

AbstractID: 4333 Title: Dosimetric study and in-vivo dose verification for conformal avoidance helical tomotherapy of anal adenocarcinoma

Purpose:

Recent studies have shown that for patients with anal canal malignancies, conformal avoidance intensity-modulated radiotherapy (IMRT) could provide better dose homogeneity and sparing of organs-at-risk (OARs) than conventional 3-D radiotherapy techniques. As a new IMRT technique, helical tomotherapy could achieve better dose modulation, and was expected to deliver adequate dose to surface lesion using tangential beams. This study aims to have dosimetric comparison between conformal avoidance helical tomotherapy plans and step-and-shoot IMRT plans for patients of anal adenocarcinoma, and to test the efficacy of helical tomotherapy for skin dose delivery.

Method and Materials:

We retrospectively generated conformal avoidance step-and-shoot IMRT (sIMRT) plans and helical tomotherapy plans for two anal cancer patients, one male and one female, with PTV volume being 5,622 cm³ and 5,280 cm³, respectively. The CORVUS Treatment Planning System was used to generate 7-field sIMRT plans. Helical tomotherapy plans used a jaw width of 2.5 cm. In-vivo skin dose measurements were performed using diodes placed on surface lesion and skin of external genitalia during conformal avoidance helical tomotherapy treatments of a recent anal cancer patient.

Results:

Compared to the sIMRT plans, the helical tomotherapy plans showed significant improvement of dose homogeneity for the PTVs, sharper dose drop-off outside the PTVs, and significantly less radiation to femoral heads and external genitalia in terms of maximum dose and average dose. In-vivo dose measurements showed adequate dose delivery to the surface lesion, and verified reduction of radiation to the skin of external genitalia. The maximum deviation of diode measurement from plan dose is 5.5%.

Conclusion:

Helical tomotherapy plans showed better dose homogeneity and conformity to the PTV and better sparing of OARs in conformal avoidance treatments of anal cancer compared to sIMRT plans. In-vivo dose measurements confirmed the ability of helical tomotherapy for adequate skin irradiation.