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# Usefulness of SYNTAX Score to Select Patients With Left Main Coronary Artery Disease to Be Treated With Coronary Artery Bypass Graft

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**Objectives** The purpose of our study was to investigate the utility of the SYNTAX (Synergy Between Percutaneous Coronary Intervention With TAXUS and Cardiac Surgery) score in aiding patient selection for percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG) in a large contemporary registry of patients undergoing revascularization of left main coronary artery.

**Background** The SYNTAX score has been developed as a combination of several validated angiographic classifications aiming to grade the coronary lesions with respect to their functional impact, location, and complexity.

**Methods** Between March 2002 and December 2008, 819 patients with left main coronary artery disease underwent revascularization in 2 Italian centers. We compared clinical outcomes of PCI versus CABG in patients with SYNTAX score ≤34 and patients with SYNTAX score >34.

**Results** The rates of 2-year mortality were similar between CABG and PCI in the group of patients with SYNTAX score ≤34 (6.2% vs. 8.1%, $p = 0.461$). Among patients with SYNTAX score >34, those treated with CABG had lower rates of mortality (8.5% vs. 32.7%, $p < 0.001$) than those treated with PCI. After statistical adjustment, revascularization by PCI resulted in a similar risk of death compared with CABG in patients with SYNTAX score ≤34 (hazard ratio: 0.81, 95% confidence interval: 0.33 to 1.99, $p = 0.64$) and in a significantly higher risk in patients with SYNTAX score >34 (hazard ratio: 2.54, 95% confidence interval: 1.09 to 5.92, $p = 0.031$).

**Conclusions** A SYNTAX score threshold of 34 may usefully identify a cohort of patients with left main disease who benefit most from surgical revascularization in terms of mortality. (J Am Coll Cardiol Intv 2009;2:731–8) © 2009 by the American College of Cardiology Foundation

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The rapid widespread and extensive use of drug-eluting stents (DES) has led to a renewed interest for the treatment of complex, off-label coronary lesions such as unprotected left main (1). The encouraging results obtained with DES supported the rationale for the use of percutaneous coronary intervention (PCI) as a safe and effective revascularization alternative to coronary artery bypass grafting (CABG) in patients with unprotected left main coronary artery disease (CAD) and suitable lesion anatomy (2–6).

The SYNTAX (Synergy Between Percutaneous Coronary Intervention With TAXUS and Cardiac Surgery) score has been recently developed as a combination of several previously validated angiographic classifications aiming to grade the coronary anatomy with respect to the number of lesions and their functional impact, location, and complexity (7). The prognostic utility of the SYNTAX score has been recently validated in different settings, including patients with 3-vessel (8,9) or left main CAD (10,11) undergoing either PCI or CABG. However, the SYNTAX score has been originally proposed as an aid to decision making for PCI patient selection more than as a predictive tool for stratifying individual outcomes of patients undergoing either procedure.

**Abbreviations and Acronyms**

**CABG** = coronary artery bypass grafting
**CAD** = coronary artery disease
**CI** = confidence interval
**DES** = drug-eluting stent(s)
**HR** = hazard ratio
**PCI** = percutaneous coronary intervention
**ULMCA** = unprotected left main coronary artery

In this perspective, the quest for the optimal threshold to distinguish patients who benefit most from surgical revascularization from those who may be safely treated with PCI is of clinical interest. In a previous study, we demonstrated that a SYNTAX score >34 optimally identifies patients with higher risk of death after left main PCI (10). The aim of this study was to investigate the utility of a SYNTAX score threshold of 34 in aiding patient selection for PCI or CABG in a large contemporary registry of patients undergoing revascularization of unprotected left main coronary artery (ULMCA).

## Methods

**Study population.** The CUSTOMIZE (Appraise a CUSTOMIZEd strategy for left main revascularization) registry holds data from 2 participating centers that performed PCI or CABG for revascularization treatment of consecutive patients with ULMCA disease (defined as the presence of lesions with stenosis of at least 50% of vessel diameter) between March 2002 and December 2008. Patients who had undergone previous CABG were excluded. The local ethics committee at each center approved the use of clinical data for this study, and all patients provided written informed consent. The authors wrote the manuscript, and are responsible for the completeness and accuracy of data gathering and analysis.

**Procedural and post-intervention practices.** The interventional strategy, as well as the choice of the various devices and the administration of therapies during the procedure, was left to the operator's discretion and standard practice. After the procedure, patients treated with DES were prescribed clopidogrel for at least 6 months. Aspirin was prescribed indefinitely for all patients, irrespective of treatment with PCI or CABG.

Surgical revascularization was performed with the use of standard bypass techniques. Whenever possible, the internal thoracic artery was used preferentially for revascularization of the left anterior descending artery. In patients <70 years of age, arterial revascularization was strongly recommended. Patients could be operated either with or without extracorporeal circulation; in on-pump surgeries the type of cardioplegia was left to surgical judgment. The post-procedure medication regimen was chosen according to local clinical practice.

**SYNTAX score calculation.** The total SYNTAX score was derived from the summation of the individual scorings for each separate lesion (defined as ≥50% stenosis in vessel ≥1.5 mm). Full details on SYNTAX score calculation are reported elsewhere (7). All angiographic variables pertinent to SYNTAX score calculation were computed by 2 of 3 experienced cardiologists who were blinded to procedural data and clinical outcome on angiograms obtained before the procedure. In case of disagreement, the opinion of the third observer was obtained, and the final decision was made by consensus.

**Follow-up.** Clinical follow-up data related to medications and clinical status were prospectively collected through scheduled outpatient clinic evaluations. Referring cardiologists, general practitioners, and patients were contacted whenever necessary for further information. All repeated coronary intervention (surgical and percutaneous) and rehospitalization data were prospectively collected during follow-up using the centralized system of the participating institutions or contacting directly the hospitals where the patients were admitted or referred. Angiographic follow-up was suggested at 6 and 9 months after the index procedure in all consenting patients treated with PCI. It was performed at an earlier time if clinically indicated. However, patients who were at high risk for procedural complications of angiography and had no symptoms or signs of ischemia, as well as patients who declined the recommendation, did not undergo routine follow-up angiography. For patients who underwent CABG, angiographic follow-up was recommended only if there were ischemic symptoms or signs during follow-up. All outcomes of interest were confirmed by source documentation collected at each center and were centrally adjudicated by an independent, blinded end points committee.