

Purpose:To quantify chest wall motion during treatment while the patient executes a breath hold (BH) maneuver for left sided breast cancer patients.

Methods:Three breast cancer patients (left side) who were to receive radiation utilizing the BH technique were prospectively chosen to take part in this study. Treatment plans were generated according to standard clinical treatment planning guidelines. Images were acquired in cine mode using the EPID (Varian Medical Systems, Palo Alto, CA) on a per fraction basis for non step and shoot fields. The chest wall was defined in each image using a logarithmic edge detection algorithm. The distance of the chest wall orthogonal to the reference axis (collimator jaw parallel to chestwall) was determined in 1 cm intervals along this axis. Motion was assessed by the standard deviation of chest wall position and the maximum distance traveled, for each field, each treatment day. The root mean square (RMS) of the standard deviations was computed as well as the average and standard deviations of maximum motion for each 1 cm interval.

Results:420, 205, and 360 images were acquired respectively for patients 1, 2, and 3 for both medial and lateral tangential fields. The total RMS of the motion computed over the entire length of the chestwall was 0.7mm, 0.8mm, and 0.6mm for patients 1-3 respectively. The maximum motion over the entire chest wall for each treatment day was 1.4+1.6mm, 1.9+1.4mm, 1.1+1.3mm on average for the course of treatment.

Conclusions:Chest wall motion during a breath hold treatment was analyzed for three patients and was found to be less than 2mm on average. When using the deep inspiration BH technique to displace the heart from the posterior tangential field border, our study suggests that delivery can be executed with minimal intra-fractional motion.