CARDIAC

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Assessment of regional left ventricular function with multidetector-row computed tomography versus magnetic resonance imaging

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Abstract This study compares quantitative and qualitative information on global and regional left ventricular (LV) function obtained with multidetector-row computed tomography (MDCT) with that obtained with magnetic resonance imaging (MRI) in patients with a high prevalence of LV wall motion abnormalities. Thirty patients (19 male, 63.7±15.1 years) with myocardial infarction (n=12), coronary artery disease (n=9), arrhythmogenic right ventricular cardiomyopathy (n=6), and dilation cardiomyopathy (n=3) were included. Segmental LV wall motion (LV-WM) was assessed using a 4-point scale. Wall thickness measurements were calculated in diastolic and systolic short axis images. Two hundred and fifty-two out of 266 (94.7%) normal and 189 out of 214 (88.3%) segments with decreased wall motion were correctly identified by MDCT, yielding a sensitivity of 88% and specificity of 95% for identification of wall motion abnormalities. LV-WM scores were identical in 86.7% of 480 segments (κ=0.809). MDCT had a tendency to underestimate the degree of wall motion impairment. Interobserver agreement was lower in MDCT (66.5%) than in MRI (89.1%; p<0.01). Normokinetic segments are reliably identified with MDCT. Sensitivity for detection and accurate classification of LV wall motion abnormalities need to be improved. Better temporal resolution of the CT system seems to be the most important factor for enhancing MDCT performance.

Keywords Multidetector-row spiral computed tomography · Regional left ventricular function · Global left ventricular function · Cine magnetic resonance imaging · Semiautomated MDCT data analysis

Introduction

Accurate and reproducible determination of left ventricular (LV) function is fundamental for the diagnosis, disease stratification, treatment planning, and estimation of prognosis in patients with ischemic and non-ischemic cardiomyopathy [1, 2]. While analysis of global LV function focuses on the assessment of LV volume changes, regional LV wall motion expressed by dynamic changes in myocardial wall thickness reveals detailed information on the functional state and viability of ischemic and non-ischemic myocardium. Regional LV wall motion can be assessed visually on cine loops from echocardiography, cineventriculography or magnetic resonance imaging (MRI).

Multi-detector row spiral computed tomography (MDCT) of the heart is being used increasingly to detect obstructive coronary artery disease and to evaluate bypass graft patency with high accuracy [3–5]. Since image reconstruction is possible in virtually any phase of the cardiac cycle by retrospective ECG gating, assessment of ventricular volume changes using MDCT is feasible [6–11]. Global LV function parameters calculated with 16-

slice MDCT were compared favorably with MRI results in recent studies [11–14]. Results of a combined assessment of global and regional function in patients with a high prevalence of regional wall motion disturbances using 16-slice MDCT have not been published. Also, data on interobserver variation for regional LV function parameters have not been documented in patients.

The aim of this study was to compare regional and global LV function parameters and the interobserver variation of regional function assessment using 16-slice MDCT in comparison to MRI in patients with different ischemic and non-ischemic cardiomyopathies.

Materials and methods

Patients

Thirty patients (mean age 63.7±15.1 years; 19 men) with previous myocardial infarction (MI, $n=12$), suspected coronary artery disease (CAD, $n=9$), echocardiographically suspected arrhythmogenic right ventricular cardiomyopathy (ARVC, $n=6$), or dilation cardiomyopathy (DCM, $n=3$) were referred for MDCT coronary angiography to non-invasively determine coronary artery plaque burden, to assess coronary artery bypass graft patency or to rule out obstructive coronary artery disease. The study had been approved by the Institutional Review Board, and the patient's written informed consent for the MDCT and MRI study had been obtained.

Imaging procedures

All MDCT studies were performed on a 16-slice CT system (Somatom Sensation 16, Siemens Medical Solutions, Forchheim, Germany) using standard parameters for coronary artery MDCT angiography (detector configuration 16×0.75 mm, 120 kV, 550 mAs, rotation time 420 ms, table speed 3.4 mm/rotation). Prospective tube current modulation was not used, resulting in an estimated effective radiation dose of 10.5 mSv for male and 12.8 mSv for female patients. One hundred milliliters of non-ionic contrast material (iomeprol 300 mg iodine/ml) were injected via an antecubital vein at a flow rate of 3.5 ml/s followed by a 50-ml saline chaser bolus using a double head power injector (Injektron CT2, Medtron, Saarbrücken, Germany).

Short axis image reformations covering the entire left ventricle (field of view of 200×200 mm, matrix of 512×512, section thickness 8 mm, no gap) at 5% steps throughout the entire R-R interval were reconstructed from the raw data using the scanner's standard reconstruction algorithm and documentation software (ACV-Algorithm, Syngo Software Version VB-10 B, Siemens Medical Solutions). The section thickness was set to 8 mm to equal the section thickness routinely obtained by MRI. As the reconstruction algorithm is influenced by the patient's heart rate the expected temporal resolution ranged from 105 to 210 ms.

Magnetic resonance imaging was performed on a whole-body 1.5 T unit (Gyroscan Intera, software release 9.1, Philips Medical Systems, Best, The Netherlands) equipped with Master Gradients using a five-element cardiac synergy coil with vectorcardiogram option for signal reception (Philips Medical Systems). All MRI studies were scheduled on the same day within 6 h of the MDCT examination. Following survey scout images in axial, coronal, and sagittal orientation a prospectively ECG-gated breath-hold steady-state free precession cine sequence (balanced fast-field-echo sequence: repetition/echo time 3.4/1.6 ms, flip angle 50°, temporal resolution 40 ms, matrix 180×256, field of view ≤380×320 mm; section thickness 8 mm, no intersection gap) was acquired in short-axis image orientation at end-expiratory suspension.

Data analysis

Global LV function parameters from MDCT studies were measured by one reader using a commercially available software package for cardiac function analysis (CT MASS 6.1, Medis, Leiden, The Netherlands) supporting automatic endo- and epicardial contour detection. Contours were checked visually and manually corrected if necessary. LV volumes and global LV function parameters were calculated by the software, which is described elsewhere [15]. The most basal slice was defined as the image showing LV myocardium in at least 50% of its perimeter and the most apical image was the last image with a detectable LV lumen. Papillary muscles were included in the LV cavity. Mean segmental end-diastolic wall thickness (EDWT) and end-systolic wall thickness (ESWT) were calculated for every segment using equidistantly distributed software-generated chords oriented perpendicular to the endocardial and epicardial border (Fig. 1).

Segmental left ventricular wall motion analysis was performed on short axis cine loops by two independent readers with either 6-year (reader 1) or 4-year experience (reader 2) in cardiac imaging. Both readers were unaware of clinical data. A modified version of the 17-segment AHA model was used to record wall motion in a basal, a mid-ventricular, and an apical section [16]. In order to make sure that CT and MRI assessments were based on the same level, the distance for each basal, midventricular and apical section from the most basal slice was recorded and the anatomic position was checked against the papillary muscle attachment. Each LV segment was assigned a score from a 4-point scale (1 = normal, 2 = hypokinetic, 3 = akinetic, 4 = dyskinetic).

Global LV function parameters and wall thickness measurement from MRI studies were determined by reader

Fig. 1 Global and regional left ventricular (LV) wall motion assessment from **a**, **b** 16-slice multi-detector row spiral computed tomography (MDCT) and **c**, **d** cine magnetic resonance imaging (MRI) using dedicated CT and MRI analysis software (MASS, Leiden, The Netherlands) on a 21-year-old man with echocardiographically suspected dilated cardiomyopathy (DCM) and positive past medical history of familiar sudden cardiac death and DCM referred for non-invasive exclusion of coronary artery disease. End-diastolic (**a**, **c**) and end-systolic (**b**, **d**) short-axis reformations revealed an enlarged LV with an end-diastolic volume of 387.8 ml, severely reduced LV ejection fraction of 25.6%, and circumferentially markedly impaired regional left ventricular (LV) motion
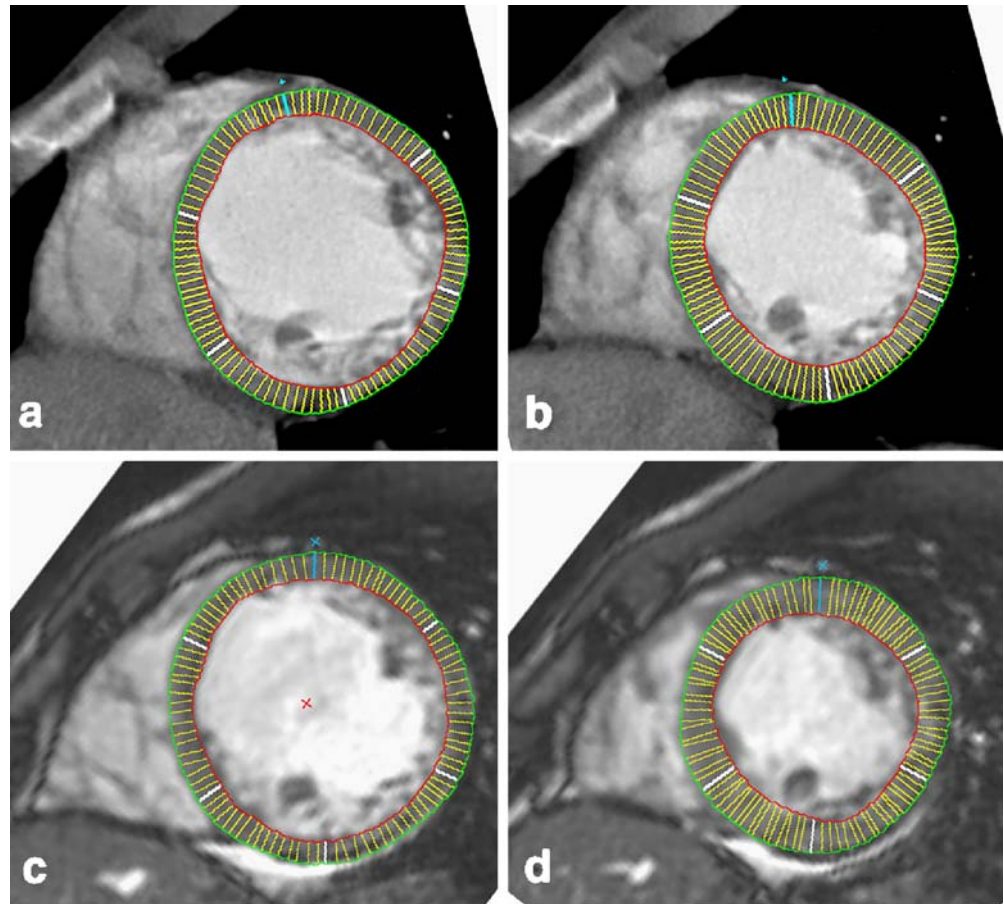
1 using the MRI-compatible version of the analysis software (MR MASS suite 6.1, Medis) on an offline workstation employing identical criteria to those used with the CT evaluation. MRI regional wall motion assessment was performed in random order independently by readers 1 and 2 4–6 weeks after assessment of the CT images.

Statistical analysis

All numerical values are expressed as mean and standard deviation. LV volume results from MDCT and MRI were tested for significant differences using the Wilcoxon test for paired samples. A p value <0.05 was considered statistically significant. Agreement between continuous variables was assessed by Lin's concordance coefficient p_c [17]. Substantial agreement can be assumed for p_c>0.90. Systematic errors and limits of agreement between global function results from MDCT and MRI were calculated using the method described by Bland and Altman [18].

To assess interobserver variation with regard to LV wall motion findings by CT and MRI absolute agreement was defined as identical LV wall motion scores by both readers and disagreement was any deviation of more than one score point between the two readers. Agreement between MDCT and MRI with regard to LV wall motion scores was assessed using kappa statistics: a kappa value below 0.4 represented poor agreement, a kappa value between 0.4 and 0.75 fair to good agreement, and a kappa value >0.75 was considered excellent agreement according to the Fleisch classification [19].

Results

Seventeen patients did take oral beta-blocker medication and the remaining 13 patients received a beta-adrenoreceptor antagonist per os (propranolol 80 mg) 45 min before the examination to lower their heart rate prior to MDCT coronary artery imaging. The mean heart rate was 64± 7.7 bpm during the CT examination and 68±8.2 bpm during the MRI examination. All 30 patients completed the MDCT and MRI studies without complication.

Global LV function

The results of volume and global function measurements are summarized in Table 1. The concordance coefficient indicated substantial agreement between LV-EDV (p_c=0.96),

Table 1 Left ventricular (*LV*) volume and global function parameters derived from 16-slice multi-detector row spiral computed tomography (*MDCT*) in 30 patients compared with magnetic resonance imaging (*MRI*). *LV-EDV* left ventricular end-diastolic volume, *LV-ESV* left ventricular end-systolic volume, *LV-SV* left ventricular stroke volume, *LV-EF* left ventricular ejection fraction, *n.s.* not significant

	MDCT	MRI	MDCT vs. MRI			
	Mean±SD	Mean±SD	Wilcoxon test p	Lin's correlation coefficient p_c	Mean difference ±SD	Limits of agreement ±1.96 SD
LV-EDV (ml)	185.2±65.2	191.2±68.1	n.s.	0.9598	−16.8±19.4	−55.6–22.0
LV-ESV (ml)	90.3±25.8	88.4±22.1	n.s.	0.9429	6.9±10.2	−13.5–27.3
LV-SV (ml)	94.6±48.1	102.8±53.6	0.02	0.9393	−7.4±11.2	−29.8–15.0
LV-EF (%)	49.6±9.5	51.8±9.2	0.02	0.8341	−2.5±4.2	−10.9–5.9

LV-ESV (p_c=0.943), and LV-SV (p_c=0.939) measurements from MDCT and MRI. The agreement on the left ventricular ejection fraction (LV-EF) was moderate (p_c=0.835). The mean LV-EF calculated from MDCT was 49.6±9.5% versus 51.8±9.2% derived from MRI. Bland-Altman analysis showed a mean systematic underestimation of LV-EDV, LV-SV, and LV-EF by MDCT compared with MRI (Fig. 2). The mean error was −2.5±4.2% for the LV-EF. Mean LV-ESV was slightly larger in MDCT than in MRI.

Regional LV function

Reader 1 found wall motion abnormalities using MRI in 27 of the 30 patients. All patients with motion disturbances by MRI were also classified as pathologic by MDCT. In one

Fig. 2 Bland-Altman plot demonstrates left ventricular ejection fraction (*LV-EF*) obtained by 16-slice MSCT vs. MRI. The systematic error for LV-EF estimation using MDCT was −2.5±4.2%

patient without impaired wall motion by MRI five segments from the anterior and midventricular septum and the anterior and midventricular lateral wall were regarded as hypokinetic using CT. Reader 1 graded 266 out of 480 LV segments (55.4%) as normal on MRI and 214 segments (44.6%) had regional wall motion disturbances: 155 segments were hypokinetic, 49 akinetic, and 10 dyskinetic (Fig. 3). MDCT and MRI were in agreement in 416 out of 480 segments (86.7%). The weighted kappa value of 0.809 (standard error ± 0.023) indicated excellent agreement. Reader 1 correctly identified 94.7% normal (252 out of 266) and 88.3% (189 out of 214) pathologic segments resulting in a sensitivity of 88%, specificity of 95%, positive predictive value of 91%, and negative predictive value of 93% for identification of wall motion abnormalities by MDCT. Fourteen normal LV segments were misclassified as hypokinetic (*n*=12) and akinetic (*n*=2) by MDCT. Results are summarized in Table 2.

Overall agreement between the two modalities was weaker in segments with wall motion impairment. One hundred and sixty-four out of 214 (76.6%) segments with disturbed wall motion were assigned the same score. MDCT had a tendency to underestimate the degree of wall motion impairment as 23 hypokinetic segments and 2 akinetic segments were regarded as normal, while only 13 hypokinetic segments and 2 akinetic segments were overgraded as either akinetic or dyskinetic (see Table 2).

Reader 2 graded 279 out of 480 segments as normal on MRI, 225 (80.6%) of which he classified as normal by MDCT. One hundred and eighty-three out of 201 segments (91.0%) with motion impairment on MRI were identified on MDCT. The weighted kappa value comparing MDCT and MRI for reader 2 was 0.751 (standard error 0.035).

Interobserver agreement for both readers was excellent in MRI. Identical wall motion scores were assigned to 89.1% of LV segments by readers 1 and 2. Agreement between MDCT results was much weaker as only 319 out of the 480 segments (66.5%, *p*<0.05) had identical scores (see Table 3). The main differences between the two readers analyzing MDCT data occurred in the interventricular septum distinguishing normal from hypokinetic
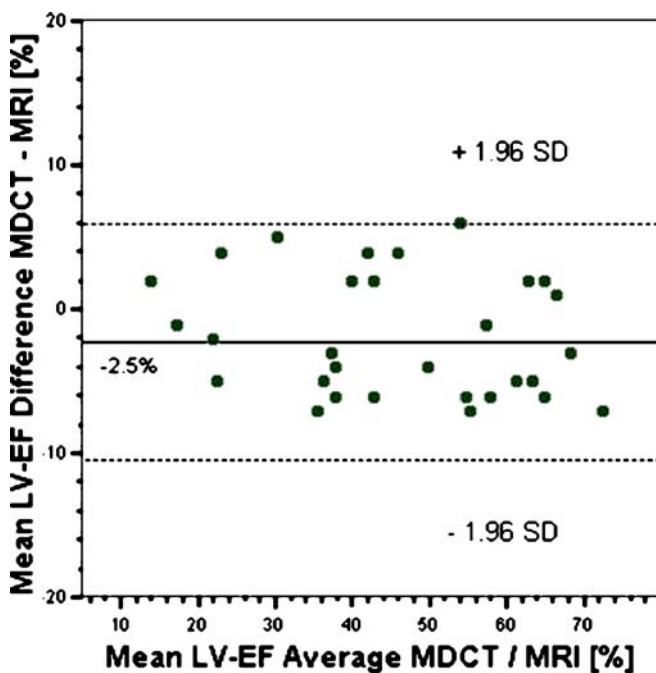
Fig. 3 a, **b** Sixteen-slice MDCT and **c**, **d** cine MRI study of a 74-year-old man with three-vessel coronary heart disease: diastolic (**a**, **c**) and systolic (**b**, **d**) mid-ventricular LV short-axis reformations demonstrate reduced global LV function (LV-EDV 176.3 ml, LV-ESV 115.8 ml, LV-EF 34.5%), thinning and regional akinesia of inferior and infero-septal LV myocardium (*arrows*) due to chronic myocardial infarction
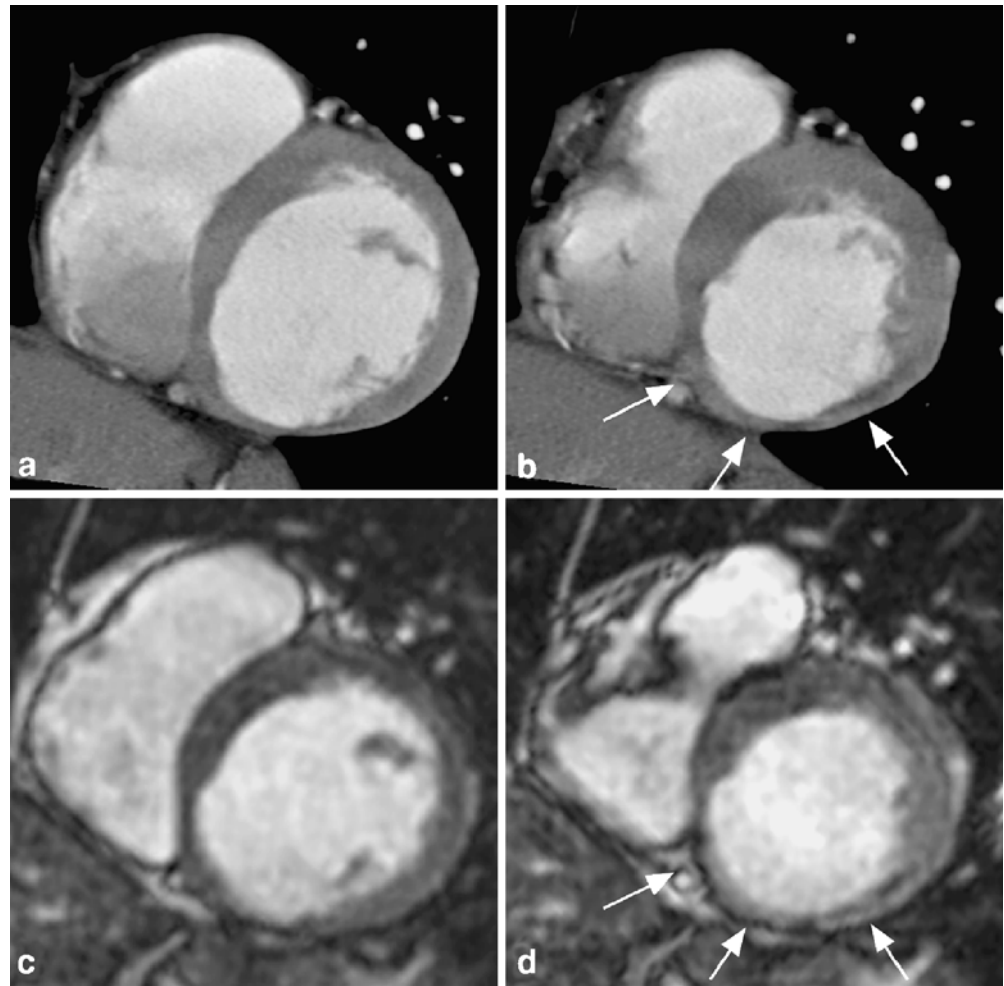
segments and in the lateral LV wall differentiating hypokinetic from akinetic segments.

Absolute wall thickness measurements revealed only small mean differences for all 480 segments between MRI and MDCT comparing end-diastolic wall thickness (-0.54 ± 2.19 mm) and end-systolic wall thickness (-0.56 ± 2.39 mm). Mean differences, however, did underestimate the absolute deviations in myocardial thicknesses found by CT and MRI (see Table 4). If an absolute difference in

measured wall thickness greater 2 mm is taken as clinically significant, 327 out of 480 LV segments (68.1%) had significant differences in wall thickness for end-diastolic images and in 257 out of 480 LV segments (53.5%) for end-systolic images. Figure 4 gives an overview of the location and number of segments with similar wall thickness for systolic and diastolic images. Agreement in wall thickness measurements was better in diastolic images than in systolic images.

Table 2 Cross-tabulation demonstrating results of visual analysis of LV wall motion from 16-slice MDCT compared with MRI in 480 LV segments

MRI: Reader 1 MDCT: Reader 1	Normal	Hypokinetic	Akinetic	Dyskinetic	Total
Normal	252	23	2	–	277
Hypokinetic	12	119	7	1	139
Akinetic	2	13	38	2	55
Dyskinetic	–	–	2	7	9
Total	266	155	49	10	480

Table 3 Cross-tabulation demonstrating results of visual analysis of LV wall motion from 16-slice MDCT by two independent readers in 480 LV segments

MDCT: Reader 1 MDCT: Reader 2	Normal	Hypokinetic	Akinetic	Dyskinetic	Total
Normal	202	32	9	–	243
Hypokinetic	58	91	22	2	173
Akinetic	17	15	22	3	57
Dyskinetic	–	1	2	4	7
Total	277	139	55	9	480

Table 4 Mean absolute differences for segmental wall thickness measurements found between 16-slice MDCT and MRI for end-diastolic and for end-systolic short axis images in 30 patients. *EDWT* end-diastolic wall thickness, *ESWT* end-systolic wall thickness

LV segments	Absolute difference MRI–MDCT	
	EDWT (mm) Mean±SD	ESWT (mm) Mean±SD
Basal segments		
Anterior S1	−0.66±2.62	−2.43±3.54
Anteroseptal S2	−1.02±1.89	−1.46±1.84
Inferoseptal S3	−1.36±1.51	−0.53±2.05
Inferior S4	−0.29±1.51	0.03±1.59
Inferolateral S5	0.54±2.41	2.57±3.39
Anterolateral S6	−1.18±1.89	−0.89±2.72
Mid-ventricular segments		
Anterior S7	−1.73±1.13	−0.34±2.14
Anteroseptal S8	−1.44±0.85	−1.21±2.18
Inferoseptal S9	−0.43±1.09	0.04±2.27
Inferior S10	−0.22±1.14	−0.44±1.28
Inferolateral S11	−0.21±1.77	−0.46±2.16
Anterolateral S12	−0.26±1.61	−0.20±2.02
Apical segments		
Anterior S13	−0.90±1.12	−0.03±2.05
Septal S14	0.06±2.19	0.33±3.10
Inferior S15	1.11±2.76	−0.66±2.67
Apical S16	−0.67±1.75	−3.27±1.24

Discussion

Magnetic resonance imaging is the reference modality for the assessment of global and regional LV function. The present study confirms an excellent agreement of 16-slice MDCT with MRI for global LV function analysis. Global LV function reflects cardiac hemodynamics and serves as a fundamental parameter for diagnosis, disease stratification, and management of ischemic and non-ischemic cardiomyopathy. Global LV function is the strongest determinant of pump failure and death due to myocardial infarction [1, 2, 20]. Early studies using 4-slice MDCT confirmed that evaluation of cardiac function is feasible by multidetector-row CT in patients with suspected or manifest CAD [7, 9, 10, 20–23], but a systematic underestimation of LV-EF of up to 11.5% had to be accounted for [21]. Newer studies using 16-slice systems with faster rotation speed and thus better temporal resolution reduced the gap between MRI and CT [11, 13, 24]. Contrary to our study, most other reports included patients with suspected coronary artery disease and near normal function. Our study population consisted of patients with a variety of cardiac diseases and therefore a large range of LV volumes were seen. The mean difference in LV-EF of −2.5%, as found our study, is similar to values reported earlier and confirms that CT yields acceptable results for global function evaluation
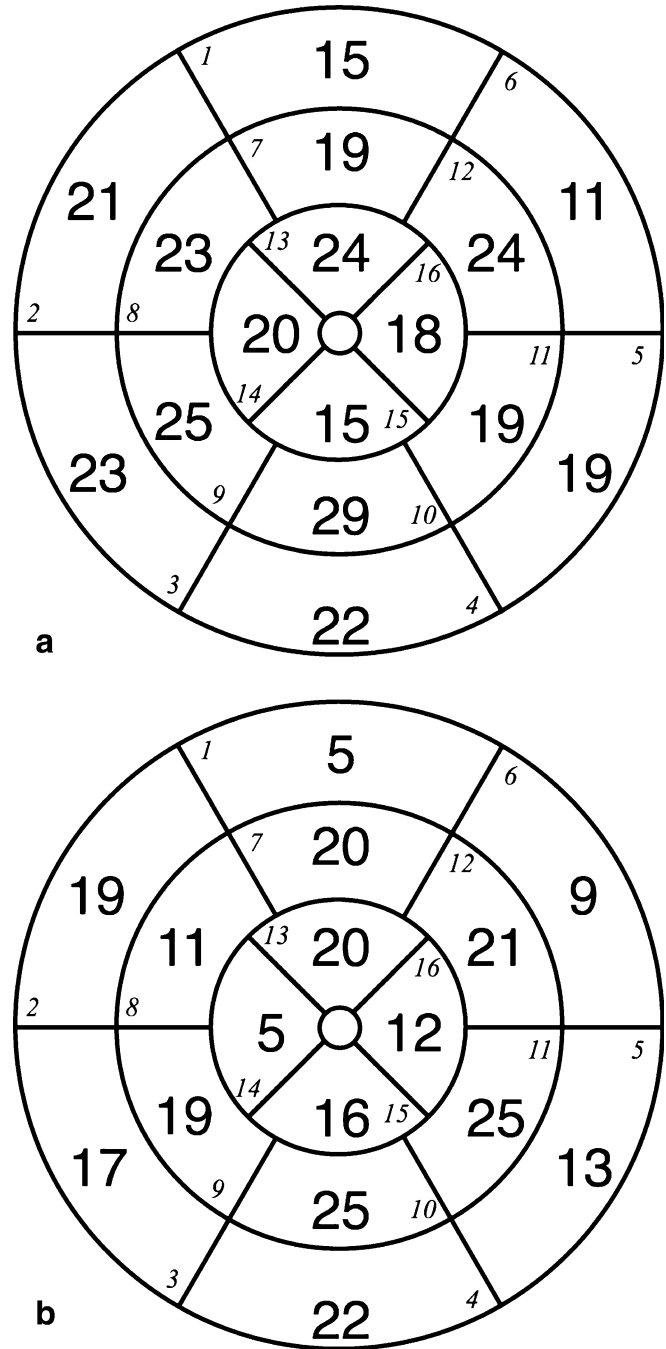

Fig. 4 Bulls eye plots showing the number of LV wall segments with similar (±2 mm) wall thickness measured by CT and MRI for **a** diastolic and **b** systolic images. The *outer circle* represents the basal segments, the *middle circle* the mid ventricular segments and the *inner circle* the apical segments modified from the AHA model [20]. *Numbers* represent the number of segments with similar wall thickness, segment numbers are denoted by *small italics*: *1*. basal anterior, *2*. basal anteroseptal, *3*. basal inferoseptal, *4*. basal inferior, *5*. basal inferolateral, *6*. basal anterolateral, *7*. mid anterior, *8*. mid anteroseptal, *9*. mid inferoseptal, *10*. mid inferior, *11*. mid inferolateral, *12*. mid anterolateral, *13*. apical anterior, *14*. apical septal, *15*. apical inferior, *16*. apical lateral

even in patients with reduced LV function. The mean underestimation of LV-EF and LV-SV found in our study is explained by the impaired temporal resolution of MDCT compared with MRI, resulting in the inability of MDCT to image the peak systolic contraction. The degree of LV-EF underestimation, however, does not seem to be clinically relevant. The minor absolute differences found in LV-ESV and LV-EDV are probably due to systematic differences between the different modalities employed.

Abnormalities of regional ventricular wall motion are important markers of myocardial ischemia and are usually assessed by cardiac ultrasound or MRI. MDCT has been used for regional wall motion evaluation with promising results, but these studies are compromised by small patient numbers or the restriction to patients with normal or near normal regional LV function [20, 22, 23, 25]. Sixteen-slice MDCT has been used to evaluate regional LV wall motion in patients with known or suspected CAD or acute myocardial infarction in comparison to MRI [12, 13]. The study by Koch et al. in patients with suspected CAD and almost normal LV function reported an overall agreement in wall motion scores in 97.1%, but only 16% of LV segments had wall motion abnormalities [13]. In our study 44.6% of LV segments in 27 out of 30 patients had regional wall motion disturbances. Agreement between MRI and CT in a per segment analysis was 86.7%, which is similar to the results by Mahnken et al. who reported an agreement in 86.3% of ventricular segments, of which 37% had regional wall motion disturbances due to acute myocardial infarction [12].

In our study, differences between MRI and CT occurred mostly in segments with wall motion abnormalities, which were usually underestimated by CT. Of the normal segments, 94.7% were assessed correctly, which is reflected by a high negative predictive value of 93% for CT.

Despite the good overall agreement of MDCT with MRI interobserver agreement was only moderate using MDCT. Only 66.5% of all segments received identical wall motion scores on MDCT, while MRI results were highly reproducible. The good interobserver agreement found for MRI is in concordance with the excellent reproducibility reported previously [26–28]. The deviations observed with MDCT have to be explained by the limited temporal resolution of the MDCT system used in our study. The system uses a rotation speed of 420 ms resulting in 105–210 ms temporal resolution depending on the patient's heart rate. Motion artifacts during rapid filling and contraction can impair delineation of myocardial borders and wall motion disturbances may be obscured or misclassified. As step artifacts will predominantly affect the quality of structures with a perpendicular orientation to the axial scan plane, the interventricular septum and the lateral wall suffered most. This is a potential explanation of the higher degree of disagreement between the two readers seen in these segments. Impaired image quality due to

motion artifacts also explains the variation in segments graded with CT as normal by the two readers (see Table 3).

The difficulties encountered in the assessment of left ventricular wall motion have been described in an experimental study in pigs comparing peak filling and peak ejection rates by 16-slice CT and MRI. Significant differences in these time-dependent parameters were attributed to the inferior temporal resolution in CT [29].

Systems with better temporal resolution should significantly improve wall motion assessment with CT. Optimized reconstruction algorithms using segmented data from multiple heart beats may achieve better temporal resolution at the expense of decreased spatial resolution [30]. Another approach would be to increase the tube rotation speed. New 64-slice systems achieve 330-ms rotation time yielding a temporal resolution of 165–183 ms. Our results indicate that a reliable wall motion evaluation is not advisable in 16-slice MDCT with rotation speeds slower than 420 ms. Even if normal segments are identified with good reliability, the interobserver variation found in pathologic segments and the underestimation of wall motion disturbances compared with MRI will limit the clinical use of MDCT. This is underlined by the absolute wall thickness measurements, which yielded quite different results for MDCT and MRI. MDCT had a strong tendency to overestimate wall thickness and less than 60% of all segments had an absolute thickness within ±2 mm of the values obtained with MRI. Besides a systematic error between the two different modalities, the inferior temporal resolution of MDCT remains the most important factor explaining this observation. Motion effects resulting in stepping artifacts impair delineation of the myocardial contours and cause overestimation of absolute wall thickness measurements. Therefore, motion free cardiac imaging remains the key requirement for reliable wall motion assessment.

A significant improvement of temporal resolution by either optimized image reconstruction algorithms or increased rotation speed is mandatory for MDCT to match results obtained from competing modalities. Nevertheless, even with 16-slice MDCT visual assessment of myocardial wall motion to differentiate normal from abnormal wall motion seems possible with acceptable agreement between MDCT and MRI.

Advances in CT reconstruction technology will make wall motion assessment easier in the future. Our system allowed to reconstruct primary multiplanar images from the CT raw data in short axis orientation, avoiding the use of primary multiphase axial images and secondary reformations. This approach decreases the number of images that are generated and shortens user interaction during data post-processing, which will improve the clinical acceptability of CT for LV function assessment with coming scanner generations. A significant decrease in assessment time has already been achieved with dedicated analysis

software offering semiautomatic chamber segmentation or myocardial contour detection [31].

Some limitations of our study have to be considered: the number of patients is limited and there is considerable heterogeneity with regard to the pathology causing LV dilatation and/or dysfunction. MRI and CT was performed on the same day; however, the delay time between CT and MRI could have influenced the degree of negative inotropic and chronotropic effects in the 13 patients with beta-blocker premedication, with possible changes in myocardial contraction and LV volumes. A systematic effect on the LV ejection fraction should be negligible, as either a minimal or no depressant effect of propranolol on global LV function in patients with coronary artery disease was found [32, 33]. However, a decrease in regional wall motion after propranolol in normal as well as diseased wall segments has been reported [32].

A potential bias might result from the fact that the same two readers analyzed CT and MRI studies. However, the delay time between the CT and MRI evaluation and random order of the studies should minimize observer bias. On the other hand, this approach was chosen to assure a comparably high level of experience in cardiac imaging and to minimize intraobserver effects impairing data analysis.

We did not evaluate the apex (segment 17) as we restricted our assessment to short-axis images, which is in concordance with two previous comparative studies [12, 13]. Furthermore, regional LV function analysis using MDCT and MRI was performed at rest. It remains unclear whether results may be transferred to measurements performed under exercise or drug-induced stress.

In conclusion, quantitative analysis of global LV function using 16-slice MDCT is feasible and in agrees favorably with MRI. MDCT regional LV function assessment yields a comparably high level of accuracy and inter-observer agreement in normokinetic LV segments; however, the inferior temporal resolution of CT is limiting the assessment and correct as well as reproducible characterization of LV segments with wall motion disturbances. With new generations of MDCT scanners offering better temporal resolution, a combination of coronary artery imaging and global as well as regional left ventricular function evaluation will become a promising approach to concise cardiac assessment.

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