Usefulness of SYNTAX score II in complex percutaneous coronary interventions in the setting of acute coronary syndrome

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Background: **SYNTAX score II (SS II) integrates anatomical SS with clinical characteristics allowing an individualized prediction of long-term mortality.**

Aims: **We sought to assess to evaluate the usefulness of SS II in a real-world acute coronary syndromes (ACS) population with severe coronary artery disease (CAD) undergoing percutaneous coronary intervention (PCI).**

Methods: **From August 2011 to May 2013, out of 1591 consecutive patients admitted for ACS, 217 (13.6%) showed severe CAD (three-vessel disease and/or left main involvement). Among the latter, 100 patients underwent PCI and were enrolled into the study. SS II was calculated in all patients. One-year clinical follow-up was performed; major adverse cardiac and cerebrovascular events (MACCE) were defined as a composite of death, nonfatal myocardial infarction, stroke, or repeat revascularization.**

Results: **The median SS II was 29 (range, 14–59). Overall, MACCE occurred in 25% of patients (cardiac death 4%, myocardial infarction 4%, stroke 0%, and repeat revascularization 17%). The 1-year MACCE-free survival was significantly lower in patients with SS ($\geqslant$29), than in those with SS II (<29) (64.2% vs. 87.2%, respectively; $p = 0.007$). In multivariate Cox regression analysis, the presence of unprotected left main stenosis [hazard ratio 2.52, 95% confidence interval (CI): 1.02–5.85; $p = 0.031$] and SS II $\geqslant$29 (hazard ratio 2.74, 95% CI: 1.30–8.21; $p = 0.011$) were the only predictors of MACCE at 1-year clinical follow-up. The c-index of SS score II was 0.70 (95% CI: 0.58–0.81). For patients who experienced MACCE, the SS II reclassification improved by 36%, while in nonevent patients the reclassification improved by 22%. The net reclassification index was 0.24 ($p = 0.09$).**

Conclusion: **SS II might represent a useful tool to predict clinical events in not only ideal stable patients, but also an unrestricted, real world population of patients with ACS and severe CAD undergoing PCI.**

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Introduction

The anatomical synergy between percutaneous coronary intervention (PCI) with taxus and cardiac surgery (SYNTAX) score (SS) is advocated in both European and American revascularization guidelines [1,2] as an important tool that can help clinicians to establish the optimal revascularization approach in patients with complex coronary artery disease (CAD). The model has also been proposed as a predictor of clinical outcome following PCI [3]. However, it is well recognized that both anatomical and clinical variables are required to appropriately stratify the risk of patients undergoing PCI. Therefore, recent scores have been developed with the aim of integrating anatomical features with relevant clinical variables, to overcome the most obvious pitfalls of a system score only based on coronary angiograms [4,5]. Recently, seven clinical parameters [age, creatinine clearance, left ventricular ejection fraction (LVEF), presence of unprotected left main (ULM), peripheral vascular disease, female sex, and chronic obstructive pulmonary disease] have been added to SS to obtain SYNTAX score II (SS II) [4]. This new score is able to predict a statistically significant difference in long-term outcomes between patients undergoing coronary artery bypass graft (CABG) and those undergoing PCI [5,6].

However, SS II has been only validated in randomized trials, not in a real-world study; thus, excluding complex patients such as those with three-vessel disease and/or ULM involvement, particularly in the setting of acute coronary syndromes (ACS).

The aim of the current study was to evaluate the usefulness of SS II in a real-world population with severe CAD and ACS undergoing PCI.

Abbreviations

ACS	acute coronary syndrome
CABG	coronary artery bypass grafting
CAD	coronary artery disease
CI	confidence interval
LVEF	left ventricular ejection fraction
LAD	left anterior descending
MACCE	major adverse cardiac and cerebrovascular events
MI	myocardial infarction
NSTEMI	non ST-elevation myocardial infarction
PCI	percutaneous coronary intervention
rSS	residual Syntax score
SS	Syntax score
ST	stent thrombosis
STEMI	ST elevation myocardial infarction
TLR	target lesion revascularization
TVR	target vessel revascularization
ULM	unprotected left main

Methods

Study population

From August 2011 to May 2013, all patients admitted for ACS, at the Cardiology Department of Cannizzaro Hospital, Catania, were screened. Those with severe CAD, defined as showing three-vessel disease (stenosis $\geqslant$70%) and/or left main involvement (stenosis $\geqslant$50%) at coronary angiography, with an indication of PCI, were enrolled into the study. ACSs were defined according to the guidelines of the European Society of Cardiology [7,8]. Patients with cardiogenic shock (systolic blood pressure <90 mmHg and signs of tissue hypoperfusion) and previous CABG were excluded. All data were prospectively collected in a dedicated database.

The study was carried out according to the Helsinki declaration principles, and a written informed consent to coronary intervention and follow-up was obtained from all patients.

Determination of SS and SS II

From the baseline angiogram, each coronary lesion causing $\geqslant$50% diameter stenosis in a vessel with a caliber $\geqslant$1.5 mm, was scored to yield the overall SS, which was calculated with the SS online calculator [9]. For each patient, all angiographic variables involved in the calculation of SS were computed by two independent experienced interventional cardiologists blinded to clinical data.

The residual Syntax score (rSS) was calculated based on the remaining obstructive CAD after treatment with PCI; incomplete revascularization was defined as a rSS >0. The Δ Syntax score (ΔSS), representative of the burden of disease removed by PCI, was calculated by subtracting the rSS from the baseline SS.

All patients were assessed with echocardiogram (Philips IE33 Matrix, Philips Healthcare, Amsterdam, Netherlands), before discharge; and LVEF was evaluated using a modified Simpson method.