Purpose: To demonstrate the dosimetric potential of volumetric modulated arc therapy (VMAT) for the treatment of patients with medically inoperable stage I/II non-small cell lung cancer (NSCLC) with stereotactic body radiation therapy (SBRT).

Methods: Fourteen patients treated with 3D-CRT with varying tumor locations, tumor sizes and dose fractionation schemes were chosen for study. The target prescription doses were 48 Gy in 4 fractions, 52.5 Gy in 5 fractions, 57.5 Gy in 5 fractions and 60 Gy in 3 fractions for 2, 5, 1 and 6 patients, respectively. VMAT treatment plans with a mix of 2-3 full and/or partial non-coplanar arcs with 5°-25° separations were retrospectively generated using Eclipse version 10.0. The 3D-CRT and VMAT plans were then evaluated by comparing their target dose, critical structure dose, high dose spillage, and low dose spillage as defined according to RTOG 0813 and RTOG 0236 protocols.

Results: The VMAT treatment plans yielded an average 9.6-33.7% reduction in dose to critical structures and an average 12.0-12.5% increase in conformity compared with the treated 3D-CRT plans. The D2cm improved with VMAT in 11 of 14 cases. The 3 that worsened were still within the acceptance criteria. Of the 14 3D-CRT plans, 7 had a D2cm minor deviation, while only one of the 14 VMAT plans had a D2cm minor deviation. The R50% improved in 13 of the 14 VMAT cases. The 1 case that worsened was still within the acceptance criteria of the RTOG protocol. Of the 14 3D-CRT plans, 7 had an R50% deviation. Only 1 of the 14 VMAT plans had an R50% deviation, but it was still improved compared to the 3D-CRT plan.

Conclusions: In this cohort of patients, no dosimetric compromises resulted from planning SBRT treatments with VMAT relative to the 3D-CRT treatment plans actually used in their treatment.