Purpose: Stereotactic body radiotherapy (SBRT) has been applied in treating early stage small lung lesions, delivering hypofractionated doses in a conformal manner. Studies have shown that SBRT has similar outcomes compared with surgery. Conventionally, SBRT lung treatments rely on utilization of multiple small, conformal, static fields in coplanar and non-coplanar arrangements. With the advent of RapidArc, it is important to evaluate the differences in dosimetry and delivery of conformal SBRT lung treatments for both conventional static field and VMAT techniques.

Methods: A retrospective study of 12 patients at our institution who have received SBRT for primary lung lesions was used to evaluate the application of RapidArc for such cases. Originally treated plans utilized eight to ten conformal static coplanar and non-coplanar fields. RapidArc plans were generated in Eclipse using single and multiple arc setups.

Results: As an intensity-modulated modality, RapidArc provides greater freedom as compared to conventional static field delivery, as one can achieve dose uniformity throughout the PTV or replicate the dosimetry synonymous with conventional SBRT. RapidArc is capable of reproducing the high conformality achieved by conventional SBRT; dual arc plans, delivering uniform dose distributions, yielded an average CI100% of 1.11 and D2cm maximum of 63% of the prescribed dose, compared to 1.33 and 77% (p-values of .002 and .005, respectively) for conventional SBRT. Application of a short, non-coplanar arc, in conjunction with dual coplanar arcs, improved sparing of OARs in direct proximity of the PTV at the expense of treatment time. RapidArc allows for faster treatment delivery; conventional SBRT delivery averages 13.7 minutes at our institution, whereas coplanar dual arcs are estimated to average treatment durations of 4.2 minutes.

Conclusions: RapidArc is capable of generating conformal dose distributions and sparing of OARs, allows greater freedom in plan optimization, and reduces treatment time significantly.