inflammation). In 80% of patients, echocardiography and CMR findings were in agreement regarding the presence of pericardial effusion. On multivariable logistic regression analysis, infarct transmurality was the strongest independent predictor of early pericardial damage ($p = 0.004$) followed by peak CRP ($p = 0.007$) and anterior MI location ($p = 0.025$). At follow-up, CMR pericardial abnormalities had disappeared in 80% of patients, although differences in left ventricular ejection fraction persisted between groups.

Our retrospective study shows CMR evidence of pericardial injury early post-infarction in nearly half of the study population and its presence is a clear marker of MI severity. These novel findings underscore the potential of CMR to better appreciate the phenomenon of post-infarction pericardial injury and to evaluate its prognostic significance in prospective studies. In the clinical setting, CMR can also be recommended in patients with atypical chest pain or ECG signs early post-infarction in whom it is unclear whether this is related to recurrent ischemia or is caused by pericarditis.

Costantinos Doulaptsis, MD, Kaatje Goetschalckx, MD, Pier Giorgio Masci, MD, Anca Florian, MD, Stefan Janssens, MD, PhD, Jan Bogaert, MD, PhD*

*Department of Radiology, UZ Leuven, Herestraat 49, B-3000 Leuven, Belgium. *E-mail: Jan.Bogaert@uz.kuleuven.ac.be*

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CT-SYNTAX Score

A Feasibility and Reproducibility Study

The SYNTAX score (SXscore) (1) is an important tool to grade angiographic complexity and to risk-stratify patients being considered for revascularization; moreover, it has been reported as an independent predictor of major adverse cardiac events in all-comers–type populations with a varying extent of coronary artery disease (CAD) (2,3). The ability of multislice computed tomography (MSCT) to obtain information noninvasively, comparable to that obtained with invasive coronary angiography (ICA) with high diagnostic accuracy, facilitated the broad dissemination of cardiac computed tomography (CT) imaging; many patients are being brought into the cardiac catheterization laboratory based on the MSCT findings. The possibility of having the SXscore calculated in advance before intervention could potentially optimize patient management. In this study, we explored for the first time the feasibility and reproducibility of the MSCT-derived SXscore in a population of symptomatic patients.

We retrospectively included 80 consecutive patients (mean age 62 ± 11 years; 73% male) who underwent ICA and MSCT angiography for suspected CAD between May 2009 and October 2010. Using a dual-source CT scanner (Somatom Definition Flash, Siemens Healthcare, Forchheim, Germany), an initial nonenhanced electrocardiography-gated scan was performed to calculate the calcium score and was followed by contrast-enhanced CT angiography. The MSCT acquisition protocol is described in the Online Appendix.

The SXscore algorithm (4) was used to score all coronary lesions deemed to have a percentage of diameter stenosis ≥50%, in vessels ≥1.5 mm. The conventional coronary angiograms were analyzed by a panel of 2 interventional cardiologists; in case of disagreement, a third analyst was consulted to reach consensus. The final score was calculated per patient and saved in a dedicated database.

All MSCT datasets were transferred for analyses to an offline multimodality workstation (MMWP, Leonardo, Siemens, Erlangen, Germany). All definitions of the ICA SXscore components were reviewed and adapted for the MSCT capabilities (Online Table 1). The MSCT scans were also analyzed by a panel of 2 experienced reviewers to identify the lesions with the percentage of diameter stenosis ≥50% and then calculate the MSCT SXscore (example in Supplementary Fig. 1). Before the study, 20 patients were reviewed as training cohort for the MSCT SXscore calculation and then discarded from the final analysis. To assess intraobserver variability, the MSCT SXscore was recalculated for 40 randomly selected patients after 2 months.

The unenhanced CT scan was used to calculate the total Agatston calcium score (CaSc). Coronary calcium often prevents the reliable assessment of the lumen; thus, it is relevant to investigate whether higher amounts of calcium tamper with the calculation of the MSCT SXscore.

The statistical analysis is detailed in the Online Appendix.

In total, 12.5% of the patients did not have significant lesions, whereas 42.5% had 1-vessel disease, 28.8% had 2-vessel disease, and 16.3% had 3-vessel disease.

There was a good correlation between the ICA and the MSCT SXscores ($r_s = 0.76$, $p < 0.001$) (Fig. 1A). The median number of lesions per patient identified on ICA and MSCT was 2 (interquartile range [IQR]: 1 to 4) and 2 (IQR: 1 to 3), respectively. The overall median values of ICA and MSCT SXscores were 10.5 (IQR: 5.00 to 20.75) and 13.0 (IQR: 7 to 24), respectively ($p = 0.004$). The mean difference was 2.7 ± 7.9 (Bland-Altman analysis in Fig. 1B). The SXscore tertiles by ICA were defined as SXscoreLOW≤7, 7<SXscoreMID≤16.5, and SXscoreHIGH>16.5, whereas the tertiles by MSCT were defined as SXscoreLOW≤9, 9<SXscoreMID≤22, and SXscoreHIGH>22.

The reproducibility analysis showed that there was a high correlation between the 2 rounds of analyses for the MSCT SXscores ($r = 0.95$, $p < 0.001$). The intraobserver variability for the MSCT SXscore tertiles showed substantial agreement (kappa = 0.80; 95% confidence interval, 0.67 to 0.94) (Table 1). The weighted

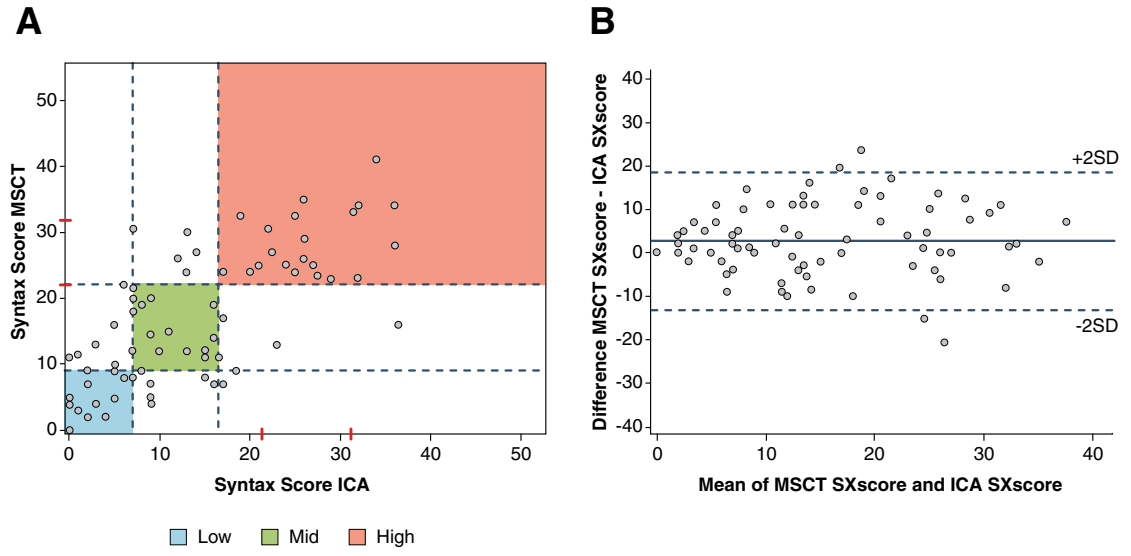

Figure 1. Correlation Plot and Bland-Altman Analysis for the MSCT SXscore and ICA SXscore Measurements

The SXscoreLOW, SXscoreMID, and SXscoreHIGH tertiles calculated for each modality are represented with **blue, green, and pink shaded areas**, respectively, on the correlation plot **(A)**. The traditional SYNTAX trial cutoff values (low, ≤22; intermediate, 23 to 32; high, ≥33) are also indicated with red marks on each axis. ICA = invasive coronary angiography; MSCT = multislice computed tomography; SXscore = SYNTAX score.

kappa value for the number of lesions, total occlusions, and bifurcation/trifurcation lesions was 0.87, 0.88, and 0.70, respectively.

The overall median CaSc was 313 (IQR: 81 to 688). There was a moderate but significant correlation between the CaSc and both the ICA and the MSCT SXscores (r_s = 0.53 and r_s = 0.54, respectively; $p < 0.001$). There was no correlation between the amount of calcium and the differences between MSCT and ICA SXscores (Online Fig. 2). The distribution of CaSc across the ICA and MSCT SXscore tertiles is presented in Online Figure 3.

The main findings of this exploratory study are the following: 1) the application of the newly developed MSCT SXscore is feasible and comparable to ICA SXscore; and 2) the MSCT SXscore appears to be highly reproducible.

Of note, the intraobserver agreement for the MSCT SXscore tertiles was high. In most previous ICA studies, SXscore reproducibility has been reported to be relatively low. One important consideration is the fact that these reports have mean ICA SXscores ranging from 16.2 to 34.1, whereas our overall ICA SXscore was lower (mean 13.05). We acknowledge that the extent and complexity of the disease may affect the reproducibility. Most of the patients in this study had low SX scores and therefore would not be candidates for coronary artery bypass surgery; thus, the study population is not comparable to the SYNTAX trial population. Nevertheless, the ICA SXscores in our study are in the same range of values reported in previous all-comers trials (2,3); to put our results in perspective, we envision that the MSCT SXscore could be used in such populations because it has a high precision.

In conclusion, the calculation of the MSCT SXscore in symptomatic patients appeared feasible and reproducible. The long-term prognostic role of this scoring methodology remains to be further investigated.

Table 1. MSCT SYNTAX Score According to Tertiles Recorded During Both Rounds of the Study

		Round one MSCT SYNTAX Score			
		≤9	>9-≤22	>22	Total
Round Two MSCT SYNTAX Score	≤9	14	3	0	17
	>9-≤22	1	9	1	11
	>22	0	2	10	12
	Total	15	14	11	40

MSCT = multislice computed tomography.

Stella-Lida Papadopoulou, MD, Chrysafios Girasis, MD, Anoeshka Dharampal, MD, Vasim Farooq, MBChB, Yoshinobu Onuma, MD, Alexia Rossi, MD, Marie-angèle Morel, BSc, Gabriel P. Krestin, MD, PhD, Patrick W. Serruys, MD, PhD, Pim J. de Feyter, MD, PhD, *Hector M. Garcia Garcia, MD, PhD

*Erasmus Medical Center, Thoraxcenter, Room z120, 's-Gravendijkwal 230, 3015 CE, Rotterdam, the Netherlands.
E-mail: h.garciagarcia@erasmusmc.nl

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▶ APPENDIX

For supplemental material, please see the online version of this article.