



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. Base-line 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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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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