

AbstractID: 8967 Title: The impact of scan angles on the visibility of anatomy in on-board digital tomosynthesis (DTS) images for head and neck cancer patients: a single-observer study

Purpose: To assess the impact of scan angles on the visibility of anatomy in on-board digital tomosynthesis (DTS) images as a means to optimize this technique.

Methods and Materials: Head and neck cancer patients undergoing intensity-modulated radiotherapy (IMRT) were enrolled onto this study. For each session, the patient was positioned using laser marks. On-board imaging data sets including CBCT scans as reference, and DTS with 20° and 40° scan angles in the coronal or sagittal directions, respectively, were obtained. Visibility of selected anatomic structures (1=much better, 2=slightly better, 3=comparable, 4=slightly worse, 5=much worse) were assessed by a single observer. Wilcoxon Signed Ranks Test was performed to analyze the statistical significance.

Results: Image data sets were collected from 30 treatment fractions for 12 patients. Overall, in coronal direction, there was no statistically significant difference in visibility between the DTS scan angles of 20° and 40° for base of tongue and cervical vertebral body ($p = 0.083, 0.157$, respectively), except for thyroid cartilage ($p = 0.025$). In sagittal direction, only the hyoid was found to have a statistically significant difference in visibility ($p = 0.025$), while no significant difference was found for the rest of anatomic structures ($p = 0.317, 0.157, 0.317$ for base of tongue, cervical vertebral body, and epiglottis, respectively). However, when assessments for multiple fractions were averaged, no statistically significant difference was found for all anatomic structures in either coronal or sagittal directions.

Conclusions: This single-observer study shows that visibility of anatomy is roughly equal for the scan angle of 40° than 20° in both coronal and sagittal direction. Due to the limitations of single-observer study, more definitive conclusion could not be drawn. Further analysis with a multiple-observer study of more patients is needed to confirm this preliminary result.