Prospective Evaluation of SBRT for Definitive Management of Medically-Inoperable Lung Cancer

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Introduction

INTRODUCTION: In patients with clinical stage I NSCLC, surgical resection is the recommended therapy. However, in those patients deemed medically inoperable, Stereotactic Body Radiation Therapy (SBRT) provides an effective non-invasive alternative. We prospectively evaluated treatment outcomes of SBRT in early stage, medically inoperable NSCLC patients treated between 2011 and 2014.

METHODS: 67 patients with medically-inoperable, primary NSCLC were evaluated in this study, with a prospectively maintained database between 12/27/2011 and 4/29/2014. 25 males and 42 females were included, between 60 to 90 years of age. Histologies are as follows: adenocarcinoma (37), non-small cell carcinoma, NOS (5), squamous cell carcinoma (21), and other (4). 25 patients underwent fiducial placement. Patients received a total dose of 45-60 Gy in 3-5 fractions. The prescription isodose line ranged between 58% - 80% and the tumor volumes measured between 3.86 cc and 153.93 cc. Acute and late toxicities were graded with CTCAE Version 3.0. Study outcomes included: local control (LC), regional control (RC), distant control (DC), overall survival (OS), acute and late toxicities.

RESULTS: With a median follow-up of 18.3 months, LC, RC and DC were 97%, 80.6%, and 85% respectively, and overall survival, 75%. Grade 1 and 2 dyspnea was observed in 10% and 5% of patients, respectively, and grade 1 cough in 20% of patients. No clinically significant pneumonitis was experienced in this study. Local control was examined as a function of tumor size, tracking technique and dose-fractionation. Only dose-fractionation was found to correlate with local control rates (p<0.034).

CONCLUSION: Stereotactic Body Radiation Therapy (SBRT) is an effective mode of therapy for medically inoperable patients with early stage NSCLC. These results are comparable to those described in the literature for surgical resection in this patient population, suggesting that SBRT can be an equally effective non-invasive alternative for appropriately selected patients.

Methods

- This study collected data from 67 consecutive patients with medically inoperable stage 1 lung cancer, treated between 2011-2014.
- The patients, between the ages of 60 to 90 years, presented with stage I non-small cell lung cancer, with tumor size ≤5 cm, and were deemed medically inoperable by either a pulmonologist or thoracic surgeon.
- The primary endpoints of this study include assessment of local, regional and distant tumor control, overall survival, and toxicity (Common Terminology Criteria for Adverse Effects: cough, dyspnea, and pneumonitis).
- This study also examined variables of tumor size, tracking technique, and dose-fractionation to correlate with local control.
- Statistical analysis (Kaplan-Meier curves with log rank) were performed using SPSS 22.0.

Patient Demographics

- Gender: female, 60.6% (n=67)
- Histology:
  - Adenocarcinoma, 37 (55)
  - Squamous cell, 21 (31)
  - Non-small cell, 5 (8)
- Stage:
  - IA, 47 (70)
  - II, 20 (30)
- Tracking Technique:
  - Fiducial markers, 25 (37)
  - X-ray spine, 13 (19)
  - X-ray lung, 29 (43)
- Fractions:
  - 5, 29 (43)
  - 1-4, 38 (57)
- Median Follow-up, months: 18.3
- Mean Tumor Size, cm: 2.41
- Mean Isodose Line, %: 63.7

Table 1: Patient demographics: majority of the patients were women; more than half of the patients presented with adenocarcinoma. 75% of all cases were Stage IA, average tumor size was 2.41 cm, median follow-up time was 18.3 months

Results

- Figures 1A: Survival Fraction for Local, Regional, and Distant Control (top, middle, bottom) at all P<0.05
- Figures 1B: Survivial Fraction by Tumor Size (top, middle, bottom) at all P<0.05
- Figure 2: Overall Survival vs. Time

Conclusions

- Stereotactic Body Radiation Therapy (SBRT) is an effective mode of therapy for medically inoperable patients with early stage NSCLC.
- These results are comparable to those described in the literature for surgical resection in this patient population, suggesting that SBRT can be an equally effective non-invasive alternative, with diminished morbidity.
- Our data is comparable to other SBRT studies published in the literature. RT0G 0236 reported 3 year data on 59 patients with medically inoperable peripheral lung tumors, 54% were in 3 fractions:
  - Local control: 97.6%
  - Distant control: 78%
  - Overall survival: 96.5%
  - Grade 3 toxicity: 12.7%
- This is a very well-tolerated treatment with only 15-20% grade 1 and 5% grade 2 toxicity.
- Possible correlation of outcome with total dose/fraction, with inferiority of 50Gy/10Gy per fraction to other fractionation schemes.
- Additional follow-up necessary for verifying longer-term outcome.

References


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