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Original

Clinical profile and outcomes of primary percutaneous coronary intervention in young patients

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ABSTRACT

Background: The epidemiology of acute myocardial infarction with ST-segment elevation (STEMI) has been modified in recent years, focusing on young people. Our goal was compare the clinical profile, laboratory, angiographic, and 30-day clinical outcomes of patients ≤ 40 years with those > 40 years undergoing primary percutaneous coronary intervention (pPCI).
Methods: Prospective cohort study of consecutive patients undergoing pPCI between 2009 and 2011.
Results: A total of 1,055 patients were included, 3.3% of them ≤ 40 years. Young patients were more often black, smokers and with a family history of coronary artery disease, and less often hypertensive and dyslipidemic. In patients ≤ 40 years, leukocyte count and ultrasensitive troponin levels at admission were higher, and high density lipoprotein-cholesterol, lower. The left anterior descending artery as a culprit vessel and left ventricular ejection fraction did not differ between groups. Although the TIMI 3 flow pre-intervention was similar, young people showed higher prevalence of myocardial blush 3 pre-procedure. The door-to-balloon time was lower in younger patients (1.0 hour [0.8-1.4 hour] vs. 1.3 hour [0.9-1.7 hour]; $p = 0.03$). At 30 days, patients ≤ 40 years had a mortality of 0% vs. 8.8% for patients > 40 years ($p = 0.07$).
Conclusions: Patients ≤ 40 years with STEMI and undergoing pPCI show differences in clinical, angiographic and procedural characteristics compared to those > 40 years. In this analysis, representative of the current medical practice, the 30-day mortality of these patients was very low.

Perfil clínico e resultados da intervenção coronária percutânea primária em pacientes jovens

Palavras-chave:
Infarto do miocárdio
Intervenção coronária percutânea
Doença da artéria coronariana

RESUMO

Introdução: A epidemiologia do infarto agudo do miocárdio com supradesnivelamento do segmento ST (IAMCST) tem se modificado nos últimos anos, com incidência maior em jovens. Nosso objetivo foi comparar o perfil clínico, laboratorial e angiográfico, e os desfechos clínicos em 30 dias de pacientes ≤ 40 anos àqueles > 40 anos submetidos à intervenção coronária percutânea primária (ICPp).
Métodos: Estudo de coorte prospectivo com pacientes consecutivos submetidos à ICPp entre 2009 e 2011.
Resultados: No período, 1.055 pacientes foram incluídos, sendo identificados 3,3% com ≤ 40 anos. Pacientes jovens eram mais frequentemente negros, tabagistas e com história familiar de doença coronária, e menos frequentemente hipertensos e dislipidêmicos. Nos pacientes ≤ 40 anos, a dosagem de leucócitos e da troponina ultrassensível na admissão foi maior, e a lipoproteína de alta densidade-colesterol, menor. A artéria descendente anterior como vaso culpado e a fração de ejeção do ventrículo esquerdo não foram diferentes entre os grupos. Apesar de o fluxo TIMI 3 pré ser similar, os jovens mostraram maior prevalência de blush miocárdico 3 pré-procedimento. O tempo porta-balão foi menor nos pacientes mais jovens (1,0 hora [0,8-1,4 hora] vs. 1,3 hora [0,9-1,7 hora]; $p = 0,03$). Em 30 dias, os pacientes ≤ 40 anos apresentaram mortalidade de 0% vs. 8,8% nos pacientes > 40 anos ($p = 0,07$).

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Conclusões: Pacientes ≤ 40 anos com IAMCST e submetidos à ICPp apresentam diferenças nos perfis clínico, angiográfico e do procedimento quando comparados àqueles > 40 anos. Nesta análise, representativa da prática médica atual, a mortalidade em 30 dias desses pacientes foi muito baixa.

Introduction

Cardiovascular diseases are the leading cause of mortality in Brazil and worldwide. Acute myocardial infarction (AMI) is the cardiovascular disease with greatest mortality, and its incidence in young patients has increased over the years.[1-3] Currently, the incidence in patients under 40 years is around 4%-10%.[4-7]

In several studies, it was observed that myocardial infarction in young patients is most often associated with smoking, family history of coronary artery disease, and dyslipidemia.[4,5,7,8] However, there are few Brazilian studies evaluating this question.

The objective of this study was to evaluate the clinical and angiographic characteristics as well as the clinical outcome for young patients with ST-segment elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention (pPCI) in contemporary clinical practice.

Methods

Patients

All patients diagnosed with AMI admitted to this institution from December 1st, 2009 to December 31st, 2011 were prospectively evaluated. Inclusion criteria were clinical and electrocardiographic diagnosis of myocardial infarction, and indication for pPCI by the attending physician. Exclusion criteria were $\Delta t > 12$ hours, age < 18 years, and refusal to sign the informed consent.

STEMI was defined as the presence of a typical pain at rest associated to ST-segment elevation in two contiguous leads of at least 1 mm in the frontal plane or 2 mm in the horizontal plane, or the presence of a typical chest pain at rest in patients with a new left bundle branch block.

Patients were categorized into two groups: patients aged ≤ 40 years and controls (> 40 years). The clinical characteristics and outcomes were compared. The study was approved by the Ethics Committee of this institution.

Percutaneous procedure

The Hemodynamics Service of this institution operates full-time, 24 hours a day, 7 days a week. Approximately 500 pPCI procedures are performed annually. The institutional routine is an acetylsalicylic acid loading dose of 300 mg and clopidogrel 300-600 mg at admission to emergency department and heparin 60-100 U/kg. pPCI procedures are performed as described in the literature.[9] Specific technical aspects, such as access route, drug administration, type of stent, and thromboaspiration, are at operators' discretion.

Clinical, laboratory, and angiographic evaluation

The clinical interview was conducted by trained researchers. Demographics, risk factors for ischemic heart disease, medical history, and clinical presentation of the event data were collected. Laboratory tests were conducted according to the institutional criteria and included, among others, serum glucose concentration, renal function, and inflammation and myocardial necrosis markers.

Angiographic evaluations were performed by a digital electronic system AXIOM Artis (Siemens, Munich, Germany). Target vessel reference diameter was defined as the average of proximal and distal diameters from the lesion, and stenosis severity was evaluated in two orthogonal projections; the most severe was considered, both before and after stent implantation. The lesion length was measured shoulder-to-shoulder and lesions with a normal arterial segment < 10 mm between them were considered as a single lesion. The coronary flow before and after the procedure was evaluated and described according to Thrombolysis In Myocardial Infarction (TIMI) criteria. Myocardial perfusion was assessed by myocardial blush, as previously described.[10]

30-day clinical outcomes

The 30-day follow-up was conducted by phone, and occurrences of death, stroke, reinfarction, need for a new percutaneous or surgical revascularization, and/or stent thrombosis were registered.

Statistical analysis

SPSS version 17.0 for Windows was used for statistical analysis. Continuous variables were presented as mean and standard deviation, and compared using Student's *t*-test. Continuous variables with non-normal distribution were described as median and interquartile range and compared using the Mann-Whitney test. Categorical variables were described as absolute number and percentage and compared by the Chi-squared test or Fisher's exact test, as appropriate. Statistical significance was defined by a two-tailed p-value < 0.05.

Results

During the study period, 1,055 patients were included, of whom 35 (3.3%) were aged ≤ 40 years. The mean age of young patients was 34.1 ± 4.5 years and 61.3 ± 11.1 years for those aged > 40 years. Table 1 shows the clinical characteristics of both groups. African descent, smoking, and family history of premature coronary artery disease were more frequent among patients ≤ 40 years. On the contrary, younger patients were less frequently affected by hypertension or dyslipidemia, and this group had lower rates of previous percutaneous revascularization. The prevalence of diabetes mellitus was similar. The door-to-balloon time was lower in patients aged ≤ 40 years (1.0 h [0.8-1.4 h] vs. 1.3 h [0.9–1.7 h]; $p = 0.03$).

Table 2 describes laboratory characteristics of each group. In patients aged ≤ 40 years, the leukocyte count and ultrasensitive troponin level at admission were higher, and the high-density lipoprotein cholesterol (HDL-C) level was lower. There was no significant difference in other markers of myocardial necrosis or inflammation between groups.

Table 3 shows angiographic and procedural characteristics; note that three-vessel involvement, left anterior descending artery as the culprit vessel, and left ventricular ejection fraction did not differ between groups. Although there was equivalence of pre-procedural TIMI-3 flows, the younger group had a higher prevalence of grade 3 myocardial blush before the procedure. The reference diameter was similar, but younger patients showed shorter lesions.