



ORIGINAL ARTICLE

Prognostic value of troponin I and NT-proBNP concentrations in patients after in-hospital cardiac arrest



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KEYWORDS

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Abstract

Objectives: Cardiac arrest (CA) is a complex event with a dismal survival rate. The aim of this study was to determine whether N-terminal pro-B-type natriuretic peptide (NT-proBNP) levels measured on admission and serial cardiac troponin I determination in patients with in-hospital cardiac arrest (IHCA) are predictive of 30-day mortality.

Methods: Out of 9877 patients hospitalized in the cardiac intensive care unit during the study, we enrolled consecutive patients experiencing cardiac arrest within 12 hours of admission. Baseline characteristics, information about circumstances of CA and cardiopulmonary resuscitation, and initial biochemical parameters were retrospectively collected.

Results: A total of 106 patients (61 male, age 71.4 ± 12.6 years) were enrolled. Thirty-four (32.1%) had a history of myocardial infarction, and 13 (12.3%) a history of stroke. Total 30-day mortality was 60.4%. Deceased patients were older (73.7 ± 11.9 vs. 67.8 ± 13.0 years; $p=0.01$) and had lower systolic (89.4 ± 37.0 vs. 115.0 ± 24.0 mmHg; $p=0.0001$) and diastolic (53.6 ± 24.8 vs. 66.1 ± 15.0 mmHg; $p=0.008$) blood pressure on admission. Shockable initial rhythm was more often noted in the survivor group (54.8% vs. 28.1%; $p=0.01$). Deceased patients had higher median NT-proBNP levels (9590.0 [25–75% interquartile range (IQR), 5640.0–26 450.0] vs. 3190.0 [25–75% IQR, 973.8–5362.5] pg/ml; $p=0.02$) on admission. There were no differences in the first two troponin I measurements, but values were higher on the third measurement in non-survivors (98.2 [25–75% IQR, 76.4–175.8] vs. 18.7 [25–75% IQR, 5.2–50.6]; $p=0.009$).

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PALAVRAS-CHAVE

Paragem cardíaca
intra-hospitalar;
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NT-proBNP;
Mortalidade

Conclusions: The survival rate of patients after in-hospital CA is poor. Deceased patients have higher NT-proBNP levels on admission, along with higher troponin I concentrations on the third measurement. Those biomarkers are useful in predicting 30-day mortality in IHCA patients.

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Valor prognóstico da troponina I e da concentração de NT-proBNP em doentes após paragem cardíaca intra-hospitalar

Resumo

Objetivos: A paragem cardíaca (PC) é uma patologia complexa com uma taxa de sobrevivência distal. O objetivo deste estudo foi analisar se a concentração do terminal N do peptídeo natriurético auricular do tipo B (NT-proBNP), medida na admissão, e se a determinação de troponina I cardíaca seriada em doentes com paragem cardíaca intra-hospitalar são fatores preditivos para mortalidade a 30 dias.

Métodos: De 9877 doentes hospitalizados durante o estudo na unidade de cuidados intensivos, inscrevemos doentes consecutivos que passaram por paragem cardíaca nas primeiras 12 horas após o internamento. Foram inicialmente recolhidos características basais, informação sobre as circunstâncias da PC, ressuscitação cardiopulmonar e parâmetros bioquímicos iniciais.

Resultados: Foram inscritos 106 doentes (61 homens, com $71,4 \pm 12,6$ anos). Trinta e quatro (32,1%) doentes tinham antecedentes de enfarte do miocárdio e 13 (12,3%) antecedentes de acidente vascular cerebral. A mortalidade total a 30 dias foi de 60,4%. Os doentes falecidos tinham idade superior a ($73,7 \pm 11,9$ versus $67,8 \pm 13,0$ anos; $p=0,01$), apresentavam pressão arterial sistólica mais baixa ($89,4 \pm 37,0$ versus $115,0 \pm 24,0$ mmHg; $p=0,0001$) e diastólica ($53,6 \pm 24,8$ versus $66,1 \pm 15,0$ mmHg; $p=0,008$) na altura do internamento. Um ritmo chocável inicial foi observado mais vezes no grupo dos sobreviventes (54,8% versus 28,1%; $p=0,01$). Os doentes falecidos apresentaram níveis medianos mais elevados do terminal N do peptídeo natriurético auricular do tipo B (NT-proBNP) [9590,0 (amplitude interquartilica 25–75% (IQR, 5640,0–26450,0) versus 3190,0 (IQR 25–75%, 973,8–5362,5) pg/ml; $p=0,02$] no internamento. Não se registaram diferenças nas duas primeiras medições de troponina I, com um valor mais elevado na terceira medição nos não sobreviventes [$98,2$ (IQR 25–75% (76,4–175,8) versus $18,7$ (IQR 25–75%, 5,2–50,6); $p=0,009$].

Conclusões: A taxa de sobrevivência dos doentes após paragem cardíaca intra-hospitalar é fraca. Os doentes que faleceram apresentaram níveis mais elevados de NT-proBNP na admissão, juntamente com concentração mais elevada de troponina I na terceira medição. Aqueles biomarcadores são úteis na previsão da mortalidade a 30 dias nos doentes com paragem cardíaca intra-hospitalar.

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List of abbreviations

CI	confidence interval
CPR	cardiopulmonary resuscitation
IHCA	in-hospital cardiac arrest
IQR	interquartile range
NT-proBNP	N-terminal pro-B-type natriuretic peptide
OHCA	out-of-hospital cardiac arrest
ROC	receiver operating characteristic
SD	standard deviation

Introduction

Cardiovascular diseases are the leading cause of mortality and morbidity worldwide.¹ Unfortunately, in many patients cardiac arrest is the first manifestation of cardiac disease.² In spite of great improvements in health care, prognosis after cardiac arrest remains dismal and over the past 30 years there have been no dramatic changes in survival rates.³ Several factors have been shown to influence long-term prognosis of cardiac arrest patients: an initial shockable rhythm (ventricular tachycardia or ventricular fibrillation), cardiopulmonary resuscitation (CPR) initiated by bystanders, early defibrillation, and introduction of intensive treatment are associated with more favorable outcome.^{4,5} It thus seems intuitive that, due to easier and

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