Better Risk Stratification for Patients With Complex Coronary Artery Disease

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Technological advancements in percutaneous coronary intervention (PCI) enable optimal revascularization to be achieved even in patients with complex coronary artery disease (CAD). The development of drug-eluting stents has dramatically reduced the incidence of in-stent restenosis. Several new techniques and dedicated device developments have contributed to the improved success rate of PCI for chronic total occlusion. However, compared with coronary artery bypass grafting (CABG), complete revascularization by PCI is sometimes difficult in patients with complex lesions. In addition, CABG seems to be a better therapeutic option than PCI in patients with severely calcified multivessel disease or multiple chronic total occlusions. Hence, appropriate risk stratification is required to evaluate the applicability of PCI for patients with 3-vessel disease or left main disease. Also, it would be ideal if the risk stratification tool could identify patients who are more suitable for CABG.

The SYNTAX (Synergy Between PCI With Taxus and Cardiac Surgery) score was recently developed to objectively evaluate the severity and extent of CAD. The SYNTAX score is an anatomy based tool that quantitatively assesses the coronary tree with regard to the number, location and complexity of obstructive lesions. The score is stratified into 3 categories as determined in the SYNTAX trial: low = 0–22, intermediate = 23–32, high: >32. The SYNTAX trial demonstrated the ability of SYNTAX score to predict adverse ischemic events in patients undergoing PCI. The predictive ability of this score has been also shown in patients undergoing PCI for left main disease or extensive CAD. These observations suggest the applicability of SYNTAX score in a variety of clinical settings.

Despite its usefulness for patients with complex CAD, one would argue that the SYNTAX score is solely an angiographic score and does not consider clinical factors associated with clinical outcome in patients with CAD. Because of this drawback, SYNTAX score II has been developed. It includes the 2 anatomical and 6 clinical factors (age, creatinine clearance, left ventricular ejection fraction, sex, chronic obstructive pulmonary disease and peripheral vascular disease) to predict 4-year mortality in patients undergoing PCI or CABG. Farooq et al investigated the superiority of SYNTAX score II in 2,891 patients with 3-vessel disease or complex CAD in the Drug Eluting stent for Left main coronary Artery disease (DELTA) registry. Their study demonstrated the better ability of SYNTAX score II to estimate long-term mortality in patients with complex CAD compared with the SYNTAX score.

This finding has been extended by Campos and colleagues in this issue of the Journal, in which they report the predictive performance of SYNTAX score II in the Coronary REvascularization Demonstrating Outcome Study in Kyoto (CREDO-Kyoto) Registry. They investigated 3,896 patients undergoing PCI or CABG and compared the SYNTAX score II with the anatomical SYNTAX score. Patients undergoing CABG exhibited more complex anatomical characteristics and a higher prevalence of left main stenosis with 3-vessel disease. Predictably, the anatomical SYNTAX score was also higher in patients treated with CABG. The investigators reported that the SYNTAX score II had better predictive ability for all-cause mortality in patients treated with PCI or CABG compared with the anatomical SYNTAX score. This score also improved risk stratification in low-, medium- and high-risk subjects. The investigators suggest the usefulness of SYNTAX score II to stratify patients with complex CAD for long-term mortality, even in Eastern populations.

These findings provide further evidence of the better predictive accuracy of SYNTAX score II for long-term prognosis in patients with complex CAD. It appears that a combination of clinical and anatomical variables is required for an effective, clinically useful risk stratification tool in the clinical setting. Nevertheless, one could argue the reproducibility of the SYNTAX scores, especially the anatomical one, which relies on visual quantification of diameter stenosis and a qualitative evaluation of the morphological features in each lesion. Inter- and intraobserver kappa values have been reported to show moderate agreement. The level of agreement in evaluating specific angiographic features such as bifurcation and calcification varied considerably. Given that extensive training is necessary to achieve accurate measurement, easier and more reproducible angiographic assessment seems to be ideal.

Although the integration of clinical variables in the SYNTAX score II contributes to its better predictive performance, this score does not have capabilities to evaluate other features of coronary lesions such as plaque burden and components because of the limitations of coronary angiography. Recent intravascular imaging studies have demonstrated the contribution of plaque burden to clinical outcome. Also, lipid core within plaques has been reported as associated with acute...
coronary events. Multislice computed tomography imaging identifies high-risk features of plaques causing acute coronary syndrome. It would be intriguing to know whether the combination of SYNTAX score II and other imaging data would further improve the predictability of clinical outcomes in patients with CAD. Further investigation will be required to establish optima risk stratification in patients with complex CAD.

Disclosures
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References