

Purpose:

We have applied OBI guidance together with a respiratory gating system to effectively control patient positioning for amplitude gating treatment with breath hold. The deep inspiration breath-hold treatment has been proven effective in reducing the heart dose for left-breast treatment. Breath-hold technique is also useful for other sites where respiratory motion exists. In this study, we quantified the degree of intra-fraction motion detected via continuous monitoring of patient position throughout treatment delivered during a single breath hold or multiple breath holds.

Method and Materials:

A real-time position management (RPM) system (Varian, CA) was used to monitor radiation treatment for patients with tumors located in the thoracic through upper-abdominal regions and the left breast. Simulation CT scans were acquired during breath holds when the breathing level was between the upper and lower thresholds that were pre-set in the RPM system. OBI kV radiographs and CBCT images were used to verify the patient position and breath-hold level during the treatment sessions. To assure accurate positioning, the OBI/CBCT images were acquired only when the breathing level was within the same thresholds as those used for the simulation CT. Cine mode portal vision images were acquired every second during treatment. The intra- and inter-breath-hold position variations were analyzed based on the cine mode portal vision and kV radiographic images.

Results:

The intra-/inter- breath-hold position variations were analyzed for a total of ninety two fractions in six patients undergoing OBI guided breath-hold treatments. The breath hold length ranged from 10 to 50 seconds. The intra-breath-hold position variation was within 2 mm. The inter-breath-hold position variation, within the same fraction, was within 4 mm.

Conclusion:

With proper OBI guidance and respiratory gating, the breath-hold technique can effectively control the target position for treatment of cancer sites where respiratory motion exists.