Effects of ECG gating and postprocessing techniques on 3D MDCT of the bronchial tree

Thomas Schertler, Simon Wildermuth, Jürgen K Willmann, Hatem Alkadhi, Borut Marinecek & Thomas Boehm

OBJECTIVE: Our goal was to determine the impact of ECG gating and different postprocessing techniques on 3D imaging of the bronchial tree. SUBJECTS AND METHODS. Retrospective ECG-gated MDCT and non-ECG-gated MDCT of the chest were performed in 25 patients. ECG-gated MDCT data were reconstructed mid diastole using a fixed interval of -400 msec in 25 patients and then additionally at -200, -300, and -500 msec in 10 of those patients. Shaded surface display and volume rendering of the bronchial tree combined with virtual bronchoscopy were performed using all data sets. The extent of bronchial tree visualization in shaded surface display-virtual bronchoscopy and volume rendering-virtual bronchoscopy and the presence of artifacts in volume-rendered images were scored by three blinded reviewers. The effective radiation doses of the ECG-gated and nongated acquisitions were compared. RESULTS: The summary scores of all bronchial segments for gated shaded surface display-virtual bronchoscopy and gated volume rendering-virtual bronchoscopy did not differ significantly. The summary scores for nongated shaded surface display-virtual bronchoscopy and nongated volume rendering-virtual bronchoscopy were not significantly different. Non-gated acquisition yielded significantly better visualization of the bronchial tree for both postprocessing techniques, regardless of the time interval used for reconstruction of the ECG-gated series. Artifact scores in volume-rendered images were significantly higher for ECG-gated MDCT compared with nongated MDCT. Effective radiation dose was significantly higher for the ECG-gated acquisition. CONCLUSION: Given the advantage of volume rendering for representing the entire data set and given the lower radiation dose and better 3D image quality of nongated acquisition, volume rendering performed on nongated MDCT data is the method of choice for 3D visualization of the bronchial tree.