Feasibility of Calculating SYNTAX Score Using Coronary Computed Tomography with Reference to Invasive Coronary Angiography

Thesis
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ACCURACY	**:**	Assessment by Coronary Computed Tomographic Angiography of Individuals Undergoing Invasive Coronary Angiography
ACCF	**:**	American College of Cardiology Foundtion
ACS		Acute coronary syndrome
AHA	**:**	Amercian Heart Association
AMI	**:**	Acute myocardial infarction
BMI	**:**	Body mass index
BMS	**:**	Bare metal stent
CA	**:**	Coronary angiography
CABG	**:**	Coronary artery bypass grafting
CAD	**:**	Coronary artery disease
cMPR	**:**	Curved multiplanar reconstruction
CTO	**:**	Chronic total occlusion
DEB	**:**	Drug eluting balloon
DES	**:**	Drug eluting stent
DM	**:**	Diabetes mellitus
ECG	**:**	Electrocardiogram
FDA	**:**	Food and drug administration
HbA_1C	**:**	Glycated hemoglobin
HR	**:**	Heart rate

HTN	:	Hypertension
HU	:	Hounsfield unit
ICA	:	Invasive Coronary angiography
ISR	:	Instent restenosis
IMA	:	Internal mammary artery
IU	:	International unit
IV	:	Intravenous
IVUS	:	Intravascular ultrasound
JNC	:	Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure
Kv	:	Kilovolt
LAD	:	Left anterior descending coronary
LCx	:	Left Circumflex
LM	:	Left main coronary
MIP	:	Maximum intensity projection
MPR	:	Multiplanar reconstruction
MSCT	:	Multislice CT
MSv	:	Millisievert
PCI	:	Percutaneous coronary intervention
SCAD	:	Stable coronary artery disease
SYNTAX	:	Synergy between Percutaneous intervention with Taxus and cardiac surgery

TIMI	:	Thrombolysis in myocardial infarction
VRT	:	Volume rendering technique
3D	:	Three dimensional

Introduction

Coronary artery disease (CAD) has superseded all other causes as the leading cause of death worldwide. Despite aggressive measures taken whether by increasing social awareness of risk factor modification and continuous improvement of preventive medicine, it remains to be on the rise and is considered as a true pandemic. (1)

Coronary artery disease lesion characteristics and complexity are recognized predictors of peri-procedural complications and long-term mortality;thus a crucial stage of management is to thoroughly evaluate the severity of CAD. The current gold standard for determining the presence of obstructive CAD is via cardiac catheterization. (3)

The synergy between Percutaneous coronary intervention with Taxus and cardiac surgery score (SYNTAX score) is a score that was developed aiming at comprehensively assessing lesion characteristics. It is derived from a combination of classifications including the American Heart Association/American College of Cardiology, modified BARI classification, chronic total occlusion and bifurcation scores, and Leaman classification.(3)

The design of the SYNTAX score takes into consideration several parameters which can assist in better anticipation of thepotential risks of percutaneous or surgical revascularization.

(4)The syntax score assesses all anatomic components of the coronary circulation with respect to their functional impact, including the presence of bifurcations, trifurcations, total occlusions, long lesions, thrombus, calcification, and small vessel disease. Higher SYNTAX scores are suggestive of more complex CADwhich denotes a potentially worse prognosis as a result of a bigger therapeutic challenge. (4)

From a clinical perspective, the benefit of the scoring system facilitates the process of patient informed consent and enables physicians to clarify to patients the potential risks of revascularization and of adverse events according to the type of revascularization procedure as well as the type of revascularization recommended (CABG vs. PCI). (4)

The up-to-date European guidelines on revascularization have recommended the creation of a heart team which serves the purpose of a balanced multidisciplinary decision process. This approach recommends that PCI should be deferred to a subsequent session after the initial CA in patients with stable complex CAD. A multidisciplinary heart team discussion should take place to review the CA and procure an optimal therapeutic plan. Multiple factors are taken into account before reaching a final decision, one of which is the patient’s SYNTAX score, which is considered a principalcontributor.(5)

The presence of non-invasive methods of coronary artery assessment had to be evaluated with regards to their reliability and ability to provide a detailed study of coronary lesions. This could facilitate the provision of sufficient data that could assist the cardiac physician team to formulate a treatment plan, whether PCI or CABG surgery.(6)

Of particular interest is the multislice computed tomography (MSCT) coronary imaging, which has over the past decade arose as one of the most promising tools in the assessment of coronary lesions. MSCT CA has been studied to a great extent in assessment of its ability as a diagnostic tool. The first prospective multicenter data provided by the ACCURACY trial evaluated the diagnostic performance of current-generation 64-multidetector row multislice CT compared with standard invasive coronary angiography in symptomatic individuals without known coronary artery disease with intermediate disease prevalence. The results of the study revealed that MSCT is highly accurate in detecting obstructive coronary artery lesions. The feasibility of calculation of the SYNTAX score via MSCT coronary imaging would facilitate an upstream selection process carried out by the heart team with regards to the optimal revascularization method (CABG or PCI) prior to performing CA, thereby optimizing patient management based on coronary anatomy and lesion complexity.(7)

Aim of the work

To test the feasibility of calculating the SYNTAX score using Multislice Computed Tomography Coronary Angiography (MSCTCA) in comparison to using invasive coronary angiography.