Comparative Analysis of Stage and Other Prognostic Factors Among Urethral, Ureteral, and Renal Pelvis Malignant Tumors

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Urinary Tract Cancers

• Transitional epithelial tissue lines most of urinary tract (except for part of urethra)

• Over 85% of malignant tumors – urothelial (transitional cell) carcinomas

• Few squamous epithelial or glandular tumors (parts of urethra)
AJCC Cancer Staging Manual 7th Edition

• Four staging forms, including Kidney (C649), Bladder (C670-C679), plus:
  
  — **Renal Pelvis and Ureter** (C659 & C669)
    ✦ Stage: 0a, 0is, I, II, III, IV
    ✦ Prognostic factors are not required for staging
    ✦ Clinically significant: extranodal extension status, size of tumor deposit in lymph nodes, WHO/ISUP grade
  
  — **Urethra** (C680) (also applicable to urothelial carcinomas of prostate and prostatic urethra)
    ✦ Stage: 0a, 0is, I, II, III, IV
    ✦ Prognostic factors are not required for staging
    ✦ Clinically significant: WHO/ISUP grade
Summary Staging Manual 2000

• Renal Pelvis and Ureter combined in one category – similar to the AJCC manual

• Urethra combined with paraurethral glands and unspecified urinary organs - dissimilar to AJCC manual

• Regional extension in SS2000 corresponds to T1, or T2, or T3, or T4 in AJCC
Collaborative Staging

• UT covered by five CS schemas:
  — KidneyParenchyma
  — KidneyRenalPelvis (renal pelvis and ureter)
  — Bladder
  — Urethra (inclusive of Transitional Cell Carcinoma of the prostatic ducts and prostatic urethra)
  — UrinaryOther

• Tumors with similar histology and prognostic factors (i.e., WHO grade), likely comparable in etiology and treatment are staged by a different set of rules based on anatomic location alone
Research Questions

• Are there patterns of extension and dissemination of urothelial tumors that support the current categorization of renal pelvis, ureter and urethra tumors?

• Is there evidence in current surveillance data to support the inclusion of histology in the definition of urinary tract CS schema(s)?
Method


• Cases select by:
  — Year of diagnosis: 2004 – 2009
  — SEER Recode: 29010 -29040 (urinary system codes)
  — Microscopically confirmed tumors
  — “Autopsy only” excluded
Distribution of Urinary Tract Cancer Cases by Anatomic Location

N=173,261

- Kidney Parenchyma: 31%
- Renal Pelvis: 60%
- Ureter: 4%
- Bladder: 3%
- Urethra: 1%
- UT Other & NOS: 1%

N=173,261
Distribution of Urinary Tract Cancer Cases by Tumor Histology

N=173,216

- 61% Transitional Cell
- 35% Adenocarcinoma
- 1% Unspecified
- 1% Epithelial NOS
- 1% Complex Mixed
- 1% All Other
Median Age at Diagnosis by Histology Category

- Kidney parenchyma: Median age 62, 73
- Renal pelvis: Median age 72, 73
- Ureter: Median age 74, 73
- Bladder: Median age 73, 73
- Urethra: Median age 69, 74
- UT other & NOS: Median age 72, 74

Median age in years:
- 55
- 60
- 65
- 70
- 75

Colors:
- All other tumors
- Transitional cell

Source: Westat
Male/Female Ratio of UT Tumors

- UT other & NOS: 2.2/1.9
- Urethra: 7.2/1.1
- Bladder: 3.2/1.9
- Ureter: 1.6/1.6
- Renal pelvis: 1.4/1.2
- Kidney parenchyma: 1.6/1.7

- Transitional cell
- All other tumors
### Proportion High Grade by Histology Category

<table>
<thead>
<tr>
<th>Tissue</th>
<th>All other tumors</th>
<th>Transitional cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney parenchyma</td>
<td>35.2%</td>
<td>74.7%</td>
</tr>
<tr>
<td>Renal Pelvis</td>
<td>61.8%</td>
<td>66.2%</td>
</tr>
<tr>
<td>Ureter</td>
<td>72.1%</td>
<td>60.1%</td>
</tr>
<tr>
<td>Bladder</td>
<td>67.0%</td>
<td>52.0%</td>
</tr>
<tr>
<td>Urethra</td>
<td>54.8%</td>
<td>66.8%</td>
</tr>
<tr>
<td>UT Other &amp; NOS</td>
<td>81.3%</td>
<td>66.7%</td>
</tr>
</tbody>
</table>

- **Proportion High Grade by Histology Category**: This table illustrates the proportion of high-grade tumors in various tissue categories, distinguishing between `All other tumors` and `Transitional cell`. The data shows significant variations across different tissues, indicating differing rates of high-grade tumors in each category.
Proportion Invasive Tumors by Histology Category

<table>
<thead>
<tr>
<th>Tissue</th>
<th>All Other Tumors</th>
<th>Transitional Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney parenchyma</td>
<td>100.0%</td>
<td>93.1%</td>
</tr>
<tr>
<td>Renal Pelvis</td>
<td>74.2%</td>
<td>94.3%</td>
</tr>
<tr>
<td>Ureter</td>
<td>78.2%</td>
<td>66.2%</td>
</tr>
<tr>
<td>Bladder</td>
<td>46.7%</td>
<td>80.5%</td>
</tr>
<tr>
<td>Urethra</td>
<td>56.8%</td>
<td>86.2%</td>
</tr>
<tr>
<td>UT Other &amp; NOS</td>
<td>75.4%</td>
<td>97.2%</td>
</tr>
</tbody>
</table>
Proportion Tumors with Distant Dissemination by Histology Category

- Kidney parenchyma
  - All other tumors: 100.0%
  - Transitional cell: 93.1%
- Renal Pelvis
  - All other tumors: 94.3%
  - Transitional cell: 74.2%
- Ureter
  - All other tumors: 78.2%
  - Transitional cell: 66.2%
- Bladder
  - All other tumors: 80.5%
  - Transitional cell: 46.7%
- Urethra
  - All other tumors: 86.2%
  - Transitional cell: 56.8%
- UT Other & NOS
  - All other tumors: 97.2%
  - Transitional cell: 75.4%
Proportion Tumors with Surgical Treatment by Histology Category

Kidney Parenchyma
- All other tumors: 88.8%
- Transitional cell: 78.9%

Renal Pelvis
- All other tumors: 68.0%
- Transitional cell: 88.0%

Ureter
- All other tumors: 60.8%
- Transitional cell: 88.3%

Bladder
- All other tumors: 80.4%
- Transitional cell: 93.5%

Urethra
- All other tumors: 70.7%
- Transitional cell: 81.6%

UT Other & NOS
- All other tumors: 9.9%
- Transitional cell: 48.2%
Proportion Tumors with Radiation Therapy by Histology Category

- Kidney parenchyma: 5.2% (All other tumors), 5.8% (Transitional cell)
- Renal Pelvis: 8.5% (All other tumors), 4.3% (Transitional cell)
- Ureter: 12.5% (All other tumors), 5.3% (Transitional cell)
- Bladder: 13.8% (All other tumors), 4.5% (Transitional cell)
- Urethra: 28.1% (All other tumors), 11.5% (Transitional cell)
- UT Other & NOS: 6.6% (All other tumors), 4.7% (Transitional cell)
Age-Standardized Cause-Specific Survival by Histology Category

- Kidney parenchyma: 76.0%
- Renal Pelvis: 35.8%*, 65.4%
- Ureter: 47.5%*, 65.9%
- Bladder: 48.2%, 82.5%
- Urethra: 51.7%, 69.4%
- UT Other & NOS: 40.3%*, 69.6%

Cumulative summary = 5yrs
Discussion

• Altogether, renal pelvis & ureter & urethra accounts for < 8% of urinary tract cancers

• Over 90% are transitional cell carcinomas
  — Approximately one third of urethra cancers are not transitional cell

• Transitional cell carcinoma tend to be diagnosed at older ages
  — Median age at diagnosis for urethral : transitional cell = 74yrs. vs. All other tumors= 69 yrs
Discussion (cont.)

• Based on the frequency of invasiveness and distant metastases at diagnosis, transitional cell carcinoma is the less aggressive histology
  — Urethral tumors are similar to renal pelvis and ureter tumors in terms of invasiveness and distant dissemination

• Survival is better for transitional cell carcinoma for all but kidney parenchyma

• Histologic type is significant in the selection of treatment modalities
  — Treatment modalities for urethra transitional cell more similar to other UT tumors of same histology than for urethral tumors of different histology
Conclusion

• As expected, anatomic location is associated with specific histology; however, for luminal organs covered by urothelium, histology is a better predictor of tumor occurrence, aggressiveness, treatment modality and survival

• For the purpose of cancer surveillance in general, and cancer staging in particular, classification schemas based on histology might be more appropriate for UT tumors
  — Moving away from anatomic classifications to more accurate prognostic factors does not necessarily entail the creation of new categories; for UT it might just require updating operational definitions