

Correlation between Comprehensive Evaluation of Coronary Artery Lesion Severity and Long-term Clinical Outcomes in Chinese Octogenarians with Acute Coronary Syndrome



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Background

There is little known about long-term outcome data regarding acute coronary syndrome (ACS) in Chinese octogenarians (> 80 years old). Long-term outcomes of octogenarians with ACS may be associated with increased complicated coronary artery lesion severity.

Methods

We classified 536 consecutive octogenarians with ACS into four groups based on Gensini score. Survival and major adverse cardiac event (MACE) rates were calculated using the Kaplan-Meier method. Multivariate Cox regression was used to identify mortality predictors. The follow-up period was 27 (IQR15-36) months.

Results

The overall long-term mortality rate was 9.1% and increased from 3.0% in group 1 to 16.7% in group 4. Increasing coronary artery lesion severity was associated with increased long-term mortality and MACE rates. ROC curve analysis showed that the predictive cut-off value of Gensini score for mortality was 53. Gensini score provided significant reclassification of mortality (net reclassification index 0.195, $P < 0.01$). Age, gender, heart rate, SBP, chronic renal failure, e-GFR, GRACE score, Gensini score, and ACS type were different between surviving and deceased patients. Notably, chronic renal failure (OR = 2.55, $P = 0.036$), GRACE score (OR = 1.10, $P = 0.006$), and Gensini score (OR = 1.11, $P = 0.003$) were the independent predictors of long-term mortality.

Conclusions

Long-term mortality of octogenarians with ACS was associated with increased comprehensive coronary artery lesion severity. Gensini score was an effective parameter for evaluation of long-term mortality.

Keywords

Acute coronary syndrome • Octogenarians • Risk factors • Coronary artery stenosis • Prognosis

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Introduction

The octogenarians represent a growing proportion of the population. Older population (age >80 years old) will increase from the current ratio of 1 in 35 to more than 1 in 12 by the year of 2050 [1–3]. The increasing prevalence of coronary artery disease (CAD) associated with aging [4], combined with the rapid growth of coronary angiography (CAG) and percutaneous coronary interventions (PCI), has markedly increased the proportion of older patients who undergo implantation of coronary stents [5].

Compared with younger patients, elderly patients who undergo CAG are subject to more complex lesions, higher comorbidities, poorer clinical outcomes and higher mortality [5–8]. However, there is limited information on the effect of comprehensive evaluation of coronary artery lesion severity based on lesion position, stenosis degree and number of lesions, in combination with other risk factors on mortality in octogenarians with acute coronary syndrome (ACS). The prior studies were simply focused on lesion position, stenosis degree or number of lesions alone. Gensini score is a good method for comprehensive evaluation of coronary artery lesion severity.

The aim of the present study was to evaluate the correlation between comprehensive evaluation of coronary artery lesion severity and the long-term clinical outcomes (including mortality, incidence of myocardial infarction (MI), and repeat PCI) in Chinese octogenarians with ACS, and screen effective parameters for long-term clinical outcomes.

Methods

Study Population

From January 2006 to December 2010, a total of 536 consecutive patients with ACS, who were referred to our hospital for elective PCI, were enrolled in this study. The inclusion criteria were: (1) patients > 80 years old; (2) a complete clinical history; (3) a diagnosis of ACS that was classified as unstable angina (UAP), non-ST-segment elevated myocardial infarction (NSTEMI) or ST-segment elevated myocardial infarction (STEMI); and (4) recent CAG. Those with acute infection, chronic hepatic dysfunction, nutritional derangements, malignancy, severe valvular heart disease, or other severe medical illnesses were excluded.

All patients consented in writing to participation in the study, and the study protocol was approved by Chinese People's Liberation Army General Hospital research ethics committee and complies with the Declaration of Helsinki.

Data Collection

The clinical characteristics of all patients were recorded before CAG. These included age, gender, heart rate (HR), body mass index (BMI), primary hypertension, systolic blood pressure (SBP), ejection fraction (EF), diabetes mellitus, hyperlipidaemia, previous MI, previous cerebral infarction (CI), chronic renal failure (CRF), smoking history, and cardiovascular

medications. Fasting blood samples were drawn prior to angiography to evaluate blood biochemistry. The fasting blood glucose (FBG), low density lipoprotein-C (LDL-C), and serum creatinine (CRE) were analysed by immunoturbidimetry (Roche Modular 7600 Automatic Biochemistry Analyzer). For all patients, renal function was assessed using the baseline estimated glomerular filtration rate (eGFR). Impaired renal function was defined as an eGFR <60 mL/min/1.73 m². The creatinine was standardised using a calibration equation called Jaffe's kinetic method[9]:

$$\text{Scr (mg/dL)} = 0.795 \times [\text{enzymatic method Scr (mg/dL)}] + 0.29.$$

The eGFR was calculated using the Chinese modified Modification of Diet in Renal Disease (C-MDRD) equation [10]:

$$\begin{aligned} \text{eGFR (mL/min/1.73 m}^2\text{)} \\ = 175 \times \text{standardised creatinine (mg/dL)}^{-1.234} \\ \times \text{age (year)}^{-0.179} \times 0.79 \text{ (if female)}. \end{aligned}$$

Coronary Angiography

CAG was performed in all patients after admission. CAD was defined as an obstructive lesion causing $\geq 50\%$ reduction of lumen diameter in at least one of the coronary arteries. The severity of CAD was evaluated using the Gensini score. The Gensini score for grading lumen narrowing was: 1 for a 1% to 25% reduction in lumen diameter, 2 for a 26% to 50% reduction, 4 for a 51% to 75% reduction, 8 for a 76% to 90% reduction, 16 for a 91% to 99% reduction, and 32 for total occlusion. This score was multiplied by a factor that accounted for lesion position within the coronary arterial tree as follows: 5 for a left main (LM) lesion, 2.5 for a proximal left anterior descending (LAD) and left circumflex (LCX) lesion, and 1 for a proximal right coronary artery (RCA) lesion. The severity of disease was expressed as the sum of the scores of the individual lesions [11].

The GRACE risk tool predicted in-hospital death of patients with STEMI, NSTEMI or UAP. The eight variables used in the GRACE risk model included older age, Killip class, SBP, ST-segment deviation, cardiac arrest during presentation, serum creatinine level, positive initial cardiac biomarkers, and HR. The sum of scores was applied to determine the corresponding all-cause mortality from hospital discharge to six months [12].

Gensini and GRACE scores for each enrolled patient were recorded by observers who were blinded to the results of laboratory tests and grouping.

The revascularisation therapy including PCI and coronary artery bypass grafting (CABG) of the patients was recorded.

Population Grouping and Follow-up

Our patient population was divided into four groups based on the Gensini score as follows: a control group with normal Gensini score (group 1), a group with Gensini score < 20 (group 2); a group with Gensini score from 21 to 60 (group 3), and a group with Gensini score > 61 (group 4). All patients were regularly followed at six-month intervals for the first

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