Rev Port Cardiol. 2019;37(11):899–900

Revista Portuguesa de Cardiologia
Portuguese Journal of Cardiology
www.revportcardiol.org

EDITORIAL COMMENT

The CRUSADE score and bleeding in acute coronary syndrome

Score CRUSADE e a hemorragia na Síndrome Coronária Aguda

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Available online 17 November 2018

The spectrum of patients admitted to hospital with acute coronary syndrome (ACS) is very wide, from simple to complex patients, with different diseases. Therapeutic measures intended to reduce ischemic events, by antithrombotic and coronary interventions, also have the effect of increasing risk for bleeding complications. These two elements need to be balanced at admission.

The European and American guidelines recommend use of the Global Registry for Acute Coronary Events (GRACE) or the Thrombolysis in Myocardial Infarction (TIMI) risk scores for ischemic events and the Can Rapid risk stratification of Unstable angina patients Suppress ADverse outcomes with Early implementation of the ACC/AHA guidelines (CRUSADE) score for bleeding events.[1]

The TIMI and GRACE scores have been thoroughly validated for assessing prognosis in coronary artery disease,[2] although not its severity, for which coronary angiography is required. Assessment of coronary anatomy is an invasive procedure that increases bleeding risk but enables optimization of therapeutic strategy. In the Portuguese Registry on Acute Coronary Syndromes (ProACS) the adoption of an invasive strategy, particularly within 24 hours, was accompanied by reductions in in-hospital mortality.[3]

The CRUSADE bleeding score was developed from a database of patients enrolled from February 15, 2003, through December 31, 2006. Given subsequent developments in medical therapy and interventions, the question is whether CRUSADE is still a good score to predict bleeding in ACS.

The article by Bento et al.[4] published in this issue of the *Journal* sets out to answer this question. They performed a single-center retrospective study of 2818 patients admitted with ACS between 2010 and 2014. The CRUSADE score was calculated for each patient, and its discrimination and goodness of fit were assessed by the area under the receiver operating characteristic curve (AUC) and by the Hosmer-Lemeshow test, respectively. Predictors of in-hospital major bleeding were determined.

The incidence of major bleeding in the different categories of the CRUSADE score was 0.5% in the very low risk category (rate estimated by the score 3.1%), 1.5% in the low risk category (5.5%), 1.6% in the moderate risk category (8.6%), 5.5% in the high risk category (11.9%), and 4.4% in the very high risk category (19.5%). The predictive ability of the CRUSADE score for major bleeding was only moderate (AUC 0.73) and although it presented some discriminatory power, it significantly overestimated the major bleeding rate, especially in patients at higher risk.

In multivariate analysis, advanced age, femoral vascular access, higher heart rate on admission and use of ticagrelor during hospital stay were predictors of major bleeding, which was associated with higher in-hospital mortality (15.4% vs. 3.8%, p<0.001).

In this study, 91.5% of patients underwent coronary angiography by radial access. Less than 2% of such proce-

DOI of original article: https://doi.org/10.1016/j.repc.2018.02.008
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https://doi.org/10.1016/j.repc.2018.10.007

dures were performed via a radial approach in the USA in 2007,[5] which is one reason there was less major bleeding in Bento et al. than in the CRUSADE cohort, since transradial PCI is associated with lower vascular and bleeding complication rates.[6]

The OASIS-5 trial, published in 2006, demonstrated that fondaparinux is similar to enoxaparin in reducing the risk of ischemic events at nine days, but substantially reduces major bleeding and long-term mortality and morbidity.[7] Fondaparinux was used little in the years during which the CRUSADE score was being validated, while in Bento et al. it was used for anticoagulation in 48% of patients, which is another reason for their lower bleeding rates.

The authors note that their patients preferably received a $P2Y_{12}$ receptor inhibitor during or after angioplasty, which may also have contributed to the low rate of major bleeding.

The definition of major bleeding in CRUSADE is different from that of GUSTO, which may be a limitation of this study, but this does not explain the large difference between bleeding events predicted by the CRUSADE score and those actually observed in the study.

These results show that in current practice the CRUSADE score is no longer a good tool to predict bleeding events, and a new score is needed for bleeding risk stratification in ACS.

Conflicts of interest

The author has no conflicts of interest to declare.

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