International Journal of Cardiology 176 (2014) 946–950

Contents lists available at ScienceDirect

International Journal of Cardiology

journal homepage: www.elsevier.com/locate/ijcard

Delay and inequality in treatment of the elderly with suspected acute coronary syndrome

Berglind Libungan [a,*], Thomas Karlsson [b], Geir Hirlekar [a], Per Albertsson [a], Johan Herlitz [c], Annica Ravn-Fischer [a]

[a] Department of Cardiology, Sahlgrenska University Hospital, Gothenburg, Sweden
[b] Center for Applied Biostatistics, Occupational and Environmental Medicine, Sahlgrenska Academy at University of Gothenburg, Gothenburg, Sweden
[c] Sahlgrenska University Hospital and Center for Pre-hospital Research, Western Sweden University of Borås, Borås, Sweden

ARTICLE INFO

Article history:
Received 26 April 2014
Received in revised form 6 August 2014
Accepted 17 August 2014
Available online 26 August 2014

Keywords:
Elderly
High age
Myocardial infarction
Acute coronary syndrome
Chest pain
Triage

ABSTRACT

Background/Objectives: The aim of this study is to determine differences between elderly patients (≥80 years) and younger patients with suspected acute coronary syndrome (ACS) regarding delay times before diagnostic tests and treatments.
Methods: All patients with chest pain who were admitted to a hospital in the Gothenburg area were included consecutively over a 3-month period. They were divided into an elderly group (≥80 years) and a reference group (<80 years). Previous medical history, ECG findings, treatments, diagnostic tests, and delay times were registered.
Results: Altogether, 2588 patients were included (478 elderly and 2110 reference).
There were no significant differences in delay time to hospital ward admission, to first medical therapy with aspirin, or to investigation with coronary angiography (CA) between the two groups. The elderly patients had a significantly shorter median time from first medical contact to first ECG (12 vs. 14 min, $p = 0.002$) but after adjustment for confounding factors, especially mode of transport, the opposite was found to be the case ($p = 0.002$). Elderly hospitalized patients with ACS were less often investigated with CA (44% vs. 89%, $p < 0.0001$) and received less medical treatment with $P2Y_{12}$ antagonists and lipid lowering drugs.
Conclusions: Elderly individuals with chest pain could not be shown to have a delay to hospital admission compared to their younger counterparts. Nevertheless, higher age was associated with a longer time to first ECG. The elderly patients received less active therapy, and fear of age-related side effects might explain this difference.

1. Introduction

According to demographic data from western countries, the elderly are a rapidly growing group and myocardial infarction is one of the major causes of death [1].

Advanced age is strongly associated with incidence of and mortality from myocardial infarction [2]. In addition, the elderly have more advanced coronary artery disease [3]. However, clinical experience tells us that uncertainties remain regarding both the diagnosis and the treatment of elderly patients with acute coronary syndrome (ACS). When they present with ACS, symptoms in the elderly can be atypical [4–6] and the ECG is more difficult to interpret due to higher incidence of left bundle branch block or pacemaker rhythm [7]. The cardiac troponins are more often elevated in the elderly in the absence of ACS [8], which could add further to the uncertainty of whether or not the patient has myocardial infarction.

Fear of an unfavorable risk/benefit balance may lead to undertreatment in the elderly population. In advanced age, there is a higher risk of adverse effects associated with both medical and surgical treatment. In addition, the elderly are a challenging group due to lack of evidence-based therapy, a high prevalence of comorbid disorders, and other factors such as treatment restriction orders.

The benefit to elderly patients of treatments often received in more specialized hospital departments can be unclear, which may lead to transfer to other less specialized units. Admission to a coronary care unit (CCU) often includes treatment with coronary angiography (CA) and revascularization if indicated (invasive treatment strategy) in patients with ACS. A post-hoc analysis of a large randomized trial showed that the oldest patients with ACS benefited most from an invasive treatment strategy [9]. However, a recent dedicated randomized clinical trial in the elderly addressing the question of the benefit of an invasive treatment strategy in ACS only showed a reduction in mortality in elderly patients with high cardiac troponins [10]. Still, whether or not age is a true effect modifier in ACS remains a matter of debate.

The outcome in patients with ACS has been shown to be time-dependent and inversely related to the delay to appropriate treatment [11,12]. This is why minimizing delay in the chain of healthcare is important for every ACS patient irrespective of age.

* Corresponding author at: Sahlgrenska University Hospital, Department of Cardiology, Blå stråket 3, vån 1, SE-413 45 Gothenburg, Sweden.

http://dx.doi.org/10.1016/j.ijcard.2014.08.109
0167-5273/

In this study, we wanted to determine the different time delays in diagnostic procedures and treatments in the chain of healthcare in a group of very old patients with suspected ACS (≥80 years old) and to compare them with those in a reference group (<80 years old). Our hypothesis was that elderly patients presenting with symptoms suggestive of ACS have longer delays in both diagnosis and treatment of acute coronary syndrome than their younger counterparts (i.e. we tested the null hypothesis of no difference).

2. Methods

We included consecutive patients with chest pain or symptoms suggestive of ACS who were admitted to one of the three hospitals (SU/S, SU/Ö, or SU/M) within the Sahlgrenska University Hospital organization. Data were collected over a 3-month period in 2008 (mid-September to mid-December).

In the city of Gothenburg, all patients requiring hospital treatment for chest pain arrive at Sahlgrenska University Hospital. Patients can arrive by ambulance or by their own means. Almost all of the patients in this study who were transferred by ambulance had an ECG transmitted to the cardiology department for triage instructions. The patient was either admitted to the emergency department (ED) for evaluation or by-passed the ED and proceeded directly to the cardiology department or catheterization laboratory. All patients were included in the study irrespective of whether they were hospitalized or discharged after ED evaluation.

Regarding the ethical aspects of the study, according to Swedish regulation, the use of certain register data does not require informed consent. After consultation of the legal authority this applied for our study, as the research relies on anonymous information and data linkage or dissemination of results does not generate identifiable information.

Data were collected from ambulance and medical records. An extensive data form was completed for the subjects in the study for subsequent statistical analysis. The data collected included information regarding age, gender, previous medical history, tobacco and alcohol habits, body mass index, symptoms, time to treatment and investigations, laboratory parameters, medication at discharge, and outcome.

The data sampling was performed by different co-workers, and all the collaborators were given clear instructions on how to record data with strict definition of each variable assessed. However, no measures were implemented to compare and improve the inter-collector data validity. All ECG variables were reviewed by one independent cardiologist.

2. 1. Definition of variables

The first physical medical contact (in the ambulance or at the ED) was used as a reference for time delay to first ECG recording and administration of aspirin.

Electrocardiogram registration time was defined as the interval between the first medical contact and the time of the initial ECG.

Time to aspirin administration was defined as the interval between the first physical medical contact and the registered time of aspirin administration (either by paramedics in the ambulance or by the nurse at the ED).

Time to coronary angiography was defined as the interval between arrival at the ED (or hospital ward for those who by-passed the ED) and registered puncture time/start of procedure at the intervention laboratory.

The primary objective measure, the time to presentation at a hospital ward, was defined as the interval between arrival at the ED and registration of arrival by the nurse at the ward.

The variable need of interpreter was defined as not speaking the native language and needing an interpreter at some time when in hospital.

The definition of acute myocardial infarction [13] was based on the following diagnostic criteria: (1) laboratory parameters (minimum of one troponin I or T value, over the upper reference level and another troponin value 6 h later, indicating dynamic changes), and either (2) symptoms raising suspicion of myocardial infarction, such as pain or discomfort in the chest, arms, neck, jaw, back, or abdomen; dyspnea; nausea; cold sweat; or (3) ECG findings indicating ischemia: ST-elevation/depression or left bundle branch block.

The definition of ACS was a final diagnosis of acute myocardial infarction (AMI) including ST-elevation myocardial infarction (STEMI) and non-STEMI, or unstable angina pectoris.

All decisions regarding treatment, either regarding medical treatment or other such as to perform a coronary angiography or not, were up to the treating physicians.

2.2. Outcome measures

The primary outcome measure in this study was time from arrival in hospital to admission to the ward or intervention laboratory (cath lab). Secondary outcome measures were delay time to the first ECG recording, to administration of aspirin, and to CA.

Date of death or confirmation of survival was obtained from the Swedish National Population Register.

2. 3. Statistical analysis

Fisher's exact test was used to test for difference in proportions between the two age groups. Unadjusted p-values for difference in delay times were calculated using Mann–Whitney U test. Multiple logistic regression, with delay times dichotomized by the median, was used to calculate odds ratios and p-values when adjusting for all baseline characteristics (i.e. variables in Table 1) with a univariate $p < 0.20$ for association with both age and the delay time in question. All tests were two-sided and a p-value below 0.05 was considered statistically significant for the primary objective, whereas p-values below 0.01 were considered significant for all other comparisons. All analyses were performed using SAS for Windows version 9.3.

3. Results

There were a total of 2588 visits, made by 2393 individual patients, who fulfilled the criteria for inclusion. The baseline characteristics for all visits are presented in Table 1 ($n = 2588$). The data from hospitalized visits ($n = 1350$) are listed in Tables 2, 3, and 4.

3. 1. Patient characteristics

The elderly group consisted of 478 patients presenting with chest pain with a mean age ± SD of 86 ± 4 years (range 80–103). The reference group consisted of 2110 patients with a mean age ± SD of 54 ± 16 years (range 16–79).

In the total group of elderly patients, there was a higher proportion of women and a higher frequency of comorbid disorders than in the reference group. Those in the elderly group were admitted by ambulance more than twice as often as those in the reference group, they were more likely to have ECG changes (i.e. ST depression) at presentation, and most of them were hospitalized.

3.2. Delay times in hospitalized patients

The median time from hospital arrival to admission to the medical ward or intervention laboratory was similar in both groups (elderly group 212 min vs. reference group 217 min, $p = 0.59$).

The median time from first physical contact to first ECG was shorter in the elderly patients (12 min vs. 14 min in the reference group, $p = 0.002$) but after adjustment for confounding factors, especially mode of transport, the elderly had a longer time than the reference group ($p = 0.002$), as shown in Table 2.

The median time from first physical contact to treatment with aspirin and from arrival in hospital to CA was shorter in the elderly group than in the reference group, but the difference was not statistically significant.

3.3. Comparison of hospitalized patients

When comparing hospitalized elderly patients to the reference group, a final diagnosis of ACS was more common in the elderly (24% vs. 17%, $p = 0.002$) but CA (12% vs. 20%, $p = 0.0003$) and echocardiography (21% vs. 34%, $p < 0.0001$) were performed significantly more seldom in the elderly (Table 5).

When echocardiography was performed, a low (<30%) left ventricular ejection fraction was more than five times more common in the elderly group than in the reference group (11% vs. 2%, $p = 0.001$).

There were very few elderly patients who did an exercise stress test (3% vs 29%, $p < 0.0001$).

3.4. Patients with ACS

In ACS patients who underwent CA, the rate of revascularization with percutaneous coronary intervention (PCI) was not significantly different from that in the reference group (59% vs. 74%, $p = 0.09$) and none of the elderly patients underwent coronary artery bypass graft surgery (CABG).

No elderly patient underwent an exercise stress test (0% vs 11%, $p = 0.001$).

Regarding medical treatment, the elderly group received $P2Y_{12}$ antagonists and lipid-lowering drugs less frequently than the reference group, both in hospital and at discharge.