Brachytherapy in Carcinoma of Lung & Esophagus

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Brachytherapy in non small cell lung cancer

- Limited practice
- Used in selective patients
- Highly conformal treatment
- Complicated technique
- Skilled procedure
Brachytherapy in NSCLC

- Brachytherapy alone
  - As definitive treatment alone
  - As palliative treatment
- Combined with EBRT (dose escalation/boost)
- Combined with surgery
Types of Brachytherapy for NSCLC

• Intraluminal/ endobronchial
• Interstitial
  - Trans-cutaneous
  - Intraoperative
  - Perioperative
ILRT

- Curative Intent Along With ERT
- Palliative Intent
- Emergency Management
  - SVC
  - Bleeding
## Risk of Hemoptysis with ILRT: Literature

<table>
<thead>
<tr>
<th>Author</th>
<th>n</th>
<th>HDR-Dose (Gy)</th>
<th>Ref.Point</th>
<th>Previous EBRT?</th>
<th>Massive hemoptysis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seagren</td>
<td>20</td>
<td>1 * 10 Gy</td>
<td>@ 10 mm</td>
<td>Yes</td>
<td>28 %</td>
</tr>
<tr>
<td>Mehta</td>
<td>31</td>
<td>4 * 4 Gy</td>
<td>@ 10 mm</td>
<td>Yes</td>
<td>3 %</td>
</tr>
<tr>
<td>Roach</td>
<td>17</td>
<td>30 Gy LDR</td>
<td>@ 5 mm</td>
<td>Yes</td>
<td>0 %</td>
</tr>
<tr>
<td>Bedwine</td>
<td>32</td>
<td>3 * 6 Gy</td>
<td>@ 10 mm</td>
<td>Yes</td>
<td>32 %</td>
</tr>
<tr>
<td>Aygun</td>
<td>60</td>
<td>4 * 5 Gy</td>
<td>@ 10 mm</td>
<td>Yes</td>
<td>15 %</td>
</tr>
<tr>
<td>Sutedja</td>
<td>31</td>
<td>3 * 10 Gy</td>
<td>@ 10 mm</td>
<td>Yes</td>
<td>32 %</td>
</tr>
<tr>
<td>Gollins</td>
<td>402</td>
<td>1 * 15-20 Gy</td>
<td>@ 10 mm</td>
<td>No (324)</td>
<td>8 %</td>
</tr>
<tr>
<td>Hennequin</td>
<td>149</td>
<td>4-6 * 7 Gy</td>
<td>@ 10 mm</td>
<td>Yes</td>
<td>7.4 %</td>
</tr>
<tr>
<td>Speiser</td>
<td>295</td>
<td>3 * 10 Gy</td>
<td>@ 10 mm</td>
<td>Yes</td>
<td>6.3 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 * 7.5 Gy</td>
<td>@ 10 mm</td>
<td>Yes</td>
<td>8.6 %</td>
</tr>
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</table>
Interstitial Brachytherapy

• Complicated procedure, but very precise method of radiation delivery
• Done under CT Guidance
• Suitable for peripheral lesions
• Very limited experience in the literature
Intra-operative RT

- Relatively new technique of RT
- Not yet established
- Fraction Size 10-20Gy followed by EBRT
Intraoperative Radiotherapy
Permanent brachytherapy implant
Brachytherapy for Carcinoma of Esophagus

- Brachytherapy alone
  - For palliative treatment
  - For definitive treatment
- Brachytherapy + EBRT: For boost

Performed in the form of Intraluminal RT (ILRT)
Intraluminal Radiotherapy (ILRT)

Rationale
• Dose fall off is very sharp, hence minimal doses to surrounding organs
• Higher dose can be given in shorter time

Procedure
• Endoscopic assessment → Insertion of esophageal applicator (Rowland’s applicator) → Source loading on Remote afterloading unit

Dose
12-15 Gy at 0.5-1.0 cm (LDR)
Contraindications for ILRT

- Severe stenosis where applicator can’t be negotiated
- T.O. fistula
- Primary tumor > 10 cm long
- Gross mediastinal L. adenopathy
- Pts with skip lesions
- Extension to cardia
Pall ILRT: AIIMS Data*

- 34 cases treated with ILRT (LDR)
- With or without previous EBRT
- Dose 12-15 Gy (LDR)
- Swallowing capacity improved in 60% pts
- Incidence of post RT stenosis: 11%

*Trop Gastroenterol 1996*
Literature

• Dinshaw et al. ILRT+5FU…JSO 1991
  After 50 Gy EBRT, 50 pts randomised to ILRT alone vs ILRT + 5FU, 2 yr surv : 15% vs 22%.

• Sur et al. Role of HDR ILRT. IJROBP 1992
  After 35 Gy EBRT, 50 pts randomised to
  - further 20 Gy EBRT vs.
  - HDR ILRT 12 GY (2x6Gy weekly F)
  1-yr survival : 44% vs. 78% (p value<0.001).

• Vivekanandam et al. EBRT+ILBT. Am J Clin Oncol
  59 pts treated by 36 Gy EBRT+30 Gy ILBT (LDR)
  1-yr surv= 24%, Mean surv=9.6 mo
American Brachytherapy Society Guidelines

- EBRT: 45-50 Gy by Conventional Fractionation
- ILRT after 2-3 wks of EBRT completion
- HDR: 5 Gy once a week x 2
- LDR: 20 Gy single session, 0.4-1.0 Gy/hr
- Dose prescription at 1.0 cm from mid-source or mid-dwell position
Conclusion (Brachy in Lung Cancer)

• Limited role but highly conformal
• Practiced in few centers
• Endobronchial brachytherapy is the main form
• Intra-operative and percutaneous Brachy requires special skill and expertise
• Limited studies in literature
Conclusion (Brachy in Esophageal Cancer)

- Technically it is relatively easier
- Mainly used for palliation: effective
- For escalating the dose after EBRT
- Risk of stenosis stricture after ILRT: 20-30%
Thank You