

Purpose: Volumetric modulated arc treatment (VMAT) reduces treatment time over static beam intensity modulated treatment (IMRT) by delivering IMRT using arcs. This clinical study evaluates the feasibility of using VMAT for spine stereotactic body radiotherapy (SBRT) to achieve highly conformal dose distributions that spare adjacent OARs with reduced treatment time.

Methods and Materials: Ten spine SBRT patients were studied retrospectively. IMRT and VMAT plans (one and two arc plans) were generated for each patient. PTV dose coverage, OAR dose sparing, and normal tissue integral dose were measured and compared. Differences in treatment delivery were also analyzed by comparing MLC segments, total MUs, and total treatment time.

Results: The PTV DVHs were comparable between the VMAT and the IMRT plans in the shoulder ( $D_{99\%}$ – $D_{90\%}$ ), slope ( $D_{90\%}$ – $D_{10\%}$ ), and tail ( $D_{10\%}$ – $D_{1\%}$ ) regions. When averaged over all patients, only VMAT<sub>2arc</sub> had a better conformity index than IMRT (1.09 vs. 1.15,  $p=0.007$ ). In terms of cord sparing, IMRT was the best and VMAT<sub>1arc</sub> was the worst. IMRT achieved >10% more  $D_{1\%}$  cord sparing for 6 out of 10 cases and 7-15% more  $D_{10\%}$  sparing over the VMAT<sub>1arc</sub>. For cord sparing, the difference between IMRT and VMAT<sub>2arc</sub> were smaller and statistically insignificant at all dose levels. Differences for other OARs were small and statistically insignificant.

The mean MUs and treatment times were (8711MU, 15.86min), (7730MU, 8.56min) and (6317MU, 7.88min) for IMRT, VMAT<sub>1arc</sub> and VMAT<sub>2arc</sub> plans, respectively. The average integral dose was the lowest for IMRT and the highest for VMAT<sub>1arc</sub>. However, the difference was statistically insignificant.

Conclusions: Although VMAT provided comparable PTV coverage and esophagus sparing for spine SBRT, VMAT<sub>1arc</sub> showed significantly worse cord sparing than IMRT, while VMAT<sub>2arc</sub> was comparable to IMRT. Treatment efficiency is substantially improved with the VMAT technique.