

Purpose: Initial outcome data from our institution have shown that sublobar resection in combination with I-125 brachytherapy is associated with recurrence rates of 2.0%, compared to 18.6% with sublobar resection alone. The objective of this work is to present the technical and dosimetric aspects required to execute this procedure from the radiation oncology perspective, as well as to analyze the dose distributions of patients treated with this technique.

Method and Materials: I-125 seeds in vicryl suture were embedded into vicryl mesh and surgically inserted providing a 2.0 cm margin on each side of the resection staple line. A nomogram was developed to determine the suture spacing in the vicryl mesh, as a function of seed activity in order to deliver 120 Gy at a distance of 0.5 cm above and below the seed array. Postoperative dosimetry consists of CT-based planning and dose volume analysis.

Results: Dose distributions, DVH data, mean dose and NTCP values for lung were analyzed in a group of patients. The mean doses ranged from 3.72 Gy to 9.10 Gy. NTCP values were below 1%. DVH data shows that a small volume of ipsilateral lung was irradiated for all patients. A comparison of brachytherapy with external beam therapy was investigated for one patient. Brachytherapy was judged to be superior to external beam therapy. Results showed that most of the ipsilateral lung volume received a lower dose when treated with an implant to 120 Gy compared to external beam therapy treated to 60 Gy.

Conclusions: Lung brachytherapy with I-125 at the time of sublobar resection is a precise and conformal option of dose delivery for stage I NSCLC patients with compromised physiologic reserve. Patient related toxicity has not been linked to this procedure. This simple technique provides significant lung sparing when compared to standard external beam therapy.