Radiation Therapy for Bladder Cancer: old and new

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Organ Preservation

National Bladder Cancer Group
68 patients with muscle invasive bladder cancer
1981-1985
Radiation with concurrent cis-platin
Overall survival: T2: 64%  T3-T4: 22%

JAMA 258: 931-935, 1987

Algorithm

NCI Canada
Randomized trial of radiation +/- cisplatin
T3 bladder tumors
Either definitive or precystectomy
Pelvic control: 67% vs 47%, favoring chemo/RT

JCO 14:2901-07, 1996
Algorithm

Bladder conservation was reserved for those patient that had a complete response to chemo/RT
Cysectomy was recommended for patients whose tumor incompletely responded to chemo/RT or subsequently recurred with invasive tumor

Algorithm

Biopsy proven muscle invasive bladder cancer
- Complete TURBT
- Induction chemo/RT 40 Gy
- Repeat cystoscopy and biopsy
- Complete response, complete chemo/RT 60-65 Gy
- Residual tumor, cysectomy
- Repeat cystoscopy and biopsy, 2-3 m after chemo RT
- CR, surveillance
- Superficial dz, intravesical Tx
- Invasive tumor, cystectomy

RTOG Experience

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment</th>
<th>5-yr OS</th>
<th>Alive with bladder</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTOG 8512</td>
<td>TURBT, cis-p/t/RT</td>
<td>52%</td>
<td>42%</td>
</tr>
<tr>
<td>RTOG 8802</td>
<td>TURBT, MCV, cis-p/t/RT</td>
<td>51%</td>
<td>38%</td>
</tr>
<tr>
<td>RTOG 8903</td>
<td>TURBT, ± MCV, cis-p/t/RT</td>
<td>49%</td>
<td>29%</td>
</tr>
<tr>
<td>RTOG 9506</td>
<td>TURBT, cis-p/t/5FU/RT</td>
<td>83%</td>
<td>66% (3 yrs)</td>
</tr>
<tr>
<td>RTOG 9706</td>
<td>TURBT, cis-p/t/bid RT, MCV</td>
<td>61%</td>
<td>48% (3 yrs)</td>
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<tr>
<td>RTOG 9906</td>
<td>TURBT, tax/cis-p/t/RT, gem/cis</td>
<td>56%</td>
<td>47%</td>
</tr>
</tbody>
</table>

Algorithm vs Practice

MGH and RTOG
- Muscle invasive bladder cancer
- Absence of hydronephrosis
- Adequate renal function
- Normal CBC
- Medical fit for cystectomy
- No lymphadenopathy on imaging

UCSF
- Muscle invasive bladder cancer or superficial disease failures
- Absence of hydronephrosis
- Any renal function
- Any CBC
- Medical inoperable or refuse cystectomy
- Recurrence after cystectomy
Algorithm - Medically Inoperable

Biopsy proven muscle invasive bladder cancer

- Complete TURBT
- Chemo/RT 60-65 Gy
- Surveillance cystoscopy

Impaired Renal function
Oral capecitabine
Low dose gemcitabine
Carboplatin

Superficial Bladder Cancer After chemo/RT

190 patients treated with chemo/RT
Median f/u 6.7 yrs
32 patients (26%) superficial relapse (60% were CIS)
TURBT and intravesical therapy
22 kept bladder
10 patient required cystectomy

Urology 58:380-385, 2001

Progression of Superficial Bladder Cancer to Muscle-Invasive

18 patients with T2 recurrence after BCG failures
TURBT, chemo/RT
Median f/u 7 yrs
7-yr OS 58% and 54% had intact bladders

BJU 104:179-83, 2009

Bladder Motion

10 patients and 262 images taken daily during RT
Bladder position on the planning day was compared to the daily treatment position
Image-Guided Bladder Radiotherapy

Gold marker placed surrounding the tumor bed after TURBT.

Image-Guided Bladder Radiotherapy

Patients are planned to give higher doses of RT near gold markers. Patient would receive daily imaging. Compared to a reference image, patient table moved appropriately.

Conclusions

- TURBT followed by Chemo/RT is a valid option for patients with muscle invasive bladder cancer or failures after BCG.
- Systemic failures still represent the bigger problem.
- Muscle invasive failures can be salvaged with surgery.
- Superficial failures can be salvaged conservatively.
- Bladder motion and surrounding small bowel make are challenges for RT.
- Image-guided bladder radiotherapy may help overcome some of the bladder motion difficulties.