

AbstractID: 3035 Title: Comparison of Linac Based Fractionated Stereotactic Radiotherapy and Tomotherapy for Treatment of Skull-Base Tumors

Purpose: To compare and evaluate Tomotherapy and linac based fractionated stereotactic radiotherapy (FSRT) techniques in the treatment of lesions located in the base of skull.

Method and Materials: Five patients with skull-base tumors, originally planned for optical guided FSRT to prescribed doses of 50.4 to 54Gy were replanned using TomoTherapy treatment planning software. All original CT scans, MR-CT fusion defined contours for target and normal structures, and PTV margins were used for Tomotherapy planning. Linac based plans utilized one of the following FSRT planning techniques: non-coplanar or coplanar intensity modulated radiation therapy (IMRT), multiple non-coplanar conformal arcs, and non-coplanar conformal radiation therapy (CRT). These plans were used as the gold standard to which the Tomotherapy plans were compared.

Results: Use of both linac based FSRT and helical tomotherapy generated highly conformal treatment plans. Criteria used for comparison included prescription isodose to target volume (PITV) ratios, inhomogeneity index (II), equivalent uniform dose (EUD) for PTV's, mean normalized total doses (NTD_{mean}) for critical structures, and size of 10, 20, and 30Gy isodose volumes. Non-coplanar linac based plans exhibited a 23% to 50% decrease in PITV ratios, increased II, similar EUD, and generally comparable to improved NTD_{mean} for critical structures when compared to helical tomotherapy, which are coplanar by nature. Use of non-coplanar field arrangements also resulted in a 14% to 72% reduction of these low dose isodose volumes when compared Tomotherapy. All criteria except for the II, which was much improved with Tomotherapy, were found to be similar when coplanar linac based plans were compared to helical tomotherapy plans.

Conclusion: Results show a distinct advantage in using non-coplanar beam arrangements for treatment of skull-base tumors. In the case where disease spreads far inferiorly, limiting the ability to use non-coplanar arrangements, Tomotherapy can be used to generate a comparable treatment plan.