PD23-12 - Near-infrared fluorescence imaging of ureters with intravenous indocyanine green during radical cystectomy to prevent ureteroenteric anastomotic strictures

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Introduction

Radical cystectomy with urinary diversion

Ureteroenteric anastomotic stricture (UAS)

1.5 to 17.6%
7 to 25 months
Introduction

Silent Hydronephrosis

Loss of renal function

Obesity Radiation Smoking Others
Introduction

- Ischemia
- Scar formation
- Quantifying vascularity in real time
- Near infrared fluorescence imaging
Introduction

- Indocyanine green (ICG)
- Intravenous 98% intra-vascular
- Fluorescence in <1min Tissue perfusion
Ureteral vascularity = decreased risk of UAS
Retrospective 2 years Single surgeon
ICG and non-ICG cohorts
CT/MRI every 6 months for 5 years

Hydronephrosis Loopogram Lasix renal scan

Stent Surgical revision Surveillance (if <10% function)
Results

61 patients

No-ICG (30)

ICG (31)
<table>
<thead>
<tr>
<th>Baseline Risk Factors</th>
<th>Total, N=61, n (%)</th>
<th>No ICG, N=30, n (%)</th>
<th>ICG, N=31, n (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, median (Q1, Q3)</td>
<td>70.5 (62.6, 74.1)</td>
<td>71.6 (64.9, 74.4)</td>
<td>67.5 (59.2, 73.5)</td>
<td>0.147</td>
</tr>
<tr>
<td>BMI, median (Q1, Q3)</td>
<td>28.7 (25.4, 32)</td>
<td>29.4 (26.4, 32)</td>
<td>28.3 (25.4, 32.2)</td>
<td>0.513</td>
</tr>
<tr>
<td>Gender: Male</td>
<td>48 (79)</td>
<td>22 (73)</td>
<td>26 (84)</td>
<td>0.315</td>
</tr>
<tr>
<td>Race: Caucasian</td>
<td>57 (93)</td>
<td>29 (97)</td>
<td>28 (90)</td>
<td>0.612</td>
</tr>
<tr>
<td>Smoking: Former or Current</td>
<td>15 (25)</td>
<td>10 (33)</td>
<td>5 (16)</td>
<td>0.119</td>
</tr>
<tr>
<td>Hypertension</td>
<td>38 (62)</td>
<td>15 (50)</td>
<td>23 (74)</td>
<td>0.051</td>
</tr>
<tr>
<td>Diabetes</td>
<td>10 (16)</td>
<td>5 (17)</td>
<td>5 (16)</td>
<td>1.000</td>
</tr>
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<td>Baseline Risk Factors</td>
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<td>---------------------------------------</td>
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</tr>
<tr>
<td>Coronary artery disease</td>
<td>10 (16)</td>
<td>7 (23)</td>
<td>3 (10)</td>
<td>0.182</td>
</tr>
<tr>
<td>Infrarenal AAA</td>
<td>7 (11)</td>
<td>5 (17)</td>
<td>2 (6)</td>
<td>0.255</td>
</tr>
<tr>
<td>Peripheral vascular disease</td>
<td>2 (3)</td>
<td>2 (7)</td>
<td>0 (0)</td>
<td>0.238</td>
</tr>
<tr>
<td>History of Pelvic Radiation</td>
<td>6 (10)</td>
<td>3 (10)</td>
<td>3 (10)</td>
<td>1.000</td>
</tr>
<tr>
<td>Ureteral Procedure -</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ureterolysis</td>
<td>1 (2)</td>
<td>0 (0)</td>
<td>1 (3)</td>
<td>0.485</td>
</tr>
<tr>
<td>Ureteroscopy</td>
<td>7 (11)</td>
<td>2 (7)</td>
<td>5 (16)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4 (7)</td>
<td>2 (7)</td>
<td>2 (6)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>49 (80)</td>
<td>26 (87)</td>
<td>23 (74)</td>
<td></td>
</tr>
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<td>Baseline Risk Factors</td>
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<td>--------------------------------------------</td>
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<tr>
<td>Neoadjuvant Chemotherapy</td>
<td>32 (52)</td>
<td>16 (53)</td>
<td>16 (52)</td>
<td>0.893</td>
</tr>
<tr>
<td>Length of Case (mins), Median (Q1, Q3)</td>
<td>398 (368, 442)</td>
<td>398.5 (368, 446)</td>
<td>398 (368, 433)</td>
<td>0.876</td>
</tr>
<tr>
<td>Urinary Diversion: Ileal conduit</td>
<td>43 (72)</td>
<td>21 (72)</td>
<td>22 (71)</td>
<td>0.901</td>
</tr>
</tbody>
</table>

No patient received pelvic radiation post-operatively
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<th>ICG, N=31, n (%)</th>
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<td>Follow up (months), median (Q1, Q3)</td>
<td>17.2 (11.3, 24)</td>
<td>23.2 (7, 29.3)</td>
<td>15.8 (12.2, 18.1)</td>
</tr>
<tr>
<td>Ureteroenteric anastomotic strictures</td>
<td>6 (9.8)</td>
<td>5 (16.7)</td>
<td>1 (3.2)</td>
</tr>
<tr>
<td>Time to stricture (months), median (Q1, Q3)</td>
<td>5.7 (3.6, 6.6)</td>
<td></td>
<td>7.5</td>
</tr>
</tbody>
</table>

The median length for the segment of resected ureter due to poor perfusion in the ICG cohort was -
1.3cm on the left
1.6cm on the right
Results

All UAS were right-sided

2 – surgical revision (incl. ICG stricture)

2 – NT/stent
2 – no intervention, renal atrophy
Use of indocyanine green to minimise uretero-enteric strictures after robotic radical cystectomy


USC Institute of Urology, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA
Real-time indocyanine green angiography with the SPY fluorescence imaging platform decreases benign ureteroenteric strictures in urinary diversions performed during radical cystectomy

Results

- No side effects from ICG
- Minimal increase in operative time
- Lower rate of UAS
Limitations

- Single center
- Retrospective
- Needs validation with larger studies
- Similar results to recent publications
Conclusion

- Fluorescence imaging with IV ICG
- Decreased rate of UAS
- Randomized, larger cohort needed
References


References


