Does Ultrasound Detect Intraabdominal Recurrences of Renal Cell Carcinoma

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Introduction

- Estimated 64,000 new cases of Renal Cell Carcinoma (RCC) and 14,000 attributable deaths \textsuperscript{1}.
- Treatment of RCC may be partial nephrectomy (PN) or radical nephrectomy (RN).
- Intrabdominal RCC recurrence is as high as 16\%\textsuperscript{2-3}.
- AUA and NCCN RCC surveillance guidelines lack strong evidence and have been shown to miss up to 33\% of recurrences\textsuperscript{4}.
- Detection and resection of solitary metastasis have been shown to improve survival outcomes\textsuperscript{5}.
- Despite inferiority in detection of small renal and adrenal tumors, lymph node, bone, and retroperitoneal invasion US is still recommended in surveillance\textsuperscript{6,7}.
- Hypothesis: The utility of US in RCC surveillance after nephrectomy is inferior to CT/MRI.

Methods

- Retrospective analysis of 800 patients undergoing RN (n=404) and PN (n=396) for RCC at the KUMC between 2008 and 2016.
- All recurrences were confirmed with CT/MRI and then later with tissue biopsy (gold standard).
- Comparisons between “abdominal recurrence” and “no abdominal recurrence” using 2-sample t-tests for interval date and Fisher’s exact tests for categorical data.

Results

Table 1: Patient characteristics by presence of intra-abdominal recurrence

<table>
<thead>
<tr>
<th>Age (years) (mean ± SD)</th>
<th>All patients (n = 800)</th>
<th>Recurrence (n = 149)</th>
<th>Partial nephrectomy (n = 651)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal fossa (%)</td>
<td>59.1 ± 12.7</td>
<td>59.1 ± 12.9</td>
<td>59.0 ± 12.6</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>Liver (%)</td>
<td>13.7 ± 6.4</td>
<td>13.5 ± 6.6</td>
<td>13.8 ± 6.3</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>Bone (%)</td>
<td>8.7 ± 5.1</td>
<td>8.7 ± 5.1</td>
<td>8.7 ± 5.1</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>Tumor stage</td>
<td>3.7 ± 1.6</td>
<td>3.8 ± 1.6</td>
<td>3.7 ± 1.5</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>Nuclear grade (%)</td>
<td>3.7 ± 1.6</td>
<td>3.8 ± 1.6</td>
<td>3.7 ± 1.5</td>
<td>&lt; .0001</td>
</tr>
</tbody>
</table>

Table 2: Intra-abdominal recurrences broken down by site in (i) entire cohort, (ii) radical nephrectomy and (iii) partial nephrectomy cohorts

<table>
<thead>
<tr>
<th>Site</th>
<th>Total (n = 800)</th>
<th>Radical Nephrectomy (n = 651)</th>
<th>Partial Nephrectomy (n = 396)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone (%)</td>
<td>21 (4.3)</td>
<td>17 (2.6)</td>
<td>4 (1)</td>
</tr>
<tr>
<td>Liver (%)</td>
<td>16 (3.2)</td>
<td>11 (3.1)</td>
<td>5 (1)</td>
</tr>
<tr>
<td>Renal fossa (%)</td>
<td>31 (6.4)</td>
<td>31 (4.7)</td>
<td>0</td>
</tr>
<tr>
<td>Retroperitoneal lymph nodes (%)</td>
<td>39 (7.4)</td>
<td>27 (4.1)</td>
<td>12 (3)</td>
</tr>
<tr>
<td>Peritoneum/omentum (%)</td>
<td>3 (0.6)</td>
<td>3 (0.5)</td>
<td>0</td>
</tr>
<tr>
<td>Adrenal gland (%)</td>
<td>4 (0.8)</td>
<td>3 (0.5)</td>
<td>1 (0.3)</td>
</tr>
</tbody>
</table>

Summary

- Of the 800 patients, 149 (19\%) had abdominal recurrences.
- Of the 149 recurrences, only 8 (19\%) were initially detected by US and 15 (10\%) recurrences were missed by a prior negative US.
- 8 false-positive US studies.

Conclusion

- Low utility of US identification of intrabdominal recurrence 2\% (RN) and 10\% (PN).
- US detected only 6(0.7\%) recurrences compared to CT/MRI detection of 51(8.4\%).
- Location of RCC recurrences is outside of scope of US.
- US would have missed at least 34\% (RN) and 61\% (PN) based upon location alone.
- Surveillance guidelines should question the inclusion of US.

Limitations and Future Studies

- Retrospective design.
- Changing guidelines during study.
- Lack of direct comparison of imaging modalities preventing the calculation of sensitivity, specificity, negative and positive predictive value and positive.
- Future prospective trial to determine the efficacy of US in comparison to CT/MRI.

References