Retrospectively ECG-gated multi-detector row CT of the chest: does ECG-gating improve three-dimensional visualization of the bronchial tree?

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PURPOSE: To determine the impact of retrospectively ECG-gated multi-detector row CT (MDCT) on three-dimensional (3D) visualization of the bronchial tree and virtual bronchoscopy (VB) as compared to non-ECG-gated data acquisition.

MATERIALS AND METHODS: Contrast-enhanced retrospectively ECG-gated and non-ECG-gated MDCT of the chest was performed in 25 consecutive patients referred for assessment of coronary artery bypass grafts and pathology of the ascending aorta. ECG-gated MDCT data were reconstructed in diastole using an absolute reverse delay of -400 msec in all patients. In 10 patients additional reconstructions at -200 msec, -300 msec, and -500 msec prior to the R-wave were performed. Shaded surface display (SSD) and virtual bronchoscopy (VB) for visualization of the bronchial segments was performed with ECG-gated and non-ECG-gated MDCT data. The visualization of the bronchial tree underwent blinded scoring. Effective radiation dose and signal-to-noise ratio (SNR) for both techniques were compared.

RESULTS: There was no significant difference in visualizing single bronchial segments using ECG-gated compared to non-ECG-gated MDCT data. However, the total sum of scores for all bronchial segments visualized with non-ECG-gated MDCT was significantly higher compared to ECG-gated MDCT (P < 0.05). The summary scores for visualization of bronchial segments for different diastolic reconstructions did not differ significantly. The effective radiation dose and the SNR were significantly higher with the ECG-gated acquisition technique (P < 0.05).

CONCLUSION: The bronchial tree is significantly better visualized when using non-ECG-gated MDCT compared to ECG-gated MDCT. Additionally, non-ECG-gated techniques require less radiation exposure. Thus, the current retrospective ECG-gating technique does not provide any additional benefit for 3D visualization of the bronchial tree and VB.