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Original Article

Results of Primary Percutaneous Coronary Intervention According to the Total Ischemic Time

Roberto Ramos Barbosa[1], Felipe Bortot Cesar[1], Renato Giestas Serpa[1], Denis Moulin dos Reis Bayerl[1], Vinicius Fraga Mauro[1], Walkimar Ururay Gloria Veloso[1], Roberto de Almeida Cesar[1], Pedro Abilio Ribeiro Reseck[1], Valmin Ramos-Silva[2]

ABSTRACT

Background: Treatment of ST-elevation acute myocardial infarction has primary percutaneous coronary intervention as the preferred method of reperfusion. This study aimed to evaluate in-hospital outcomes of patients with ST-elevation acute myocardial infarction according to the total ischemic time until performing primary percutaneous coronary intervention. **Methods**: Single-center registry of patients admitted with ST-elevation acute myocardial infarction undergoing primary percutaneous coronary intervention between March/2012 and February/2014, followed from admission to hospital discharge, and compared according to the total ischemic time (Group 1: symptom onset-to-balloon time < 6 hours; Group 2: symptom onset-to-balloon time ≥ 6 and < 12 hours). **Results**: Two hundred seventy nine patients underwent primary percutaneous coronary intervention, 118 in Group 1 (42.3%) and 161 in Group 2 (57.7%). Group 2 was older, had higher prevalence of hypertension, fewer smokers, more patients in Killip-Kimball class ≥ 2 and lower primary percutaneous coronary intervention success rate. The incidences of death or non-fatal infarction (11.0% vs. 18.6%; $p = 0.08$), death (8.5% vs. 16.8%; $p = 0.04$) and acute renal failure (7.6% vs. 19.9%; $p < 0.01$) were greater in Group 2. **Conclusions**: Patients with ST-elevation acute myocardial infarction undergoing primary percutaneous coronary intervention with symptom onset-to-balloon time ≥ 6 hours presented higher clinical complexity and worse in-hospital outcomes when compared to patients treated earlier. Joint actions in different critical areas of patient care are essential to increase treatment efficacy and reduce adverse outcomes.

DESCRIPTORS: Myocardial infarction. Percutaneous coronary intervention. Myocardial reperfusion. Mortality.

RESUMO

Resultados da Intervenção Coronária Percutânea Primária de Acordo com o Tempo Total de Isquemia

Introdução: O tratamento do infarto agudo do miocárdio com supradesnivelamento de ST tem a intervenção coronária percutânea primária como método preferencial de reperfusão. Este estudo teve como objetivo avaliar a evolução hospitalar de pacientes com infarto agudo do miocárdio com supradesnivelamento de ST, conforme o tempo total de isquemia, até a realização de intervenção coronária percutânea primária. **Métodos**: Registro unicêntrico, de pacientes admitidos com infarto agudo do miocárdio com supradesnivelamento de ST submetidos à intervenção coronária percutânea primária entre março de 2012 e fevereiro de 2014, acompanhados da admissão até a alta hospitalar e comparados conforme o tempo total de isquemia (Grupo 1: tempo dor-balão < 6 horas; Grupo 2: tempo dor-balão ≥ 6 e < 12 horas). **Resultados**: Foram submetidos à intervenção coronária percutânea primária 279 pacientes, sendo 118 do Grupo 1 (42,3%) e 161 do Grupo 2 (57,7%). O Grupo 2 apresentou idade mais avançada, maior prevalência de hipertensão arterial, menor proporção de tabagistas, maior número de pacientes em classe Killip-Kimball ≥ 2 e menor taxa de sucesso da intervenção coronária percutânea primária. As incidências de óbito ou infarto não fatal (11,0% vs. 18,6%; $p = 0,08$), óbito (8,5% vs. 16,8%; $p = 0,04$) e insuficiência renal aguda (7,6% vs. 19,9%; $p < 0,01$) foram maiores no Grupo 2. **Conclusões**: Pacientes com infarto agudo do miocárdio com supradesnivelamento de ST submetidos à intervenção coronária percutânea primária com tempo dor-balão ≥ 6 horas apresentaram maior complexidade clínica e pior evolução hospitalar em relação àqueles tratados mais precocemente. Ações conjuntas em diversos pontos críticos da assistência ao paciente são fundamentais para aumentar a eficácia do tratamento e reduzir os desfechos adversos.

DESCRITORES: Infarto do miocárdio. Intervenção coronária percutânea. Reperfusão miocárdica. Mortalidade.

[1] Hospital Evangélico de Vila Velha, Vila Velha, ES, Brazil.
[2] Escola Superior de Ciências da Santa Casa de Misericórdia, Vitória, ES, Brazil.

Correspondence to: Roberto Ramos Barbosa. Rua Mato Grosso, 80, apto. 602 – Praia da Costa – CEP: 29101-120 – Vila Velha, ES, Brazil
E-mail: roberto.rb@cardiol.br

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Acute myocardial infarction (AMI) has a high incidence and is currently a leading cause of death in Brazil, in addition to generating large expenditures, of both financial and technological resources, by the country's health care systems. The increasing number of cases of AMI, particularly in developing countries, is presently one of the most relevant public health issues.[1]

There are very robust, evidence-based scientific data regarding the clinical benefit of primary percutaneous coronary intervention (PPCI) in acute myocardial infarction with ST-segment elevation (STEMI).[2-5] However, some obstacles can directly influence the treatment of patients with AMI. In this context, primary PCI should be made available in centers with interventional cardiology training, and reducing the time between symptom onset and the procedure is associated with a higher rate of culprit artery patency, smaller infarct size, and lower mortality.[6] For that to occur, it is necessary the combine the actions of several professionals in an integrated and efficient system, which includes symptom recognition by population, disease diagnosis at the service of arrival, patient transportation to the referral service, and finally, the engagement of the interventional cardiology team.

In the guidelines of the Brazilian Society of Cardiology, the indication for primary PCI from up to 90 minutes of the first medical contact for patients with STEMI in the acute phase (with symptoms that started less than 12 hours before) receives Class I recommendation, level of evidence A.[7] Although the performance of primary PCI within 12 hours of the onset of STEMI is universally accepted, agility and the reduction of the delay until coronary reperfusion therapy are constantly sought. Thus, this study aimed to evaluate the clinical evolution of patients with STEMI, according to the total ischemic time until the performance of the PPCI.

METHODS

Study design and population

This was an observational study of a single center registry of patients admitted with STEMI, submitted to PPCI between March 2012 and February 2014 at Hospital Evangélico de Vila Velha, located in Vila Velha (ES), followed from hospital admission until discharge or death. This series included consecutive patients older than 18 years who underwent primary PCI within 12 hours of the onset of AMI, with persistent ST-segment elevation or new left bundle branch block on ECG, and treated by the Brazilian Unified Health System (Sistema Único de Saúde – SUS). Patients undergoing primary PCI with STEMI onset of more than 12 hours were excluded from the study, as well as those for whom there were doubts about the diagnosis of STEMI by the Clinical Cardiology and Interventional Cardiology staff.

Patients included in the study were divided into two groups according to the total time of ischemia; Group 1, with symptom-onset-to-balloon time < 6 hours, and Group 2, with symptom-onset-to-balloon time ≥ 6 and < 12 hours.

The data obtained from the medical records were stored prospectively in the service in registry format. All patients signed an informed consent prior to the procedures. The study was approved by the Research Ethics Committee under protocol number 492.764.

PROCEDURES

Hospital Evangélico de Vila Velha is a referral center of SUS for cardiovascular emergencies in the metropolitan region of Vitoria. The Service of Interventional Cardiology and Hemodynamics comprises medical and nursing staff in attendance 24 hours a day, 7 days a week, working together with the clinical cardiology team.

All patients were assessed regarding the emergency nature of the primary PCI procedure, and patients were taken to the invasive procedure room as soon as possible after a communication with the emergency room team. Patients received a loading dose of 200 to 300 mg of acetylsalicylic acid and 300 to 600 mg of clopidogrel, or 180 mg of ticagrelor. The use of morphine, sublingual/intravenous nitrate, or beta-blocker was at the discretion of the attending physician. All underwent full heparinization with unfractionated heparin immediately before the intervention (60 to 100 U/kg).

The PPCI was performed as recommended by guidelines,[7] and the vascular access route was at the interventionist's discretion. Pre-dilation, post-dilation, and administration of glycoprotein IIb/IIIa inhibitors were performed at the surgeon's discretion.

Definitions and Outcomes

In addition to the time of symptom onset-to-balloon, the following times were also analyzed: symptom onset-to-door time (from symptom onset to arrival at the first health service); inter-hospital transfer time (time elapsed from arrival at the first health service until arrival at the referral service, i.e., the emergency room of Hospital Evangélico de Vila Velha), for cases that were not initially seen at the referral service; and door-to-balloon time (interval between arrival at the emergency referral service to the performing PPCI).

Hospitalization was recorded in days, from the day of admission, considered as zero day. In the analysis of length of hospitalization, only patients who were discharged to home were considered, excluding those who died during the hospitalization.

Regarding mortality, hospital mortality was considered as cases of death from any cause after the