance in good surgical candidate
  - Reassurance for safety of AS
- Recent/current malignancy
  - Metastatic lesion to kidney may not be best served with local therapy
- Atypical Imaging Appearance
- Concern for infection
- Histologic Subtyping prior to systemic therapy if no cytoreductive nephrectomy
Renal Mass Biopsy
Guideline Based Algorithm

- Kutikov, Eur Urol 2016
- Cambell et al. AUA Guidelines 2017
Renal Mass Biopsy
New Frontiers

Prospective Evaluation of $^{99m}$Tc-sestamibi SPECT/CT for the Diagnosis of Renal Oncocytomas and Hybrid Oncocytic/Chromophobe Tumors

- Technetium-99 sestamibi mitochondrial imaging agent
- Oncocytoma rich in mitochondria
- Preliminary Results:
  - Sensitivity: 87.5%
  - Specificity: 95.2%
Renal Mass Biopsy

Summary

1. Renal Mass is safe with excellent results (except tumor grade)
2. Impacts management in the minority of patients
3. Best candidates
   1. Concern for metastatic disease, lymphoma, infection
   2. Histologic subtype prior to systemic therapy in metastatic disease
4. Improvements in technology (Robotic Partial Nephrectomy)
   1. Decreased risk of treatment
   2. Improved recovery with minimally long term side-effects
   3. Lessens burden of overtreatment given metastatic disease has very poor long term survival
5. Personal opinion ➔ Biopsies best ordered by treating Urologist
QUESTIONS?

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