Heart, Lung and Circulation (2016) xx, 1–5
1443-9506/04/$36.00
http://dx.doi.org/10.1016/j.hlc.2016.09.007

ORIGINAL ARTICLE

Differing Clinical Characteristics Between Young and Older Patients Presenting with Myocardial Infarction

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Received 18 April 2016; received in revised form 3 August 2016; accepted 2 September 2016; online published-ahead-of-print xxx

Background To date, there has been no detailed study of the risk factors and clinical characteristics of patients presenting with myocardial infarction (MI) at a young age in our region. The purpose of this study was to assess the rate and clinical profile of those presenting with young MI in New Zealand.

Methods We identified a cohort of 1199 patients presenting with acute MI between January 2012 and November 2015 from the Wellington Acute Coronary Syndrome Registry. We compared those presenting with young MI, defined as presentation with MI aged 50 years or younger, to those aged over 50 years.

Results Myocardial infarction at a young age occurred in 154 (12.8%) patients. Compared to those in the older MI group, the young MI group were more likely to be male (80% vs. 71%, P=0.026), of Maori or Pacific Island ethnicity (21% vs. 10%, P<0.0001), have a higher BMI (31 kg/m^2 vs. 29 kg/m^2, P<0.0001), have a family history of premature coronary artery disease (49% vs. 34%, P<0.0001) and to be current smokers (47% vs. 20%, P<0.001). Young MI patients were less likely to have hypertension, dyslipidaemia and diabetes than the older MI patient population. Within the young MI group 36% had none or only one traditional risk factor for MI, and would have been classified as low risk prior to their index event.

Conclusion Those with young MI accounted for 12.8% our cohort and had a different risk factor profile to the older MI group with smoking and obesity being particularly prevalent.

Keywords Myocardial infarction • Young • Risk factors

Introduction

Q3 Myocardial infarction (MI) is a leading cause of death and morbidity in Australia and New Zealand [1,2]. Although considered a disease of the older population [1], a small proportion of these cases, termed young MI, occur in patients aged 50 years or below. Previous international studies have described the demographic and risk factor profiles of young MI patients, with reported incidence rates between 2%–10% [3–15]. New Zealand has a unique ethnic cohort, with ethnic minorities such as Maori and Pacific Islanders being over-represented in adverse cardiovascular events. To date, there is little data on the rate and clinical features of the premature MI population that occurs in our region.

Current guidelines for primary prevention rely heavily on age as a predictor for cardiovascular disease risk [16,17]. Determining the frequency of young MI cases and assessing the clinical features of this population could help identify the

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Please cite this article in press as: Matsis K, et al. Differing Clinical Characteristics Between Young and Older Patients Presenting with Myocardial Infarction. Heart, Lung and Circulation (2016), http://dx.doi.org/10.1016/j.hlc.2016.09.007

main risk factors associated with their MI, and how this differs from the older MI population. These findings could subsequently inform future screening and primary prevention strategies in this group. Therefore the purpose of this study was to assess the rate and clinical profile of young adults presenting with an MI in New Zealand.

Methods

Study Population

The Wellington Acute Coronary Syndrome (ACS) registry prospectively enrolled 1337 patients presenting with presumed ACS undergoing invasive management who were adequately pre-treated with dual antiplatelet therapy between January 2012 and November 2015. Patients were excluded from the registry if they had a platelet count less than 100 x 10^9/L, known platelet function disorder, administration of a fibrinolytic agent within 24 hours of enrolment or administration of a glycoprotein IIb/IIIa receptor antagonist within a week prior to enrolment. From this registry cohort we excluded 82 patients with a diagnosis of unstable angina and 56 patients who were subsequently reclassified as having an alternative diagnosis (myocarditis, pericarditis, takotsubo cardiomyopathy, etc) leaving 1199 patients with acute myocardial infarction that were analysed for this study. This study was reviewed and approved by the Central Regional Ethics Committee (URA/11/05/2016). Participation was voluntary, and each patient gave informed written consent at the time of recruitment.

Data Collection

Patient demographics, clinical characteristics and medications were collected prospectively from review of the medical records and the cardiac catheterisation database.

Definitions

Myocardial infarction was defined according to the third universal definition of myocardial infarction [18]. The young MI group was defined as patients aged 50 years or younger. The older, comparative MI group was defined as patients aged 51 years and older. Hypertension, diabetes mellitus, dyslipidaemia, smoking, family history of premature coronary artery disease, prior MI and heart failure were defined according to the American College of Cardiology key data elements and definitions for measuring the clinical management and outcomes of patients with acute coronary syndromes [19]. Obesity was defined as a BMI of 30 kg/m^2 or greater. Patients had lipids, fasting glucose and HbA1c tested at the time of admission and blood pressure documented during the admission. If these met the above criteria then the patients were classified as having these risk factors.

Statistical Analysis

Categorical variables are expressed as frequencies and percentages. Continuous variables are expressed as mean ± standard deviation. Statistical analyses were performed with Chi squared tests for dichotomous data and independent t-tests for continuous data. For all statistical analyses a p-value <0.05 was considered significant. All statistical analyses were conducted using SPSS v.22 (IBM; New York, USA).

Results

Baseline Characteristics of ACS Study Population

The demographic and clinical characteristics of the 1199 patients that meet the study criteria are summarised in Table 1. The demographics and clinical characteristics of the study population were typical of those presenting with myocardial infarction. The mean age of the cohort was 63 ± 11 years, with 72.4% being male and a 20.1% having diabetes mellitus. The clinical presentation was ST-segment elevation MI (STEMI) in 20% and non ST-segment elevation MI (NSTEMI) in 80% of patients.

Baseline Characteristics of Young MI Versus Older MI patients

From the total study population 154 (12.8%) patients met the criteria for having a young MI leaving 1054 patients in the older group. Age in the young MI patients ranged from 28 to 50 years. The demographic data and clinical characteristics for both these groups are summarised in Table 1.

Compared to those in the older MI group, the young MI group were more likely to be male (80% vs. 71%, P=0.026), of Maori or Pacific Island ethnicity (21% vs. 10%, P<0.0001), have a higher BMI (31 kg/m^2 vs. 29 kg/m2, P<0.0001), have a family history of premature CAD (49% vs. 34%, P<0.0001) and to be current smokers (47% vs. 20%, P<0.0001). Young MI patients were less likely to have hypertension, dyslipidaemia, diabetes, or a previous MI than the older MI patient population.

There was no significant difference in type of clinical presentation between young and older MI groups. Patients in the older group were more likely to have at least one lesion with greater than 50% stenosis in a major epicardial vessel than those in the premature MI group (94% vs. 87%, P=0.01).

We categorised the young MI group and the older MI group according to the number of traditional risk factors that they presented with. Traditional risk factors included hypertension, dyslipidaemia, obesity, diabetes and smoking. While there were significant differences in the proportion of patients with each of the cardiac risk factors when comparing the young MI group to the older group (Table 1), no significant differences in the total number of risk factors present were detected between the two groups (Figure 1). Q4

When stratifying the young MI patients according to the total number of cardiac risk factors (Table 2), we see that 56 patients presented with one or less risk factors (group 1), 81 patients presented with two to three risk factors (group 2) and 17 patients presented with four to five risk factors (group 3). In group 1, we observed that smoking and family history of premature CAD were by far the most prevalent risk factors, whilst groups 2 and 3 had increased frequencies of

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