Three-dimensional magnetic resonance imaging using single breath-hold k-t BLAST for assessment of global left ventricular functional parameters.

Abstract:

To determine the accuracy of three-dimensional k-t broad-use linear acquisition speed-up technique (k-t BLAST) accelerated magnetic resonance imaging (MRI) for the assessment of left ventricular (LV) parameters compared to segmented multiple breath-hold cine imaging. A multislice cine (steady state free precession [SSFP]) sequence was performed with complete ventricular coverage during multiple breath-holds (temporal resolution 47 ms, voxel size 1.25 × 1.25 × 8 mm(3)). In addition, two k-t BLAST sequences with complete coverage were acquired, KT1 (temporal resolution 57 ms, voxel size 1.25 × 1.25 × 4 mm(3)) and k-t2 (temporal resolution 57 ms, voxel size 1.25 × 1.25 × 8 mm(3)), during a single breath-hold. For comparison of SSFP and k-t BLAST, LV parameters were determined: ejection fraction (EF), end-diastolic volume, end-systolic volume, and LV mass. EF was underestimated by KT1 (47%) and KT2 (48%) compared to the SSFP sequence (53%). All parameters showed high correlation with the k-t BLAST sequences and the SSFP sequence (r = 0.88-0.98, P < .001). The mean relative difference for KT1/KT2 compared to the SSFP sequence was -0.11/-0.09 for the EF, -0.073/-0.086 for the EDV, 0.044/0.051 for the ESV, and 0.085/0.12 for the LV mass. The use of three-dimensional k-t BLAST enabled
a determination of the LV parameters with high correlation compared to the SSFP sequence. EF was slightly underestimated, and LV mass was slightly overestimated.