Canadian Journal of Cardiology 30 (2014) 125–131

Clinical Research

Accuracy of Dedicated Risk Scores in Patients Undergoing Primary Percutaneous Coronary Intervention in Daily Clinical Practice

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ABSTRACT

Background: Comparisons between dedicated risk scores in patients with ST-segment elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention (pPCI) in real-world clinical practice are scarce. The aim of this study was to assess the diagnostic performance of the Global Registry of Acute Coronary Events (GRACE), Primary Angioplasty in Myocardial Infarction (PAMI), Thrombolysis in Myocardial Infarction (TIMI), and Zwolle scores in STEMI patients undergoing pPCI in contemporary clinical practice.

Methods: This was a prospective cohort study of consecutive patients with STEMI undergoing pPCI between December 2009 and November 2010 in a high-volume tertiary referral centre. The outcomes assessed were major cardiovascular events (MACEs) and death within 30 days. The diagnostic accuracy of the scores was assessed using receiver operating characteristic curves, and scores were compared using the DeLong method.

Results: During the study period, 501 patients were included. Within 30 days, 62 patients (12.4%) presented a MACE and 39 individuals (7.8%) died. All scores were statistically associated with death and MACE within 30 days ($P < 0.01$). The c-statistic and 95% confidence intervals for 30-day mortality were: GRACE, 0.84 (0.78-0.90); TIMI, 0.81 (0.74-0.87); Zwolle, 0.80 (0.73-0.87); and PAMI, 0.75 (0.68-0.82) ($P < 0.01$). There was no statistically significant difference regarding the accuracy of the TIMI, GRACE, and Zwolle scores for 30-day mortality, but the GRACE score was superior to the PAMI score ($P < 0.01$).

RÉSUMÉ

Introduction : Les comparaisons entre les scores de risque des patients ayant eu un infarctus du myocarde avec sus-décalage du segment ST (IM avec sus-décalage du segment ST) qui subissent une intervention coronarienne percutanée primaire (ICPP) dans la pratique clinique réelle sont peu nombreuses. Le but de cette étude était d'évaluer la performance diagnostique du registre global GRACE (*Global Registry of Acute Coronary Events*), de l'étude PAMI (*Primary Angioplasty in Myocardial Infarction*), de l'étude TIMI (*Thrombolysis in Myocardial Infarction*) et des scores Zwolle chez les patients subissant une ICPP dans la pratique clinique actuelle.

Méthodes : Il s'agissait d'une étude de cohorte prospective de patients consécutifs ayant eu un IM avec sus-décalage du segment ST qui ont subi une ICPP entre décembre 2009 et novembre 2010 dans un centre de référence tertiaire à volume élevé. Les résultats cliniques évalués ont été les événements cardiovasculaires indésirables majeurs (ÉCIM) et la mortalité dans les 30 jours. L'exactitude diagnostique des scores a été évaluée à l'aide de la courbe caractéristique d'efficacité du récepteur (ROC : *receiver operating characteristic*), et les scores ont été comparés à l'aide de la méthode de DeLong.

Résultats : Durant la période étudiée, 501 patients ont été inclus. En 30 jours, 62 patients (12,4 %) ont subi un ÉCIM et 39 individus (7,8 %) sont morts. Tous les scores ont été statistiquement associés à la mortalité et l'ÉCIM dans les 30 jours ($P < 0,01$). La statistique C et l'intervalle de confiance à 95 % de la mortalité dans les 30 jours a été : registre global GRACE, 0,84 (0,78-0,90); étude TIMI, 0,81 (0,74-0,87);

In recent years, significant advances have been made in the treatment of ST-segment elevation acute myocardial infarction (STEMI).[1-5] In current daily clinical practice there are patients with very low predicted mortality. These patients could benefit from early discharge from the intensive care unit and from the hospital, resulting in better clinical care and optimization of health resources.[6-9] In contrast, morbidity and mortality after STEMI are still high in other subgroups.[10-13] With the aim of identifying these patients, dedicated risk scores have been developed, which might allow individualized management and treatment of patients with STEMI.[14-17] A comparison among these scores is available in Supplemental Table S1.

Despite their frequent use, some scores present the limitations of having been developed more than a decade ago. The inclusion of patients of randomized clinical trials

Received for publication May 22, 2013. Accepted July 18, 2013.

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See page 130 for disclosure information.

http://dx.doi.org/10.1016/j.cjca.2013.07.673

Conclusions: The TIMI, GRACE, and Zwolle scores performed equally well as predictors of mortality in patients who underwent pPCI in current practice. These results suggest that these scores are suitable options for risk assessment in a real-world setting.

Conclusions : L'étude TIMI, le registre global GRACE et les scores Zwolle ont montré une performance aussi bonne que les prédicteurs de la mortalité chez les patients qui avaient subi une ICPP dans la pratique actuelle. Ces résultats suggèrent que ces scores sont des options qui conviennent à l'évaluation des risques dans un contexte réel.

might also limit their use in current real-world practice. Evaluations of those scores in populations within contemporary interventional practice are scarce, as are comparative studies of several scores.[18,19] The aim of this study was to assess the diagnostic performance of the **G**lobal **R**egistry of **A**cute **C**oronary **E**vents (GRACE), **P**rimary **A**ngioplasty in **M**yocardial **I**nfarction (PAMI), **T**hrombolysis **i**n **M**yocardial **I**nfarction (TIMI), and Zwolle risk scores in STEMI patients undergoing primary percutaneous coronary intervention (pPCI) in contemporary daily clinical practice.

Methods

Patients

This was a prospective cohort study that consecutively included patients with STEMI who underwent pPCI at the Instituto de Cardiologia do Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil, from December 2009 to November 2010. Our facility is a tertiary referral centre that performs approximately 3000 percutaneous coronary interventions per year. pPCI is the routine STEMI treatment at our institution, and the catheterization laboratory is open 24 hours per day, 7 days per week. The project was approved by the local Research Ethics Committee, and all patients received information regarding the study and provided written informed consent. The authors are responsible for the design and conduction of the study, analysis, writing and editing, and final content of the manuscript. No extramural funding was used to support this work.

The inclusion criterion was STEMI submitted to pPCI as the initial reperfusion strategy, determined by the assisting physician. STEMI was defined as typical chest pain at rest associated with ST-segment elevation of at least 1 mm in 2 contiguous leads in the frontal plane or 2 mm in the horizontal plane, or typical pain at rest in patients with a new, or presumably new, left bundle-branch block. The exclusion criteria were delta T greater than 12 hours, use of lytic therapy as the primary reperfusion therapy for the index event, age younger than 18 years, or refusal to participate. Delta T was defined as the time from the onset of chest pain to hospital arrival.

pPCI procedures

The medications used in the patient's initial care and the indications for pPCI were at the discretion of the medical team. Patients received a bolus dose of acetylsalicylic acid (300 mg) and clopidogrel (300-600 mg). After conventional coronary angiography, unfractionated heparin was administered at a dose of 60 U/kg to 100 U/kg and pPCI was performed as previously described.[20] Aspects related to the procedure, such as access site, administration of glycoprotein IIb/IIIa inhibitors and adjunctive aspiration thrombectomy, were left to the operators' discretion. An intra-aortic balloon was used only in patients with cardiogenic shock.

Data collection

Patients were interviewed by 1 of the investigators (A.P.A., R.B.D.) on hospital admission, and clinical, angiographic, and laboratory data were collected using a standard questionnaire. Blood samples for laboratory tests were collected from all patients at admission. Angiography was performed in at least 2 different views by experienced operators using a previously validated digital electronic system (Siemens Axiom Artis, Munich, Germany). Intracoronary nitroglycerin was routinely administered at a dose of 200 μg before measurements. Coronary flow before and after the procedures was assessed and described according to the TIMI criteria.[21]

Outcomes and follow-up

All patients were visited daily during the in-hospital period by 1 of the investigators (A.P.A., R.B.D.) to assess in-hospital events. The occurrence of events 1 month after the index event was evaluated in a telephone call and by review of medical records. All-cause mortality and major cardiovascular events (MACEs) were assessed and registered by 1 of the study investigators. MACEs were defined as a combination of all-cause mortality, new acute myocardial infarction (MI), or stroke. New MI was defined by recurrent chest pain with new elevation of serum biomarkers, after the initial decline of the natural curve, with ST-segment elevation or new Q waves, according to the universal definition of MI.[22] Stroke was defined as a new, sudden-onset focal neurological deficit, of presumably cerebrovascular cause, irreversible (or resulting in death) within 24 hours, and not caused by another readily identifiable cause. Stroke was classified as ischemic or hemorrhagic.