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Editorial

Coronary stenosis and left ventricular function - Major prognostic factors in patients with ischemic heart disease: Has something changed in the era of "precision medicine"?

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In this issue of International Journal of Cardiology publication, "Prognostic impact of residual stenosis (RS) after percutaneous coronary intervention (PCI) in patients with ischemic heart failure (HF) – a report from the CHART-2 study" (NCT00418041) by Hao et al. [1], in a large prospective hospital-based study, it was shown that in 851/1307 (65.1%) post-PCI patients, who had RS ≥70% with symptomatic HF in the median follow-up period of 3.2 years, RS had a clinically significant impact on higher all-cause mortality. Even the propensity-score analysis, in 332 matched patients with vs. without RS, showed that the impact of RS remained significant. In the stepwise multivariable Cox regression analysis, the presence of RS was also selected as a predictor of all-cause death in patients with ischemic HF [HR 1.62 (95%CI:1.07–2.46), P = 0.024]; however, that was not observed in the subgroup of patients with left ventricular ejection fraction (LVEF) <40%. Those patients (n = 169) had the highest mortality regardless of the presence or absence of RS. The studied patients had symptomatic HF and previous PCI, probably having both epicardial and microcirculation affected; consequently they possibly suffered the large atherosclerotic burden. Those results are expected according to the traditional teaching when the number of coronary arteries diseased (CAD) and LVEF were the main prognostic determinants in the whole spectrum of patients with ischemic heart disease concerning groups, but not good enough for each individual patient.

However, since the introduction of selective coronary angiography (1958), coronary artery bypass grafting (CABG) (1968) and PCI (1977), there has been a lot of refinement in trying to tailor diagnostic and therapeutic means to each individual patient within the given strata of LVEF and the number of CAD. The best example may be the SYNTAX II trial [2], where patients with de-novo 3-CAD (without left main stenosis) were treated by PCI. They were selected by calculation of SYNTAX score II, which was taking into account coronary angiographic, as well as clinical parameters, and approved by the Heart team that "state-of-the-art" PCI may achieve the equal result to CABG. Additionally, prior to stenting, the functional significance of each coronary stenosis (CS) was estimated by instantaneous wave-free ratio and, in uncertain cases, by fractional flow reserve (FFR). Intra-vascular ultrasound was performed to check if optimal deployment was achieved after stenting. At 1-year follow-up, the results are equal or superior to historic "Synergy between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery" study CABG and PCI arm, correspondingly. So, are we witnessing the era of "precision medicine"? We are heading towards it by two steps forwards one-step backwards. The SYNTAX score II, which is in our opinion a step forward in a decision-making process [3], has been taken out from Guidelines 2018 [4] (used to be IIa B in 2014) and, hopefully, it will be refined. Having different angiographic cut-off values in Europe (50%) and the USA (70%) is not in line with the precision medicine, especially as we know that difference is multiplied by 2 digits regarding the coronary flow resistance. Complicating the understanding of those different cut-offs is the recommendation for using radial artery as graft only if CS ≥90%.

In publication by Hao, since HF has been the main issue of CHART-2, only the information of LVEF and number of RS were available. The number of RS in a stepwise fashion was indicating increased mortality, but the presence of chronic occlusion, as well as RS on left anterior descending (LAD) coronary artery and proximal or distal location were not the predictors. One recently published study found that out of 35,993 patients without ST-segment elevation myocardial infarction, incomplete revascularization (IR) was observed in 25,732 (71%), and there was a stepwise increase in mortality if ≥2 vessel IR and proximal LAD vs. non-proximal LAD was present, as well as for IR on cut-offs

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70% vs. 90% [5]. Most of the IR were planned, so the subtitle of editorial commentary to that manuscript "The Devil is in details" [6] was mostly addressing what was missing in the articles of that sort (socio-economic status, life-style, physical capacity, angina status, atherosclerotic burden, provocative tests for ischemia and myocardial viability, valve functions, comorbidities, degree of frailty…) and posing the question if IR were the cause of worse outcome or whether that outcome was cofounded by other factors not taken into account.

Referring to the patients with LVEF <40% in the published paper [1], it should be noted that after the publication of the 10-year follow-up of the Surgical Treatment for Ischemic Heart Failure trial, myocardial revascularization in patients with HF with LVEF ≤35% has become Class I B irrespective of viability [4].

Being interventional cardiologists, even in the era pre-FFR when the pressure gradient across the CS used to be measured by pulling back balloon catheters, following "Primum non nocere", we developed and promoted the complementary skill of performing the stress echocardiography, which offered a better dynamic evaluation of myocardial function, inducible ischemia with regional wall motion abnormalities, viability and coronary microcirculation status, through Doppler-based coronary artery flow velocity reserve (CFVR) of LAD and vulnerability to pulmonary edema [7]. The stress echocardiography, possibly in a one-stop radiation-free and non-invasive setting, would certainly make the stratification more personalized and effective than a simple resting static assessment. To corroborate that, it has been shown that provoked ischemia was more important than FFR value and whether CS was treated or not by PCI [8], in regards to the prognosis of the patients. Furthermore, the findings of stress echocardiography detected if real single vessel PCI or sham procedure was performed in the study [9]; in another study CFVR estimated by trans-thoracic echocardiography predicted non-culprit CS significance in post-primary PCI patients and deferred unnecessary PCI [10].

The integration of invasive Cathlab info and a comprehensive non-invasive stress testing info is the road to tailored risk stratification, which is the issue in Stress echo 2020: The international study in ischemic and non-ischemic heart disease.

Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

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