

Brachytherapy in cancer of esophagus

A. Treatment Regime/Rationale:

- Esophagectomy alone is associated with high morbidity and mortality for upper esophageal lesions because esophagus **above tracheal bifurcation** lies continuous and posterior to the membranous portion of the trachea and main bronchus.
- Conventional EBRT produce similar results to surgery in early cases and may be better for palliation in more advanced tumors. But amount of radiation is limited by the tolerance of the normal tissues in chest (lung, spinal cord, mediastinal structures).
- Intra-luminal brachytherapy places highest concentration of dose to disease, but significantly lower dose to adjacent normal tissues.

B. Dose Prescription:

- Palliative: EBRT (600cGy x 3fx) + intra-luminal brachy
- Curative : EBRT (4000cGy in 15 fx or 5000cGy in 20 fx)
 + intra-luminal brachy:
 LDR: 3000cGy in 48hr **at 1cm of the axis** over 8-12cm or
 HDR: 1500cGy in single fx

C. Planning criteria:

D. Radionuclide physics:

| | | | |
|-------------------------|-------|--|--|
| Energy | (keV) | | |
| HVL | | | |
| Half-life | days | | |
| Source Strength | mCi | | |
| Physical Size | | | |
| Exp Rate Constant | | | |
| S _k constant | | | |
| Dose Rate Constant Λ | | | |
| Calibration | | | |
| Seed Spacing | | | |
| Init DR | | | |
| RBE | | | |
| IU seeds: | | | |
| | | | |

E. Clinical Workflow:

- E.1. Anatomical location and extension of the lesion by:
 barium swallow X-ray, endoscopic and CT scans
- E.2. Localization and planning of treatment area
 In simulator using a limited bromium swallow study at least 24hr prior to procedure
 ISO and field for EBRT and brachy are chosen
- E.3. Insert nasogastric tube containing guide wire;
- E.4 Placement of applicator tube
- E.5. Dummy source verification and planning
- E.6. treatment delivery

F. Record/documentation

G. References:

Endo-bronchial brachytherapy (EBBT)

A. Treatment Regime/Rationale:

- Endobronchial brachytherapy (EBBT) has been primarily used for palliation for recurrent lung disease.
- EBBT is ideal for delivering very high dose to neoplastic tissue in or within 1cm radius of the main airway
- Provide relief of airway obstruction to a greater extent and faster than EBRT. However, extrinsic compression is best treated with EBRT.
- Can cure occult cancer of lung (however, occult cancer has high rate of synchronous lesions which must be all identified and treated.)

B. Dose Prescription:

- The prescription depths range from 0.5cm ~ 2cm which allows for effective dose distribution to encompass tumor volume depth w/o exceeding bronchial mucosa tolerance dose. (Dose normally reported @ 1cm depth from source axis for comparison)
- A longitudinal margin of 2cm proximal and distal to the malignant margins is commonly used.
- Curative : EBRT (6400Gy in 32fx or 6000cGy in 30 fx)
+ EBBT (500/750 cGy x 3 fx to 1cm depth)
- Palliative : EBRT (3750Gy in 15fx or 6000cGy in 30 fx)
+ EBBT (500/750 cGy x 3 fx to 1cm depth)
- Recurrent : EBBT (500Gy x 4 fx or 750cGy x 3 fx)

C. Planning criteria:

D. Radionuclide physics:

E. Clinical Workflow:

- E.1. Malignant lesion localization under video bronchoscopy
Distance from anatomical landmarks, radio-opaque markers on patient corresponding to the most distal and proximal extents under fluoroscopy
- E.2. Endobronchial catheter with guide-wire placement
- E.2. Orthogonal treatment localization and dummy source verification
- E.3. Tx planning
- E.6. Tx delivery