Clinical Use of a Novel Balloon Based Esophageal Brachytherapy Applicator

Gil’ad N. Cohen1, Karyn A. Goodman2, Abraham J. Wu1.
1MSKCC, New York, NY, USA, 2University of Colorado Denver, Aurora, CO, USA

Purpose
We report on the clinical implementation of a newly designed balloon applicator for high dose rate treatment of esophageal cancer.

Impetus
- Review of our institutional experience with Esophageal HDR:
  - Well tolerated, BUT ...
  - High rate of local recurrence
  - Need to overcome surface dose limitation
  - Significant increase in Grade 3 toxicity for single fraction doses above 15 Gy from SBRT spine treatments (Cox et al 2012).

Clinical Implementation
We maintained overall treatment regimen and clinical workflow, namely:
- 5 Gy x 3 weekly fractions + chemotherapy
- Endoscopy and fluoroscopy guidance

Changes introduced are:
- CT simulation & CT image based planning
- Dose prescribed to the entire volume

Treatment Planning
1. Contouring:
   - Target = Affected Esophageal lumen
   - Normal Esophagus = Esophageal lumen above and below target

2. Plan optimization
   - Target: V100 > 90%; D0.3cc ≤ 11 Gy
   - Normal Tissue (margin around target) minimized for dose conformity
   - Normal Esophagus minimized, e.g. D0.3cc ≤ 120%

3. Planing results
   - Highly modulated dwell times
     i.e. need to reproduce applicator position for each treatment

Treatment verification
- Use 10% contrast (Omnipaque) in balloons
- Implanted fiducial marker (e.g. Visicoil) ideal but not always feasible
- Traditional tools:
  - Skin markers, anatomic landmarks
  - Endoscopic verification
  - Insertion depth

Conclusion
A multi-institutional study is being initiated to test the efficacy of these treatments and explore dose escalation in these patients, using this applicator.

References:

Acknowledgments/Disclosures
- FDA 510(k) approved
- Developed in collaboration with Ancer Medical
- Patent pending

Correspondence: coheng@mskcc.org