Purpose: Traditional SBRT employs approximately 10 static beams with up to 20 Gy per fraction, requiring lengthy treatments which can be difficult for patients to tolerate, increasing the risk of movement, and causing discrepancies in the reproducibility of the breathing cycle. Commercial VMAT systems offer shorter treatment times with modulated beams; however, modulation is often not necessary or desired for small fields. Conformal arc therapy offers efficient beam delivery, but with only one aperture shape and constant beam weighting over all gantry angles. This study evaluates the efficiency of a new SBRT delivery method: a conformal arc with multiple aperture shapes and variable dose rate.

Methods: Three clinical SBRT cases were chosen for this study. Each static field was converted into an arc segment to create a StereoArc plan. Gantry angle ranges were determined from the clinical monitor units, with the MU/degree chosen to maximize the dose rate. All segments were merged into a single arc with variable dose rate. Dose distributions from the StereoArc plans were compared to the clinical static field plans using Pinnacle. Delivery times were compared between the static SBRT plans, both with and without Beam Automation, and equivalent StereoArc plans. All plans were delivered on a Varian TrueBeam using a dose rate of 1000 MU/min.

Results: Dose differences between StereoArc and static plans were minimal. Delivery times for the static plans were 5-8 minutes, while delivery time with StereoArc was less than 3 minutes for all cases, which was equivalent to delivering the static plans with Beam Automation.

Conclusions: Delivery efficiency was improved up to 60%: from 8 minutes for static fields, to less than 3 minutes for StereoArc. StereoArc appears to be both an effective and efficient way of delivering SBRT for centers not wishing to modulate SBRT and without access to Beam Automation.

Funding Support, Disclosures, and Conflict of Interest:

This study is partially supported by NIH grant 1R01CA133539-01A2.