Vocal Cord Paralysis after Stereotactic Body Radiation Therapy to the Left Lung Apex

Todd J. Carpenter, MD, and Kenneth E. Rosenzweig, MD

Stereotactic body radiotherapy (SBRT) is an effective treatment for early-stage inoperable non–small-cell lung cancer (NSCLC) with local control rates approaching 90% and acceptable rates of acute toxicity.[1] However, one of the trade-offs of larger fraction sizes utilized is an increased risk of long-term toxicity to organs-at-risk, such as the lungs, central airway/bronchi, esophagus, heart, great vessels, spinal cord, brachial plexus, and chest wall.[2] Here, we report a case of vocal cord paralysis secondary to recurrent laryngeal nerve compression from radiation-induced fibrosis in a patient who received SBRT to a dose of 48 Gy in four fractions, 2 years and 9 months earlier.

CASE REPORT

An 85-year-old female with a 50+ pack-year smoking history was found to have a 3.3 cm left upper lobe lesion and a 0.8 cm right middle lobe lesion on chest computed tomography (CT). Positron emission tomography/CT demonstrated no evidence of metastatic disease. CT-guided biopsies, demonstrated TTF-1-positive adenocarcinoma. She was not a surgical candidate secondary to poor pulmonary function.

The patient was treated with SBRT to both lesions consecutively to a dose of 4800 cGy in four fractions treated every other day utilizing a 6-field fixed-angle intensity modulated radiotherapy plan. Daily 2DkV and cone beam CT images were obtained before each treatment, and typical normal tissue constraints were observed (Fig. 1*A,B*). The patient tolerated treatment without any significant toxicity. Routine follow-up did not reveal any late toxicity and surveillance CT imaging demonstrated stable post-treatment changes. Recently, 2 years and 9 months after treatment, the patient experienced new-onset hoarseness. Flexible laryngoscopy revealed total paralysis of the left vocal cord in the paramedian position. A repeat CT scan again demonstrated a stable 4.7 × 2.2 cm mass-like consolidation in the left upper lobe corresponding to the patient's treatment field (Fig. 1*C,D*).

DISCUSSION

One particular challenge with any emerging treatment modality is successfully defining organs-at-risk. Early experience revealed an unexpected 11-fold increased risk of grade 3–5 toxicity for tumors within 2 cm of the main tracheobronchial tree.[2] Similarly, the importance of limiting chest wall dose was elucidated only after initial cases of chest wall pain and rib fracture after SBRT were reported.[3] Although sensory deficits (e.g., brachial plexopathy and chest wall pain) are recognized concerns when irradiating apical tumors, other forms of peripheral nerve damage, such as motor dysfunction, are less common.[4] The time course for radiation-induced damage to the recurrent laryngeal nerve after conventionally fractionated radiation is known to be highly variable and can occur up to 25 years after treatment.[5] This report of left recurrent laryngeal nerve damage occurring more than 2.5 years after SBRT highlights the importance of close long-term follow-up of patients treated with SBRT and the ongoing need to document and report unexpected toxicities to minimize their probability in the future. The optimal risk-adapted fractionation schemes for SBRT to centrally located lung tumors is currently being investigated by RTOG 0813. (http://www.rtog.org/ClinicalTrials/ProtocolTable/StudyDetails.aspx?study=0813).

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Department of Radiation Oncology, Icahn School of Medicine at Mount Sinai, New York, NY.
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Address for correspondence: Kenneth Rosenzweig, MD, Department of Radiation Oncology, Icahn School of Medicine at Mount Sinai, One Gustav L. Levy Place—Box 22, New York, NY 10029. E-mail: kenneth.rosenzweig@mountsinai.org
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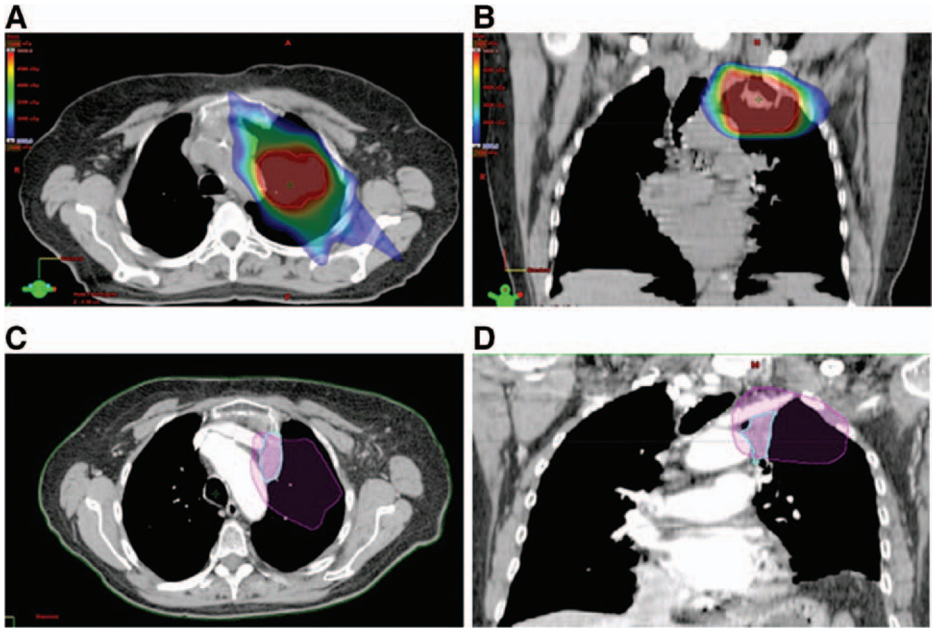

FIGURE 1. Axial and coronal CT images showing the patient's left apical tumor obtained at simulation with the dose colorwash overlaid (*A*, *B*) and the patient's follow-up scan obtained 2 years, 9 months later demonstrating post-radiation fibrosis exerting mass effect upon the course of the left recurrent laryngeal nerve with the 36 Gy isodose line in magenta and the area of fibrosis outlined in cyan (*C*, *D*).