Reviews

Modifying angiographic syntax score according to PCI strategy: lessons learnt from ERACI IV Study

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A B S T R A C T

In recent years an angiographic score was introduced in clinical practice to stratify different levels of risk after percutaneous coronary interventions (PCI) with drug eluting stents (DES).

Investigators from the SYNTAX trial [1,2] — which was a randomized comparison between PCI with implantation of a 1st generation DES (Taxus, Express, Boston Scientific, Marlborough, MA, USA) versus coronary artery bypass graft (CABG) in patients with three-vessel coronary artery disease (CAD) or unprotected left main — designed and created an anatomic angiographic score to identify different risk levels in the outcome from those patients included and treated in the SYNTAX trial. This score was called Syntax Score (SS), and almost immediately after SYNTAX trial released the results, SS started being used as a risk score worldwide.

The SYNTAX lesion score was calculated by grading 11 types of lesions, answering sequential interactive questions taking into account: number of disease segments, tortuosity, heavy calcification, presence of thrombus, lesion length, dominance, bifurcation, trifurcation, aortostomal lesions, diffuse disease, and total occlusion [2], and each coronary lesion with a diameter stenosis ≥50% in vessels ≥1.5 mm was scored.

In ERACI IV registry we used a revascularization strategy during PCI where operators were advised to only treat lesions ≥70% in a ≥2.0 mm reference vessel; therefore, no intermediate lesions should be treated, and severe stenosis in vessels <2.0 mm was discouraged as well.

If we recalculated SS using the above-mentioned operators’ advices all intermediate lesions were not scored, and severe stenosis in vessels <2.0 mm were excluded for the analysis, including bifurcations, trifurcations and chronic total occlusions; after this new scoring, the original SS dropped significantly which is in accordance with the goal of complete functional revascularization strategy of the ERACI IV study and the low one year adverse events of such study. In conclusion, if we performed an SS scoring, only severe stenosis in vessels with a reference diameter ≥2.0 mm would allow a more rational assessment of coronary anatomy, and the use of a more conservative PCI strategy.

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diameter stenosis larger or equal than 50% in vessels ≥ 1.5 mm should be treated accordingly. In the trial, stent length was 84.6 mm. For the past three years, we conducted a prospective, multicenter, controlled registry called ERACI IV, using a 2nd generation DES (Firebird 2, Microport Inc, Shanghai, China) in patients with two or three-vessel CAD and unprotected left main [7,8]. One year follow-up was recently reported [8].

In contrast with SYNTAX, in ERACI IV the stent length immediately after PCI was only 41.4 mm in spite of the 27.7 SS shown in the study [8]. The differences in stent length observed in both studies (86.4 mm vs. 41.4 mm in SYNTAX and ERACI IV respectively, p < 0.001) were not correlated with the differences in SS (p = 0.04), suggesting large variability in PCI strategy. In fact, in ERACI IV, the goal was to achieve complete functional revascularization [9], and operators were advised to only treat lesions ≥ than 70% in a ≥ 2.0 mm reference vessel, provisional stent in all bifurcations was recommended, no intermediate lesions were treated and, finally, severe stenosis (≥ 70%) in vessels < 2.0 mm was discouraged as well [7,8].

Taking into account the original high SS found in ERACI IV, total stent length of this study appears to be quite low, and, for this reason, we recalculated SS now following the above-mentioned operator advice for the study [7,8], thus, with these new measures, all intermediate lesions were not scored, and severe stenosis in vessels < 2.0 mm were excluded for the analysis, including bifurcations, trifurcations and chronic total occlusions. In-stent restenosis, allowed to enter in ERACI IV, was scored as heavy calcified lesion; all other angiographic variables were measured according to the original SS. As an example, if a patient had intermediate stenosis (50% to 69%) in a heavy calcified, tortuous and diffuse major epicardial vessel, these angiographic characteristics — which were scored in the original SS — had no value now, within the new assessment; due the presence of an intermediate stenosis. Therefore, all the above-mentioned variables, together with intermediate stenosis, were not scored (Fig. 1).

After this new scoring, the original SS dropped from 27.7 to 22.02 which is in accordance with the number of stents deployed and stent length seen in ERACI IV [8].

In ERACI IV, as we can see in Fig. 2, still using the original SS, 33.8% of patients were low, 32.4% intermediate and 33.8% high. After the new scoring, low SS rose to 54.8%, intermediate dropped to 27.9% and only 17.2% of ERACI’s patients scored a high SS.

In addition, excluding all intermediate lesions and severe stenosis in vessels < 2 mm, the number of diseased vessels also changed, with the new scoring 13.4% had 1 vessel CAD, 59.8% 2 vessel CAD and 26.8% 3 vessel CAD.

Although a significant safety/efficacy improvement was observed with latest generation DES, presence of neoatherosclerosis remained [10], a fact that favors a more conservative strategy during PCI.

Park recently published the first randomized study utilizing everolimus DES vs. CABG for multiple vessel disease [11]. Major adverse cardiac events (MACCE) at 4.6 years were higher with DES, 15.3% vs. 10.6% for CABG, p = 0.04, and this was mainly driven by the occurrence of spontaneous myocardial infarction (p = 0.02) and need for target vessel (p = 0.03) or new lesion revascularization in the DES group (p = 0.01). In this trial, total stent length was 85.3 mm in spite a quite low SS of 24.2, suggesting that — similar to SYNTAX — an aggressive PCI strategy was used.

We do recognize some limitations for this sort of score: first we do not use functional assessment of the lesions, and it is well known that several intermediate lesions will have similar fractional flow reserve compromise to a single severe stenosis [12] therefore, the accuracy of visual assessment of a coronary lesion outside the context of an acute coronary syndrome is flawed in most of cases. Functional assessment using FFR should become gold-standard in all patients with stable CAD undergoing PCI with stent implantation as was recently suggested [13], although we are aware that FFR is often not covered in many healthcare systems worldwide. In addition, most of the patients including in ERACI IV had functional thallium stress test previous to the PCI procedure [9,14]. Finally, our remarkable low one year rate of MACCE in ERACI IV [8] is probably due to a combination of factors, including the use of second generation DES together with our PCI strategy.

![Fig. 1. Example from an ERACI IV patient. SYNTAX score vs. Modified ERACI IV SYNTAX score. PTID:01-082SYNTAX score=37 (red and white arrows) Modified ERACI IV SYNTAX score=31 (only red arrows, white arrows were not scored). A. Right coronary artery with proximal severe stenosis scored; mid intermediate lesion and severe lesion in small (< 2.0 mm) posterior descending artery were not scored. B. Both intermediate lesions in obtuse marginal not scored. C. Both severe stenosis in proximal and mid portion of left anterior descendent artery were scored.](image-url)
and lesion assessment, but it is still unknown whether this approach will result in a low 5-year MACCE rate.

In conclusion, if we performed an SS scoring, only severe stenosis in vessels with a reference diameter ≥ 2.0 mm would allow a more rational assessment of coronary anatomy, and the use of a more conservative PCI strategy that could be associated with a low events rate.

References


