REPLY: De-Escalation of the P2Y12 Inhibitor After Acute Coronary Syndromes According to On-Treatment Platelet Reactivity A Promising Step of Enormous Magnitude That Should Be Explored

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REPLY: De-Escalation of the $P2Y_{12}$ Inhibitor After Acute Coronary Syndromes According to On-Treatment Platelet Reactivity

A Promising Step of Enormous Magnitude That Should Be Explored

We have read with great interest the letter from Dr. Lozano and colleagues about our paper assessing the impact of on-treatment platelet reactivity on switching strategy after acute coronary syndrome (ACS) (1). First, we would like to thank the authors for their comments and the interest regarding this strategy.

As mentioned, de-escalation strategy is becoming a valid and cost-effective alternative to standard dual antiplatelet therapy (DAPT) with newer $P2Y_{12}$ inhibitor (prasugrel and ticagrelor) for 1 year after ACS. Recently, the TOPIC (Timing of Platelet Inhibition After Acute Coronary Syndrome), TROPICAL ACS (Testing Responsiveness to Platelet Inhibition on Chronic Antiplatelet Treatment For Acute Coronary Syndromes Trial), and PRAGUE 18 (Comparison of Prasugrel and Ticagrelor in the Treatment of Acute Myocardial Infarction) trials provided reassuring data regarding this practice (2–4). In parallel with the issue of DAPT duration, DAPT choice after ACS should take into account the individual ischemic and bleeding risk balance. This dynamic risk evolution supports switching strategies as highlighted recently in a consensus paper (5).

Confirming previous data, we identified that a large proportion of patients treated with prasugrel and ticagrelor are defined as biological hyper-responders to this treatment. This status has been associated with higher bleeding risk (5). Although not supported by most recent guidelines, it seems that selected platelet function testing (PFT) could play a role, when switching strategy is considered. Identification of patients with hyper-response to newer $P2Y_{12}$ blockers is of interest, because this cohort is at higher risk of bleeding with greater benefit of de-escalation to clopidogrel. However, in the TOPIC study, the benefit of de-escalation on bleeding prevention was also observed, to a smaller extent, in patients without hyper-response.

In conclusion, we agree with Lozano and colleagues that PFT could be useful to identify patients with potential greater benefit derived from switching strategy when the decision is challenging. However, PFT will provide only 1 element driving the clinical decision (switching or not), which should integrate other clinical, social, and procedural factors (patient characteristics, concomitant therapies, costs, social issues, development of side effects, medication adherence, and patient/physician preference).

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RESEARCH CORRESPONDENCE

Trends in Contrast Volume Use and Incidence of Acute Kidney Injury in Patients Undergoing Percutaneous Coronary Intervention

Insights From Blue Cross Blue Shield of Michigan Cardiovascular Collaborative (BMC2)

Contrast-induced acute kidney injury (CI-AKI) is a common complication in patients undergoing cardiac catheterization and percutaneous coronary interventions (PCIs), is associated with a high morbidity and mortality, and is a major contributor to health care cost. There seems to be a nonlinear association between the risk of CI-AKI and contrast media dose, and in prior work we had proposed use of renal function-based contrast dosing as a strategy to minimize risk of CI-AKI (1). The broad generalizability and clinical impact of routinely using estimated glomerular filtration rate (eGFR)-based thresholds on contemporary practice has not been studied.

We report the results of a statewide collaborative effort targeting renal function based contrast dosing. The study population for this analysis included all consecutive patients who underwent PCI between January 2010 and December 2016 at 48 hospitals participating in the BMC2 (Blue Cross Blue Shield of Michigan Cardiovascular Consortium).

The physician advisory committee of BMC2 recommended a CI-AKI rate of <3% (based on the 75th percentile rank of the collaborative) as a quality goal in calendar year 2009. This was followed by development and sharing of best practice protocols (including use of contrast thresholds in procedure time out) across participating sites and the inclusion of site-level ranking with CI-AKI incidence in the quarterly and annual reports. The role of appropriate risk stratification, hydration, and contrast volume (CV) reduction was discussed in an ongoing fashion at the quarterly collaborative meetings. Funnel plots for operator level and institutional risk-adjusted outcomes were provided to catheterization laboratory directors annually to facilitate outlier detection and guide focused quality efforts. Proportion of patients with CV/GFR 2 to 3 and those exceeding CV/GFR >3 was added to the reports in 2013. Beginning in 2014, institutions that were positive and negative outliers were invited to share their perspective and experience on applying best practices at a physician champion dinner meeting. Finally, procedures exceeding CV/GFR ≥3 were added to the morbidity and mortality report in 2014.

GFR was calculated using the Chronic Kidney Disease Epidemiology Collaboration equation. This equation is preferentially endorsed by consensus guidelines, has been demonstrated to be superior to other equations for predicting complications in patients undergoing PCI, and is used for reporting purposes in the quarterly and year-end BMC2 reports (2). AKI was defined as an elevation in serum creatinine of ≥0.5 mg/dl. We and others have previously demonstrated this definition to be preferable to more sensitive definitions of AKI for predicting the likelihood of hard clinical events (3). We excluded patients who were on dialysis at the time of the procedure, those who died in the catheterization laboratory, those undergoing coronary artery bypass grafting in the same hospitalization, those missing pre-procedural or post-procedural creatinine values, and those who had creatinine clearance or baseline AKI risk that could not be estimated because of missing information.

A total of 182,196 patients underwent PCI over the 7 study years across 48 hospitals. There was a steady decline in the average contrast volume that was used over the study period with the mean contrast volume declining from 197 (75) ml in calendar year 2010 to 168 (75) ml in calendar year 2016. When the contrast dose was adjusted for renal function, there was a decrease in average CV/GFR ratio (from a median of 2.53 to 2.23, and mean of 2.92 to 2.51) (**Figure 1**) with the proportion of patients exceeding CV/GFR ≥3 declining from 36% in 2010 to 25% in 2016. There was a commensurate reduction in the risk-adjusted incidence of AKI (**Figure 1**) over the study period.

Although observational findings cannot be used to ascribe causality, the decline in AKI rates that was observed in parallel with the reduction in