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Original research article

Residual syntax score can predict short- and long-term outcomes in patients with STEMI

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ABSTRACT

Objectives: The prognostic value of residual Syntax score (rSS) has been observed in different patient groups. However, its prognostic value has not been compared in patients with ST segment elevation myocardial infarction (STEMI) treated with primary percutaneous coronary intervention (PCI).

Methods: A total of 208 patients meeting the eligibility criteria were included in the study. Complete revascularisation (CR) was defined as rSS = 0 and incomplete revascularisation (IR) was defined as rSS ≥ 1.

Results: Among the sample, 78 patients (33.3%) were included in the CR group and 130 patients (67.7%) in the IR group. One patient (1.3%) in the CR group and 8 patients (6.2%) in the IR group died by day 30 ($P < 0.01$). The incidence of stent thrombosis, recurrent myocardial infarction (MI) and target lesion revascularisation (TLR) was similar between the two groups. During follow-up (mean 28.8 ± 7.1 months), 2 patients (2.6%) from the CR group and 10 (7.7%) patients from the IR group died ($P > 0.05$). The incidence of recurrent MI (18.5% vs. 7.7%; $P < 0.01$) and major adverse cardiovascular events (MACE) (24.6% vs. 7.7%; $P < 0.01$) were significantly higher in the IR group.

Conclusion: rSS, which is an indirect marker of incomplete revascularisation, was independently correlated with recurrent MI and MACE after STEMI.

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Introduction

Despite significant improvements in the diagnosis and treatment of ST segment elevation myocardial infarction (STEMI), it continues to be the most important public health problem especially in developing countries. With the development and widespread adoption of primary angioplasty (PCI), major advancements have been made in the management of acute myocardial infarction [1]. However, incomplete revascularisation (IR) is a major problem that may lead to worse outcomes after PCI [2–4]. IR has no universally accepted definition. Post-PCI residual coronary stenosis severity, extent and nature may have different effects on outcomes. The SYNergy between PCI with TAXUS and Cardiac Surgery (SYNTAX) scoring system may show the severity of the coronary anatomy before revascularisation based on a quantitative and reproducible measurement [5–9]. Different scoring systems have been created with a combination of clinical variables and angiographic, electrocardiographic and demographic data [10]. In patients undergoing PCI with a diagnosis of STEMI, these scoring systems have been reported to predict outcomes. Our study aimed to investigate the relation between residual Syntax score (rSS) and short- and long-term outcomes in STEMI patients treated with primary PCI.

Material and methods

251 eligible patients who were diagnosed with STEMI and treated with primary PCI between April 2011 and October 2014 at Sakarya University Education and Research Hospital were retrospectively recruited to the study. All patients signed a written informed consent.

Inclusion criteria were ST elevation ≥1 mm in ≥2 adjacent leads or new onset of left bundle branch block on electrocardiography (ECG), onset of chest pain <12 h and/or patients with chest pain or ongoing symptoms despite 12–24 h period of time, and patients who underwent emergency coronary angiography with primary PCI. Patients with previous coronary artery bypass graft (CABG) surgery ($n = 15$) or proposed to undergo urgent CABG after primary PCI ($n = 12$), with cardiogenic shock ($n = 9$) and with failed thrombolytic therapy and applied rescue PCI ($n = 7$) were excluded from the study. In total, 43 patients were excluded from the study and finally 208 patients' data were examined.

The study protocol was approved by the local ethics committee.

Evaluation of the patient data

Clinical risk factors, such as age, sex, diabetes mellitus (DM), hypertension (HT), hypercholesterolemia, current smoking, history of myocardial infarction (MI) and history of PCI were evaluated. History of out-hospital cardiac arrest, Killip classification, arrival pulse rate, systolic blood pressure (SBP), diastolic blood pressure (DBP), height, weight, body mass index and creatinine clearance (CrCL) values were processed. CrCL was calculated from the Cockcroft–Gault formula.

Definitions

HT was defined as resting SBP or DBP of at least 140/90 mmHg or the presence of diagnosed disease by the clinician. DM was defined as the use of antidiabetic drugs and fasting blood glucose level >126 mg/dl. Renal failure was defined as creatinine clearance <60 ml/min according to the Cockcroft–Gault formula. Multivessel disease was defined as the presence of more than 50% stenosis on two or three major epicardial coronary arteries. Acute stent thrombosis was defined as the abrupt onset of cardiac symptoms with elevated cardiac biomarker levels or ECG evidence of myocardial injury after stent deployment in the first 24 h accompanied by angiographic evidence of a flow-limiting thrombus 5 mm adjacent to a previously placed stent. Cardiac death was defined as unexplained sudden death or death due to acute MI, heart failure and cardiac arrhythmias. Cardiogenic shock was defined as the presence of symptoms of hypoperfusion associated with marked and resistant hypotension (SBP < 80 mmHg) for longer than 30 min because of left ventricular dysfunction, right ventricular infarction, or mechanical complications. Reinfarction was defined as rising serum CK-MB enzyme levels more than twice the upper limit of the normal and re-elevation of ST segment on ECG.

Target lesion revascularisation (TLR) was defined as the revascularisation of the stented segment or within the 5 mm margins proximal or distal to the stent by either repeat PCI or CABG.

Follow-up information was obtained through a review of hospital records and telephone contact with the patient or the patient's relatives. All subsequent hospital admissions (for angina, recurrent infarction and additional intervention) during follow-ups were recorded. TLR not related to thrombosis-related events were assumed to be 'restenosis related'. Major adverse cardiac events (MACE) were defined as cardiovascular mortality, reinfarction and TLR (percutaneous or surgical). CR was defined as a successful operation in whole major epicardial coronary artery lesions (provided that stenosis ≥50% and diameter ≥2.5 mm) with PCI during hospitalization and in the first four weeks.

Angiographic parameters and definitions

Coronary angiography was performed using the standard Judkins technique via the femoral artery on catheter laboratory of Sakarya University Education and Research Hospital Cardiology Department. Coronary angiography and PCI was performed by 4 experienced interventional cardiologists (>75 cases per year). Before procedure, a loading dose of 300 mg acetylsalicylic acid and 600 mg clopidogrel were given to all patients. The degree of occlusion on IRA was evaluated according to the TIMI classification. After identifying coronary anatomy, heparin 100 U/kg was given. For each procedure success was defined as TIMI grade 3 flow or residual stenosis less than 20% on IRA. During the process, stent usage, selection of stent type, stent diameter/length, predilatation or post-dilatation implementation, use of the suction catheter and tirofiban were left to the discretion of the operator. Lesion characteristics on IRA or other epicardial coronary arteries that could affect the success rate, such as serious calcification,

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