AbstractID: 12612 Title: Intensity Modulated Arc Therapy for Pediatric Brain Tumors

Purpose: Investigate the benefits of intensity modulated arc therapy (IMAT) for pediatric brain tumors over non-coplanar IMRT.

Method and Materials: Nine pediatric patients with posterior fossa tumors, mean age 9.6 years (6.1-15.1), were treated with IMRT within the past year at our institution. For this study, each was re-planned with 54Gy to the PTV with five different methods; 8 field non-coplanar IMRT, single coplanar IMAT, double coplanar IMAT, single non-coplanar IMAT, and double non-coplanar IMAT. For each method, the dose to 95% of the PTV was held constant and the dose to surrounding critical structures were minimized. The plans were compared based on conformality index (CI), MUs, and dose to surrounding normal tissue.

Results: The body V_5 and brain D_{50} for IMAT and double IMAT were reduced ($p<0.01$) compared to NC-IMRT. The body V_{50} and D_{50} to the cochleae were increased ($p<0.01$). For IMAT, the CI and MU were decreased ($p=0.01$). For NC-IMAT, the V_5 was increased ($p=0.01$) but the D_{50} to the right cochlea and both temporal lobes was decreased ($p=0.01$). For double NC-IMAT, the body V_{50}, D_{50} to both cochleae and temporal lobes were decreased ($p<0.01$), however the body V_5 and MU were increased ($p<0.01$). The CI for the double NC-IMAT was also improved ($p=0.05$). Four patients had NC-IMRT plans where both cochleae received greater than 25Gy; the average for these patients was 27.9Gy. The average dose was increased for the IMAT (32.7Gy $p=0.01$) and double IMAT (31.0Gy $p=0.05$). For the NC-IMAT, the dose decreased to 22.5Gy ($p=0.03$) and double NC-IMAT was also decreased (20.0Gy $p<0.01$).

Conclusion: Double NC-IMAT can improve treatment for pediatric posterior fossa tumors over non-coplanar IMRT, and this option may be able to provide dose reduction to certain critical structures. This method has merit and should be considered alongside IMRT for these patients.