



ORIGINAL ARTICLE

The prognostic value of admission red cell distribution width-to-platelet ratio in patients with ST-segment elevation myocardial infarction undergoing primary percutaneous coronary intervention



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KEYWORDS

RDW-to-platelet ratio;
ST-segment elevation myocardial infarction;
Primary percutaneous coronary intervention;
Cardiovascular mortality;
Prognosis

Abstract

Objective: Red cell distribution width (RDW) is a measure of variation in the size of circulating red blood cells. Recent studies have reported a strong independent relation between elevated RDW and short- and long-term prognosis in various disorders.

The aim of the present study was to investigate the relationship between admission RDW-to-platelet ratio (RPR) and in-hospital and long-term prognosis in patients with ST-segment elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention (PCI).

Methods: A total of 470 consecutive patients with a diagnosis of STEMI who underwent primary PCI were included in this prospective study. The patients were divided into two groups based on their admission RPR: high (>0.061) RPR group and low (≤ 0.061) RPR group. The patients were followed for adverse clinical outcomes in-hospital and for up to one year after discharge.

Results: In-hospital cardiovascular mortality, major adverse cardiovascular events (MACE), advanced heart failure and cardiogenic shock were significantly higher in the high RPR group ($p < 0.05$). All-cause and cardiovascular mortality, MACE, fatal reinfarction, advanced heart failure, and rehospitalization for cardiac cause were more frequent in the high RPR group in one-year follow-up ($p < 0.05$). High RPR was found to be a significant independent predictor of one-year cardiovascular mortality in multivariate analysis ($p = 0.003$, OR: 3.106, 95% CI: 1.456–6.623).

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PALAVRAS-CHAVE

Rácio do índice de dispersão eritrocitária pelo número de plaquetas; Enfarte do miocárdio com elevação do segmento ST; Intervenção coronária percutânea primária; Mortalidade cardiovascular; Prognóstico

Conclusion: RPR is an inexpensive and readily available biomarker that provides an additional level of risk stratification beyond that provided by conventional risk parameters in predicting long-term MACE and cardiovascular mortality in STEMI.

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O valor prognóstico do rácio do índice de dispersão eritrocitária pelo número de plaquetas em doentes com enfarte do miocárdio com elevação do segmento ST submetidos a intervenção coronária percutânea

Resumo

Objetivos: O índice de dispersão eritrocitária (RDW) é uma medida de variação do tamanho dos glóbulos vermelhos em circulação. Estudos recentes reportaram uma forte relação independente entre o RDW e o prognóstico a curto e a longo prazo em diversas patologias.

O objetivo deste estudo foi investigar a relação entre o rácio do índice de dispersão eritrocitária pelo número de plaquetas (RPR) à admissão e o prognóstico a longo prazo de doentes com enfarte do miocárdio com elevação do segmento ST (STEMI) submetidos a intervenção coronária percutânea (ICP) primária.

Métodos: Um total de 470 doentes consecutivos com diagnóstico de STEMI e submetidos a ICP primária foram incluídos neste estudo prospetivo. Os doentes foram divididos em dois grupos baseados no rácio das plaquetas (RPR) na altura do internamento (grupo com RP elevado (> 0,061) e grupo com RPR inferior ($\leq 0,061$)). Os doentes foram seguidos para registo dos eventos clínicos adversos durante o internamento e um ano após a alta hospitalar.

Resultados: A mortalidade cardiovascular intra-hospitalar, os eventos cardiovasculares adversos major (MACE), a insuficiência cardíaca avançada e o choque cardiogénico foram significativamente superiores no grupo com RPR elevado ($p < 0,05$). A mortalidade por qualquer causa e cardiovascular, os MACE, o reenfarte fatal, a insuficiência cardíaca avançada, o reinternamento por motivos cardíacos foram mais frequentes no grupo com RPR elevado num seguimento a um ano ($p < 0,05$). O RPR elevado foi considerado um fator preditor significativamente independente da análise não multivariada da mortalidade cardiovascular a um ano ($p = 0,003$, OR: 3,106, IC 95%: 1,456-6,623).

Conclusão: O RPR é um biomarcador barato e imediatamente disponível que proporciona um nível de estratificação de risco adicional para além do proporcionado pelos parâmetros do risco convencional na previsão dos MACE a longo prazo e da mortalidade cardiovascular em STEMI.

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Introduction

Despite advances in diagnosis and treatment, ST-segment elevation myocardial infarction (STEMI) remains the most common cause of cardiovascular mortality and morbidity in both developing and developed countries. It is crucial to identify high-risk patients who will require immediate and intensive treatment for myocardial infarction (MI).^{1,2}

Thrombosis and inflammation play an important role not only in the pathophysiology of acute ischemic syndromes,³ but also in the process of atherogenesis, especially in the progression of disease.⁴ Red cell distribution width (RDW) is a measure of variation in the size of circulating red blood cells and is routinely reported as part of an automated full blood count.⁵ Recent studies have reported a strong independent relation between elevated RDW and short- and long-term prognosis in various disorders such as coronary artery disease (CAD),⁶ peripheral vascular disease,⁷ MI,⁸ acute and chronic heart failure^{9,10} and pulmonary

embolism,¹¹ as well as in the general population.¹² A correlation between RDW and the complexity and severity of CAD has been presented in a previous study.¹³

Both chronic inflammation and neurohumoral activation lead to an increase in the heterogeneity of circulating erythrocytes, resulting in elevated RDW.^{14,15}

Platelets play a crucial role in the pathogenesis of acute coronary syndrome (ACS). Activated platelets adhere to the vessel wall at the site of ruptured plaque, and initiate arterial thrombus formation, which leads to ischemia or infarction.^{16,17} Platelets both release markers of inflammation such as soluble CD40 ligand and beta-thromboglobulin^{18,19} and directly stimulate other cells (including leukocytes, lymphocytes, and monocytes), which can lead to further release of inflammatory markers.^{20,21} A decreased platelet count was found to be associated with increased infarct size and extent, mean platelet volume and increased platelet aggregation in ACS in previous studies.^{22–24} There is controversy in the literature

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