

**SUPPLEMENTARY DATA**

**Table S1** Comparison of repeated subendocardial and subepicardial as determined by the three definitions: twist, normalized twist, CL shear angle.

**Table S2** Inter-study reproducibility for subendocardial and subepicardial as determined by the three definitions: twist, normalized twist, CL shear angle.

**Table S3** Sample size calculations for subendocardial and subepicardial as determined by the three different definitions to detect a relative change in 10, 15 or 20 % of mean (Exam A and B) torsion and torsion rate, respectively.

## Supplementary material

**Table S1** Comparison of repeated subendocardial and subepicardial torsion (mean (standard deviation)) and torsion rates (median (25<sup>th</sup>-,75<sup>th</sup> percentiles)) as determined by the three definitions.

	Exam A	Exam B	Exam C	P value
<b>Subendocardial</b>				
Twist	12.3 (4.1)	12.4 (4.6)	11.0 (3.9)	0.22
Peak Torsion [°]				
Peak Systolic Torsion Rate [° s <sup>-1</sup> ]	86.6 (52.6;92.6)	73.1 (49.6;104.3)	71.5 (52.7;79.1)	0.59
Peak Diastolic Torsion Rate [° s <sup>-1</sup> ]	-65.8 (-88.0;-49.0)	-75.4 (-100.7;-58.0)	-72.9 (-102.0;-61.0)	0.60
Normalized Twist	3.0 (1.1)	3.0 (1.1)	2.7 (1.0)	0.18
Peak Systolic Torsion Rate [° cm <sup>-1</sup> s <sup>-1</sup> ]	18.8 (13.3;25.0)	18.0 (14.0;25.0)	16.0 (12.0;22.8)	0.43
Peak Diastolic Torsion Rate [° cm <sup>-1</sup> s <sup>-1</sup> ]	-15.1 (-21.3;-12.3)	-19.3 (-23.6;-13.2)	-18.3 (-23.3;-12.8)	0.65
CL Shear Angle	5.5 (1.9)	5.4 (1.8)	4.8 (1.7)	0.16
Peak Torsion [°]				
Peak Systolic Torsion Rate [° s <sup>-1</sup> ]	36.1 (30.1;42.0)	32.8 (29.1;45.0)	32.7 (24.2;39.0)	0.49
Peak Diastolic Torsion Rate [° s <sup>-1</sup> ]	-25.4 (-40.8;-18.1)	-32.9 (-40.5;-21.1)	-33.0 (-40.8;-22.7)	0.52
<b>Subepicardial</b>				
Twist	7.1 (3.2)	7.1 (2.8)	5.9 (3.2)	0.39
Peak Torsion [°]				
Peak Systolic Torsion Rate [° s <sup>-1</sup> ]	49.4 (32.4;56.7)	47.3 (37.3;58.8)	41.3 (27.5;49.5)	<b>0.04*</b>
Peak Diastolic Torsion Rate [° s <sup>-1</sup> ]	-54.3 (-74.4;-44.7)	-51.3 (-78.5;-34.3)	-46.7 (-69.3;-40.0)	0.67
Normalized Twist	1.7 (0.7)	1.7 (0.6)	1.4 (0.8)	0.45
Peak Systolic Torsion Rate [° cm <sup>-1</sup> s <sup>-1</sup> ]	11.6 (8.8;15.0)	11.8 (10.8;13.5)	10.1 (6.8;12.4)	<b>0.03*</b>
Peak Diastolic Torsion Rate [° cm <sup>-1</sup> s <sup>-1</sup> ]	-13.4 (-17.0;-10.8)	-13.8 (-18.3;-8.4)	-12.4 (-16.2;-9.0)	0.70
CL Shear Angle	4.2 (1.4)	4.3 (1.4)	3.6 (1.9)	0.46
Peak Torsion [°]				
Peak Systolic Torsion Rate [° s <sup>-1</sup> ]	22.3 (17.7;28.9)	21.9 (18.7;24.8)	18.9 (15.4;23.7)	0.16
Peak Diastolic Torsion Rate [° s <sup>-1</sup> ]	-22.5 (-30.9;-16.7)	-21.0 (-31.9;-14.7)	-22.3 (-30.2;-17.6)	0.96

\* pairwise comparison between Exam B and C (p = 0.02)

**Table S2** Interstudy reproducibility for subendocardial and subepicardial as determined by the three different definitions.

		Mean difference $\pm$ SD	CoV [%]	ICC (95% CI)
<b>Subendocardial</b>	Twist			
	Peak Torsion [°]	0.0 $\pm$ 5.8	23.3	0.87 (0.67-0.96)
	Peak Systolic Torsion Rate [° s <sup>-1</sup> ]	1.5 $\pm$ 47.4	30.6	0.75 (0.27-0.91)
	Peak Diastolic Torsion Rate [° s <sup>-1</sup> ]	6.5 $\pm$ 69.1	46.0	0.51 (0.00-0.83)
	Normalized Twist			
	Peak Torsion [° cm <sup>-1</sup> ]	0.0 $\pm$ 1.3	22.4	0.90 (0.70-0.96)
	Peak Systolic Torsion Rate [° cm <sup>-1</sup> s <sup>-1</sup> ]	0.7 $\pm$ 10.9	29.1	0.80 (0.43-0.92)
	Peak Diastolic Torsion Rate [° cm <sup>-1</sup> s <sup>-1</sup> ]	1.3 $\pm$ 15.8	43.5	0.61 (0.00-0.86)
	CL Shear Angle			
	Peak Torsion [°]	0.1 $\pm$ 2.3	21.5	0.90 (0.70-0.96)
Peak Systolic Torsion Rate [° s <sup>-1</sup> ]	2.4 $\pm$ 23.0	31.4	0.80 (0.44-0.93)	
Peak Diastolic Torsion Rate [° s <sup>-1</sup> ]	3.1 $\pm$ 30.4	48.8	0.47 (0.00-0.82)	
<b>Subepicardial</b>	Twist			
	Peak Torsion [°]	0.0 $\pm$ 3.3	23.2	0.92 (0.77-0.97)
	Peak Systolic Torsion Rate [° s <sup>-1</sup> ]	2.0 $\pm$ 26.6	26.5	0.87 (0.64-0.96)
	Peak Diastolic Torsion Rate [° s <sup>-1</sup> ]	2.0 $\pm$ 53.1	46.1	0.42 (0.00-0.80)
	Normalized Twist			
	Peak Torsion [° cm <sup>-1</sup> ]	0.0 $\pm$ 0.9	25.1	0.89 (0.68-0.96)
	Peak Systolic Torsion Rate [° cm <sup>-1</sup> s <sup>-1</sup> ]	0.5 $\pm$ 6.6	27.7	0.81 (0.47-0.94)
	Peak Diastolic Torsion Rate [° cm <sup>-1</sup> s <sup>-1</sup> ]	0.6 $\pm$ 12.0	43.5	0.38 (0.00-0.79)
	CL Shear Angle			
	Peak Torsion [°]	0.1 $\pm$ 1.9	24.0	0.86 (0.58-0.95)
Peak Systolic Torsion Rate [° s <sup>-1</sup> ]	1.7 $\pm$ 19.6	31.1	0.71 (0.16-0.90)	
Peak Diastolic Torsion Rate [° s <sup>-1</sup> ]	1.0 $\pm$ 22.9	47.8	0.26 (0.00-0.75)	

SD, standard deviation; CoV, coefficient of variation; ICC, intraclass correlation coefficient; CI, confidence interval; CL

Shear Angle, circumferential-longitudinal shear angle

**Table S3** Sample size calculations for subendocardial and subepicardial as determined by the three different definitions to detect a relative change in 10, 15 or 20 % of mean (Exam A and B) torsion and torsion rate, respectively.

	Sample size [n]		
	10 %	15 %	20 %
<b>Subendocardial</b>			
Twist			
Peak Torsion	86	38	22
Peak Systolic Torsion Rate	148	66	37
Peak Diastolic Torsion Rate	332	148	83
Normalized Twist			
Peak Torsion	79	35	20
Peak Systolic Torsion Rate	133	59	34
Peak Diastolic Torsion Rate	297	132	75
CL Shear Angle			
Peak Torsion	73	33	19
Peak Systolic Torsion Rate	155	69	39
Peak Diastolic Torsion Rate	375	167	94
<b>Subepicardial</b>			
Twist			
Peak Torsion	85	38	22
Peak Systolic Torsion Rate	110	49	28
Peak Diastolic Torsion Rate	334	149	84
Normalized Twist			
Peak Torsion	100	45	25
Peak Systolic Torsion Rate	121	54	31
Peak Diastolic Torsion Rate	298	133	75
CL Shear Angle			
Peak Torsion	94	42	24
Peak Systolic Torsion Rate	158	70	40
Peak Diastolic Torsion Rate	359	160	90
CL Shear Angle, circumferential-longitudinal shear angle			