

Clinical Characteristics and Long-term Prognosis in Patients with Chronic Heart Failure and Reduced Ejection Fraction in China



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Aims

Chronic heart failure with reduced ejection fraction (CHF-REF) remains a major public health problem with high morbidity and mortality, but the data on current treatment status and long-term prognosis in China were still missing.

Methods

Among prospectively recruited 2368 patients with CHF-REF in 10 hospitals, 2154 patients provided complete followed data. Two aetiology subgroups (dilated cardiomyopathy, DCM and ischaemic cardiomyopathy, ICM) were classified. Clinical data and long-term prognosis were analysed.

Results

After a median follow-up of 52 months, 850 (39.46%) patients died, of whom 302 (35.53%) were sudden cardiac death (SCD). Unadjusted rates of all-cause mortality and SCD were higher in DCM than those in ICM ($p < 0.001$ for both modes of death), but mortalities were comparable after adjustment for co-variables ($p = 0.387$ and $p = 0.483$ respectively). ACEIs/ARBs, aldosterone receptor antagonists, β -blockers and diuretics were dominant prescribed drugs with the prescription rates of 65.97%, 74.61%, 68.29% and 74.37% respectively. Multivariable analysis identified co-morbidities (eg, hypertension), NYHA class, ventricular tachycardia/fibrillation (VT/VF), QRS duration, left ventricular EF and creatinine as independent predictors of mortalities, whereas ACEIs/ARB, β -blockers and statins were associated with better prognosis. Survived from sustained VT/VF episodes had the highest predictive value for SCD (HR, 4.230; 95% CI, 2.500–7.157; $p < 0.001$). The predictors for mortalities in DCM and ICM were different.

Abbreviations: ACEIs/ARBs, Angiotensin-converting enzyme inhibitors/angiotensin-receptor blockers; AF, Atrial fibrillation; BMI, Body mass index; BNP, Brain natriuretic peptide; CHF-PEF, Chronic heart failure with preserved ejection fraction; CHF-REF, Chronic heart failure with reduced ejection fraction; CI, Confidence interval; COPD, Chronic obstructive pulmonary disease; CRT/D, Cardiac resynchronisation therapy/defibrillator; DCM, Dilated cardiomyopathy; HRs, Hazard ratios; hs-CRP, High sensitivity C-reactive protein; ICD, Implantable cardioverter defibrillator; ICM, Ischaemic cardiomyopathy; LVEDD, Left ventricular end-diastolic diameter; LVEF, Left ventricular ejection fraction; NSCD, Non-sudden cardiac death; NYHA, New York Heart Association; SCD, Sudden cardiac death; VT/VF, Ventricular tachycardia/ventricular fibrillation

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Conclusions Patients with CHF-REF had a poor prognosis in China despite being under current standard therapies, especially patients with DCM. Predictors for all-cause mortality and SCD might be identified for evaluating the prognosis of these patients.

Keywords Chronic heart failure • Prognosis • Treatment • Dilated cardiomyopathy • Ischaemic cardiomyopathy

Introduction

Chronic heart failure (CHF) represents a major and increasing public health problem in the world owing to high prevalence, poor prognosis and extreme expenditure. Epidemiology shows that by 2030, the prevalence and total cost of CHF will increase 25% and 120% from 2013 estimate [1]. Despite the improvement of medical and surgical therapy in CHF with reduced ejection fraction (HF-REF) [2], the morbidity and mortality are still high, as well as the re-hospitalisation rate [3]. In the United States, for example, the 30-day, one-year, and five-year mortality rates are as high as 10.4%, 22.0%, and 42.3% [4]. Approximately half died of malignant ventricular arrhythmias (ventricular tachycardia/ventricular fibrillation, VT/VF) leading to sudden cardiac death (SCD) [5].

Although cardiovascular diseases varied worldwide in type and distribution especially between the developed and developing countries, CHF affected ~0.9% of the adult Chinese population in the year of 2000 [6] and the overall prevalence of CHF is likely to increase [7]. The recent data in Caucasian populations within developed countries showed some improvement in prognosis of patients with CHF-REF [8], but the current treatment status and long-term prognosis of CHF-REF in China are still missing. In addition, the European study suggested that the aetiologies of CHF had an impact on mortality [9]. Whether the aetiologies of DCM and ICM affected mortalities in patients with CHF-REF was not clear for China.

The aims of this multicentre, prospective study were to reveal the current treatment status, assess the long-term survival, and identify independent predictors for all-cause mortality and SCD in patients with CHF-REF due to DCM and ICM.

Materials and Methods

Study Population and Data Collection

The study protocol has been described previously [10]. Briefly, 2368 hospitalised patients with CHF-REF in 10 hospitals in the mainland of China from July 2005 to December 2009 were prospectively enrolled. The CHF-REF was diagnosed based on medical history, symptoms, physical signs and echocardiography on admission. The inclusion criteria were as follows: patients with CHF-REF due to DCM or ICM; in New York Heart Association (NYHA) classes II–IV; left ventricular ejection fraction (LVEF) \leq 45% in DCM or \leq 50% in ICM. DCM was diagnosed by the guidelines for the study of familial DCM [11], and ICM was defined as a luminal

stenosis \geq 70% of at least one major coronary artery diagnosed by coronary angiography or a previous myocardial infarction at least three months before enrollment [10]. Patients were excluded if they had incomplete clinical data, malignancies, severe liver and kidney dysfunctions, or severe systemic disease, pregnancy, or unwillingness to participate. In this way, a total of 2279 patients were finally included.

The clinical data were collected based on the individual's medical archive which included demographic information, medical history, and complete examinations. The treatment records at discharge and immediately before the deadline of follow-up were also completed, including device therapy, such as pacemaker, implantable cardioverter defibrillator (ICD) and cardiac resynchronisation therapy/defibrillator (CRT/D).

Follow-up and Endpoints

The study closed on 31 March 2013 with a median follow-up time of 52 months (ranged from 0.40 to 114 months). Follow-up data were obtained by a regular visit at outpatient clinics or telephone contact with patients or their close family members. The successful follow-up rate was 94.52%, and the remaining 125 patients who were lost during follow-up were excluded from the data analysis. Finally, 2154 patients (1693 males and 461 females) completed the follow-up. All-cause mortality, non-SCD (NSCD) and SCD (including ICD appropriate discharge) after enrollment were determined. SCD was defined as a witnessed death attributable to cardiac causes within 1 h of onset of acute symptoms or an unwitnessed death of a patient seen in a stable medical condition within 24 h previously with no evidence of a non-cardiac cause [12]. Patients who reached the end of study were considered as censored data.

Statistical Analysis

All analyses were performed with a statistical analysis software package (SPSS 19.0, SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean \pm SD and compared by unpaired Student's *t*-tests. Categorical variables were summarised by absolute numbers and percentages and analysed by Chi-square tests. Univariate analyses of all-cause mortality and SCD were performed using Cox univariate analysis for continuous variables and log-rank test for categorical variables. All variables in Table 1 were evaluated as possible univariate predictors and are shown in Table 2. Significant predictors for both modes of death were all entered into multivariate Cox proportional hazards regression model. Age, body mass index (BMI), brain natriuretic peptide (BNP) and creatinine were entered in the model as

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