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The UK HeartSpare Study: randomised evaluation of voluntary deep-inspiratory breath-hold in women undergoing breast radiotherapy.

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PURPOSE:

To determine whether voluntary deep-inspiratory breath-hold (v_DIBH) and deep-inspiratory breath-hold with the active breathing coordinator™ (ABC_DIBH) in patients undergoing left breast radiotherapy are comparable in terms of normal-tissue sparing, positional reproducibility and feasibility of delivery.

METHODS:

Following surgery for early breast cancer, patients underwent planning-CT scans in v_DIBH and ABC_DIBH. Patients were randomised to receive one technique for fractions 1-7 and the second technique for fractions 8-15 (40 Gy/15 fractions total). Daily electronic portal imaging (EPI) was performed and matched to digitally-reconstructed radiographs. Cone-beam CT (CBCT) images were acquired for 6/15 fractions and matched to planning-CT data. Population systematic () and random errors () were estimated. Heart, left-anterior-descending coronary artery, and lung doses were calculated. Patient comfort, radiographer satisfaction and scanning/treatment times were recorded. Within-patient comparisons between the two techniques used the paired t-test or Wilcoxon signed-rank test.

RESULTS:

Twenty-three patients were recruited. All completed treatment with both techniques. EPI-derived were $\leq 1.8\text{mm}$ (v_DIBH) and $\leq 2.0\text{mm}$ (ABC_DIBH) and $\leq 2.5\text{mm}$ (v_DIBH) and $\leq 2.2\text{mm}$ (ABC_DIBH) (all p non-significant). CBCT-derived were $\leq 3.9\text{mm}$ (v_DIBH) and $\leq 4.9\text{mm}$ (ABC_DIBH) and $\leq 4.1\text{mm}$ (v_DIBH) and $\leq 3.8\text{mm}$ (ABC_DIBH). There was no significant difference between techniques in terms of normal-tissue doses (all p non-significant). Patients and radiographers preferred v_DIBH (p=0.007, p=0.03, respectively). Scanning/treatment setup times were shorter for v_DIBH (p=0.02, p=0.04, respectively).

CONCLUSIONS:

v_DIBH and ABC_DIBH are comparable in terms of positional reproducibility and normal tissue sparing. v_DIBH is preferred by patients and radiographers, takes less time to deliver, and is cheaper than ABC_DIBH.