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Prediction of 1-Year Clinical Outcomes Using the SYNTAX Score in Patients With Acute ST-Segment Elevation Myocardial Infarction Undergoing Primary Percutaneous Coronary Intervention

A Substudy of the STRATEGY (Single High-Dose Bolus Tirofiban and Sirolimus-Eluting Stent Versus Abciximab and Bare-Metal Stent in Acute Myocardial Infarction) and MULTISTRATEGY (Multicenter Evaluation of Single High-Dose Bolus Tirofiban Versus Abciximab With Sirolimus-Eluting Stent or Bare-Metal Stent in Acute Myocardial Infarction Study) Trials

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Objectives This study sought to evaluate the impact of SYNTAX score (SXscore), and compare its performance in isolation and combination with the PAMI (The Primary Angioplasty in Myocardial Infarction Study) score, for the prediction of 1-year clinical outcomes in patients with ST-segment elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention.

Background Patients with STEMI were excluded from the original SYNTAX score (SXscore) algorithm. Therefore, the utility of using the SXscore in this patient group remains undefined.

Methods SXscore was calculated retrospectively in 807 patients with STEMI enrolled in the randomized STRATEGY (Single High-Dose Bolus Tirofiban and Sirolimus-Eluting Stent Versus Abciximab and Bare-Metal Stent in Acute Myocardial Infarction) and MULTISTRATEGY (Multicenter Evaluation of Single High-Dose Bolus Tirofiban Versus Abciximab With Sirolimus-Eluting Stent or Bare-Metal Stent in Acute Myocardial Infarction Study) clinical trials. Clinical outcomes of all-cause death, reinfarction, and clinically driven target vessel revascularization were subsequently stratified according to SXscore tertiles: $SX_{LOW} \leq 9$ (n = 311), $9 < SX_{MID} \leq 16$ (n = 234), $SX_{HIGH} > 16$ (n = 262).

Results At 1-year follow-up, all clinical outcomes including mortality, mortality/reinfarction, major adverse cardiac events (MACE) (a composite of all-cause death, reinfarction and target vessel revascularization), and definite, definite/probable, and any stent thrombosis were all significantly higher in patients in the highest SXscore tertile. SXscore was identified as an independent predictor of mortality, MACE, and stent thrombosis out to 1-year follow-up. The combination SYNTAX-PAMI score led to a net reclassification improvement of 15.7% and 4.6% for mortality and MACE, respectively. The C-statistics for the SXscore, PAMI score, and the combined SYNTAX-PAMI score were 0.65, 0.81, and 0.73 for 1-year mortality, and 0.68, 0.64, and 0.69 for 1-year MACE, respectively.

Conclusions SXscore does have a role in the risk stratification of patients with STEMI having primary percutaneous coronary intervention; however, this ability can be improved through a combination with clinical variables. (Multicentre 2×2 Factorial Randomised Study Comparing Tirofiban Versus Abciximab and SES Versus BMS in AMI; NCT00229515) (J Am Coll Cardiol Intv 2011;4:66–75)

Currently, several validated patient-based risk scores are in use in patients presenting with ST-segment elevation myocardial infarction (STEMI) (1–5). Most of these scores, apart from the Zwolle and CADILLAC (Controlled Abciximab and Device Investigation to Lower Late Angioplasty Complications) scores, rely entirely on patient-based variables such as Killip class, serum creatinine levels, and degree of ST-segment change. This is not surprising given these models were developed before the widespread use of primary percutaneous coronary intervention (PCI) for the treatment of STEMI. Overall, the individual ability of these scores to predict mortality is somewhat variable (6), and a notable limitation is the absence of any assessment of lesion characteristics.

The SYNTAX score (SXscore) is an angiographic scoring system that has been shown to be able to aid revascularization decisions, and predict mortality and morbidity in patients irrespective of disease severity, at both short- and long-term follow-up (7–15). These previous assessments of the SXscore have been largely limited to elective patients. At present, therefore, the SXscore has not been validated in patients with STEMI, and as such, the utility of risk stratifying these patients using the SXscore remains unknown.

The objective of this study was to assess the impact of the SXscore and compare its performance in isolation, and in combination, with an entirely clinical-based score, the PAMI (Primary Angioplasty in Myocardial Infarction) study score, for the prediction of 1-year clinical outcomes in patients with STEMI treated with primary PCI, who were enrolled in the prospective randomized STRATEGY (Single High Dose Bolus Tirofiban and Sirolimus Eluting Stent Versus Abciximab and Bare-Metal Stent in Myocardial Infarction) (16) and MULTISTRATEGY (Multicenter Evaluation of Single High-Dose Bolus Tirofiban Versus Abciximab With Sirolimus-Eluting Stent or Bare-Metal Stent in Acute Myocardial Infarction) (17) studies.

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Methods

Study population. The STRATEGY and MULTISTRATEGY studies have been published previously (16,17). In brief, the single-center prospective STRATEGY study randomized 175 patients to treatment with either tirofiban and sirolimus-eluting stents (SES) or abciximab and bare-metal stents (BMS), whereas the multicenter MULTISTRATEGY study randomized 745 patients between an infusion of either tirofiban or abciximab and stenting with either a SES or BMS.

Patient selection. Inclusion and exclusion criteria were similar for both studies. Patients presenting with STEMI who had: 1) chest pain for >30 min with ST-segment elevation of ≥1 mm in ≥2 contiguous electrocardiographic leads or with presumably new left bundle-branch block; and 2) admission either <12 h of symptom onset or between 12 and 24 h with evidence of continuing ischemia were eligible for enrollment. Exclusion criteria included administration of fibrinolytic agents in the previous 30 days, history of bleeding diathesis or allergy to the study drugs, major surgery within 15 days, and active bleeding or previous stroke in the last 6 months. The institutional review board at each participating center approved the protocol, and all patients gave written informed consent.

Abbreviations and Acronyms

BMS = bare-metal stent(s)
IRA = infarct-related artery
MACE = major adverse cardiac event(s)
PCI = percutaneous coronary intervention
ROC = receiver-operator characteristic
SES = sirolimus-eluting stent(s)
ST = stent thrombosis
STEMI = ST-segment elevation myocardial infarction
SXscore = SYNTAX score
TIMI = Thrombolysis In Myocardial Infarction
TVR = target vessel revascularization

Randomization and procedure. Detail information regarding the randomization procedure for both studies is provided elsewhere (16,17). In brief, before angiography open-label 1:1 and 1:1:1:1 randomization was performed in the STRATEGY and MULTISTRATEGY studies, respectively. In STRATEGY, patients were randomized to an infusion of tirofiban and then PCI with SES or an infusion of abciximab followed by PCI with BMS. In MULTISTRATEGY, patients were randomized to an infusion of tirofiban or abciximab followed by PCI with either SES or BMS. Tirofiban and abciximab were administered before sheath insertion. Crossover to a BMS was only allowed when SES implantation failed or when it was impossible to match SES diameter with coronary reference diameter.

Details of angiographic and electrocardiographic analysis together with dosage regimes of the parenteral periprocedural anticoagulants heparin, tirofiban, and abciximab are provided elsewhere (16,17). All patients received aspirin