Bladder replacement in men and women: when and when not?

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Outline

1) Selection criteria for orthotopic diversion:
   Tumor-related factors
   Patient-related factors

2) Techniques for preservation of continence

3) Outcomes

Continent Diversion

History

Prior to 1950: Ureterosigmoidostomy
After 1950: Bricker ileal conduit (urostomy)

Advantages: less infection, reliable stoma
Disadvantages: bag on outside
   long-term risk of pyelo, stones, renal damage

1982 Nils Kock (Swedish general surgeon) reports on a continent ileostomy for patients after total colectomy

Animal experiments show that the ideal reservoir is detubularized, double-folded ileum
   (La Place’s Law)
Continent Urinary Diversion

Basic Requirements

- Low pressure reservoir
  - Detubularized bowel (small or large intestine)
  - Double fold achieves lowest pressure + maximum volume

- Reliable continence mechanism
  - Kock intussuscepted nipple valve
  - Reinforced ileocecal valve (Indiana pouch)
  - Mitrofanoff technique – appendix or tapered ileum
  - Native urethral sphincter

Continent Diversion

History at USC

1979 Camey and le Duc introduced idea of orthotopic diversion to native urethra

at USC:

1986 First orthotopic hemi-Kock pouch in male
1992 First orthotopic diversion in female

Continent Urinary Diversion

Cutaneous vs Orthotopic Diversion

Cutaneous
- Dry immediately
- Less frequent voiding
- Sleep through night

But:
- Need to catheterize
- 10-30% revision rate

Orthotopic
- No stoma
- Most “natural” voiding
- Low revision rate

But:
- Incontinence
- Need to wake up
- May need to catheterize

Evolution of Urinary Diversion at USC

1971 - 2008

60-70% of men and women opt for orthotopic diversion
Orthotopic (neobladder) Diversion

**Patient Selection**

Tumor-related factors:

1. Risk of urethral recurrence in men and women
2. Locally-extensive cancer or grossly positive nodes

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**Urethral recurrence in males (n=768)**

<table>
<thead>
<tr>
<th>Pathologic factor</th>
<th>No pts</th>
<th>5 yr urethral recurrence (%)</th>
<th>10 yr urethral recurrence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No prostate involvement</td>
<td>639</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>Any prostate involvement</td>
<td>129</td>
<td>15%</td>
<td>16%</td>
</tr>
<tr>
<td>Mucosa/ducts only</td>
<td>78</td>
<td>12%</td>
<td>15%</td>
</tr>
<tr>
<td>Prostatic stroma</td>
<td>51</td>
<td>18%</td>
<td>18%</td>
</tr>
</tbody>
</table>

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**Could the orthotopic diversion help protect against urethral recurrence?**

<table>
<thead>
<tr>
<th>Type of diversion</th>
<th>5 yr urethral recurrence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All pts</td>
</tr>
<tr>
<td>Cutaneous</td>
<td>371</td>
</tr>
<tr>
<td>Orthotopic</td>
<td>397</td>
</tr>
</tbody>
</table>

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**Patient Selection**

Urethral recurrence in men is **NOT** increased by:

- CIS in the bladder
- Location of tumor
- Tumor stage (other than prostatic involvement)
**Patient Selection - females**

**Risk of urethral involvement in women:**

7 pathologic studies, 378 patients
- Bladder neck involvement: 22% (19 - 33%)
- Urethral involvement: 12.4% (7 - 46%)
- All urethral tumors also had tumor at bladder neck

- Two other series identified occasional ‘skip’ lesions
- In our prospective series frozen section of the urethral margin reliably identified all cases of urethral tumor

Stein J Urol 2007:181:2052

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**Patient Selection**

**Urethral involvement in women is increased with:**

- Tumor at the bladder neck at the time of TUR
- Palpable mass involving anterior vaginal wall

*But – half of women with one or both of these factors will have a negative urethral margin*

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**Orthotopic (neobladder) Diversion**

**Patient - related factors**

**Psychosocial**
- Motivation
- Social support
- Willing & able to do self-catheterization

**Medical**
- General health
- Renal function
- Functional urethra
- Prior treatments (eg. radiation, bowel surgery)

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**Patient Selection**

**Locally-extensive or nodal disease**

- Local recurrence can cause direct invasion of the pouch, bleeding, outlet obstruction or fistula
- Local recurrence is seen in less than 10% of patients
- Only 10-25% of those will have problems from the pouch
- Up to 30% of patients with node-positive disease can be expected to be long-term survivors

Orthotopic (neobladder) Diversion

Patient Selection

Difficult psycho-social issues:

- Elderly patients living alone
- Memory loss
- Language barriers
- Cultural differences

Renal Function:

- Renal compromise increases risk of acidosis, may risk progressive renal disease with continent diversion
- Generally recommend eGFR ≥ 35-40 ml/min

Age

- Older men gain continence more slowly
- Older women more likely to remain incontinent
- Frail elderly – may not benefit

Other medical problems:

- Severe cardiac/pulmonary disease – need to do expeditious surgery
- Liver disease – pouch causes absorption of ammonia

Patients with prior pelvic radiation

148 cystectomy patients with prior history of ≥ 60 Gy pelvic radiation (1983 – 2008)

Median age 74

Diversion type:

- ileal conduit 65 (44%)
- continent cutaneous 35 (24%)
- orthotopic 48 (32%)

Operative mortality (90 day) 6 %

Early complications (grade 3-5) 32.4 %
Early complications in patients with prior pelvic radiation

![Bar chart showing early complications by severity and type]

Patients with prior pelvic radiation
Types of high-grade early complications

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal</td>
<td>31</td>
</tr>
<tr>
<td>GU/Diversion</td>
<td>22.5</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>14</td>
</tr>
<tr>
<td>Cardiac</td>
<td>7</td>
</tr>
<tr>
<td>Bleeding</td>
<td>4.2</td>
</tr>
<tr>
<td>Wound</td>
<td>2.8</td>
</tr>
<tr>
<td>Thromboembolic</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Patients with prior pelvic radiation

- Patients undergoing orthotopic diversion are highly selected
  - adequacy of sphincter
  - presence of urethral stricture disease

Long-Term complications:
- Higher long term risks of incontinence and bladder neck contracture in males
- Increased risk of incontinence and fistula in females

Technique for preserving continence

**Males**

- Management of urethra is identical to radical prostatectomy

- Keys:
  - Minimize dissection around urethra
  - Careful control of DVC
  - Improved with nerve-sparing?
Anatomy of female urethral sphincter

- Striated rhabdosphincter lies below endopelvic fascia
- Nerve supply runs below endopelvic fascia within levators
- Role of nerve bundles along lateral vagina is unclear

(From Colleselli J Urol 1998; 160:49)

Technique for preserving continence

**Females**

- Preserve vagina if possible
- Avoid dissection below endopelvic fascia or around urethra

Technique for preserving continence

**Females**

- Routinely perform sacrocolpopexy with mesh
- Interpose omental flap between vagina and neobladder

Orthotopic neobladder

<table>
<thead>
<tr>
<th>Author and pouch type</th>
<th>Number of patients</th>
<th>Daytime continence (percent)</th>
<th>Nighttime continence (percent)</th>
<th>Requiring catheterization (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elmajian 1996 Kock reservoir</td>
<td>295</td>
<td>87</td>
<td>86</td>
<td>8</td>
</tr>
<tr>
<td>Hautmann 1999 ileal neobladder</td>
<td>363</td>
<td>96</td>
<td>95</td>
<td>6</td>
</tr>
<tr>
<td>Stein 2004 T-pouch</td>
<td>209</td>
<td>87</td>
<td>72</td>
<td>25</td>
</tr>
<tr>
<td>Studer 1999 Studer pouch</td>
<td>200</td>
<td>90</td>
<td>80</td>
<td>0.5</td>
</tr>
<tr>
<td>Ali el Dein 2008 ileal neobladder (females)</td>
<td>192</td>
<td>92</td>
<td>72</td>
<td>16</td>
</tr>
<tr>
<td>Stein 2009 (females)</td>
<td>56</td>
<td>77</td>
<td>66</td>
<td>63% (30% regularly)</td>
</tr>
</tbody>
</table>
Conclusions

• The majority of patients will opt for continent orthotopic diversion if given the choice

• Patient selection is crucial in order to optimize outcome from both oncologic and functional perspectives

• Careful surgical technique is important in preserving continence