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Value of the relationship with Plasma NT-proBNP and heart function in Diagnosis of Cardiac Insufficiency

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***Abstract*—Objective to investigate the plasma NT-proBNP in value in early diagnosis of aged patients with diastolic heart failure. 26 cases of cardiac function in normal checkup for the control group, a clear diagnosis in patients with systolic heart failure (LVEF<50%) Group of 25 cases, normal heart diastolic heart failure (LVEF ⩾ 50%, E/A ⩽ 1) 32 cases and heart expanding group of 38 cases of diastolic heart failure. ELISA method for the determination of plasma NT-proBNP concentration. Results 1. NYHA functional class associated with the NT-proBNP concentration is notable is a line (r=0.658, P<0.01), LVEF associated with NT-proBNP concentration is significantly negative linear (r=-0.608, P<0.01), NT-proBNP statistically significant difference between the NYHA classification (P<0.01). 2. the Group of plasma NT-proBNP level in heart failure with significant statistical differences between the various groups (P<0.01). Plasma NT-proBNP conclusions can do for objective indicators for evaluating severity of heart failure; Especially for early diagnosis of diastolic heart failure.**

Keywords- Plasme NT-proBNP;Left Ventricular Ejection Fraction (LVEF);iastolic heart failure,early Diagnosis.

I. INTRODUCTION

N-terminal pro brain natriuretic peptide (NT-proBNP) is ventricular muscle cells secrete brain natriuretic peptide (BNP) while Moore result of a nerve hormone, left ventricular end- diastolic volume or pressure increases can promote its synthesis and release. Ventricular wall tension increases make the increase level of tension plasma BNP and NT-proBNP in heart failure. Because plasma BNP and NT-proBNP in heart failure patients is significantly higher than normal levels, and in recent years are often used as reference index of heart failure diagnosis. Heart failure (HF) including the systolic and diastolic heart failure, and When the heart's systolic dysfunction often exist at diastolic dysfunction. Systolic heart failure (SHF) NT-proBNP when increased levels have been confirmed, and on simple diastolic heart failure (DHF), but simply diastolic heart failure (DHF) with change to less deals with NT-proBNP. This paper is intended to detect changes of plasma NT-proBNP through the testing older diastolic heart failure patients ,discusses the elderly diastolic heart failure in early diagnosis of clinical application value.

II. OBJECT

A. Object

Study subjects choice in February 2009 to May 2009 in 121 cases of our medical (male 71 cases, female 50 cases), with an average age of 63.53, diagnosis for heart failure patients for the 75 cases, including coronary heart disease 55 cases (with coronary heart disease (with high blood pressure, coronary heart disease of 33 cases of ischemic cardiomyopathy type in 15 cases, coronary stenting 7 cases), simple hypertension 8 cases, expansion sexual myocardial disease 2 cases, hypertrophy sexual myocardial disease 3 cases, rheumatic heart disease 2 cases (which for flap operation Hou 1 cases), rhythm arrhythmia 2 cases, other 3 cases. Heart failure diagnosis to clinical doctors according to the history, symptoms, signs, echocardiography, electrocardiogram, chest, to make comprehensive judgment.

B. Group

Control group: the normal, the medical clinic heart function without heart failure always history, clinical performance without heart failure, echocardiography normal 46 patients (male and female, 12). And according to the age is divided into old age 20 cases of control group, with an average age of 68.2 years (60-73); The old age of 26 patients in the control group, with an average age of 38.9 years (22-59 years old). HF group: there are divided into (1) DHF group ①after the year 2000-compliant Vasan, improvement in patients with diastolic heart failure diagnostic criteria [1]; (2) ruled out an acute infection, severe hepatic and renal insufficiency; a total of 50 cases (24 men, 26 women) with an average age of 68.1 (60-78years). According to the group and DHF have expanded further divided into: heart of normal size (22 cases) and enlarged heart group (28cases). (2) SHF groups: left ventricular systolic dysfunction, LVEF < 50%, other standards are all the same, a total DHF group 25 cases (13 men, 12 women), with an average age of 70.4 years (60-88 years) all the candidates are in accordance with the United States New York Heart Association (NYHA) classification scheme will heart function is divided into Ⅰ ~ Ⅳ level [2].

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III. METHODS AND RESULTS

A. The determination of NT- proBNP

Take the subjects elbow venous blood on an empty stomach in the morning 3 ml, into using ethylene diamine tetraacetic acid sodium (EDTA) of anticoagulant in the vacuum of vacuum blood collection tubes. Centrifugal within 2 hours, 4 ℃, centrifugal 3000 turn, 15 minutes. Take 20 ℃, plasma divide-refrigerator save, 1 months plasma NT-proBNP level determination. Kit provided by sino-american wuhan science and technology, China provide use ELISA DNM-9602 G in perlong enzyme standard analyzer determine, on examination scope: 0.312 ng/ml-20 ng/ml minimum assessment: 0.078 ng/ml.

B. Echocardiography

The participants left lateral position, using United States-GE company Vivid 7 color echocardiography apparatus, 1.7~3.4MHz probe frequency checks, determination of IVS and LVIDD, and LAESD, and LVPWD, and RV. Record E peak and peak velocities (VpE), A peak and peak velocities (VpA) and LVEF. Which do not participate in the study experienced doctor complete the echocardiography examination of echocardiography, cardiac cavity size standards based on four military medical press of the ultrasonic Diagnostics [3]

C. Statistical analysis

Using SPSS17.0 statistics software, data were positively normal distribution, measurement data to (± s) that the comparison between the two groups, compares the t test, many groups of mean compares the AVOAN; With Pearson correlation analysis related; $P < 0.05$ a statistically significant.

D. Plasma NT-proBNP level and cardiac function classification, ratio of LVEF and E/A relations

Heart failure group, as increasing NYHA classification and left ventricular systolic function (LVEF) decline in plasma NT-proBNP levels significantly elevated in patients with heart failure, NYHA grade and level of NT-proBNP is positive (r=0.658, P<0.01); LVEF and NT-proBNP level is markedly negative correlation (r=-0.608, P<0.01), E/A and diastolic heart failure group NT-proBNP negative correlation (r=-0.501, P<0.01) plasma NT-proBNP level in patients with different cardiac functional class statistically significant differences (P<0.01). (See table 1, Figure 1)

Table 1 LVEF of different patients with NYHA classification, E/A and the comparison of plasma levels of NT-proBN

NYHA classification	n	E/A	LVEF	PlasmaNT-proBNP (ng/ml)
Ⅰ	15	1.29±0.52	67.10±6.98	4.355±2.545
Ⅱ	26	0.80±0.36▲	61.85±9.98▲	6.846±3.025▲
Ⅱ	20	0.73±0.15▲	53.07±13.49▲★	9.206±3.622▲★
Ⅳ	14	0.70±0.39★	42.48±10.69▲▼	12.776±3.202▲★▼

Note: ▲ compared with NYHA grade ⅰ P<0.05; ★ compared with NYHA class ⅱ P<0. 01, compared with NYHA grade ⅲ P<0.01.

E. The relationship between the value of the plasma NT-proBNP level and cardiac ultrasound

All the men of plasma NT-proBNP level and echocardiographic each value are analyzed, which LVIDD (r = 0.404, P < 0.01), LAESD (r = 0.389, P < 0.01), an RV (r = 0.221, P < 0.05) and NT-proBNP levels were positively related to the straight line

F. Comparison between different groups of plasma NT-proBNP level

Plasma levels of NT-proBNPl, in the control group, the non-elderly group and the elderly group had no significant difference, Heart failure and control group each significantly, a statistically significant (P < 0.01); Contractile diastolic heart failure than systolic heart failure group (P < 0.05), a statistically significant; diastolic heart failure group in the heart to expand the size of the normal group, higher than the heart is statistically significant (P < 0.01). But diastolic heart failure of group E/A and plasma NT-proBNP negative correlation (r = 0.501, P < 0.01),.

Table 2 groups of LVEF, E/A, comparison of plasma NT-proBNP level

Group	n	E/A	Plasma NT-proBNP (ng/ml)
control group			
non-elderly group	26	1.72±0.37	3.242±0.824
elderly group	20	1.64±0.34	3.431±0.907
heart failure group			
normal heart size DHF group	22	0.78±0.15◆	5.795±2.806◆●
heart expanded DHF group	28	0.61±0.13◆▲	7.152±3.421◆●▲
SHF gruop	25	0.69±0.58◆	11.903±2.635◆●▲★

Note:: and non-elderly P<0 compared to control groups. 01, compared with the old control group P<0. 01; ▲ and heart cavity size compared to normal DHF group, P<0.05; ★ compared with the heart expanded DHF group <0. 01;

IV. DISCUSS

NT-proBNP is mainly secreted by the ventricular myocytes, in ventricular synthesis, is a product of BNP is generated, the BNP are generated, NT-proBNP as a product of the BNP is generated also Moore released into the blood. NT-proBNP does not have a natriuretic effect of BNP [4]. BNP and NT-proBNP mainly comes from, its release and ventricular ventricular expansion and pressure is proportional to the overload [5]. Plasma BNP and NT-proBNP to 1:1 proportion in the practical work exists, and both can be used as a test markers. NT-proBNP compared

with BNP is a long half-life, physiological activity that is relatively stable, the more appropriate for clinical testing.

In recent years, failure caused by more and more clinical doctors attention. In a typical congestive heart failure (CHF) in patients with diastolic dysfunction simply caused by heart failure (DHF) happened [1] rate can be as high as 40%. DHF tends to SHF, early detection and before active prevention and may reduce DHF late mixed heart failure rate. Many studies confirmed that NT-proBNP is the best myocardial markers in diagnosis of chronic heart failure [5, 6]. Chronic heart failure and acute myocardial infarction mortality rates and the best prognosis index of stable, coronary artery disease NT-proBNP concentration, is an independent prognostic index, and the prediction can be used to FeiYuanXing difficulty breathing and heart source sex the differential diagnosis of breathing difficulties [7-9].

This research shows that, plasma NT-proBNP level and has nothing to do with age, NYHA classification of the most closely related ($r = 0.658$). Along with the increase of NYHA classification, symptoms of heart failure is aggravating, plasma NT-proBNP level, heart failure and significantly increased the severity of the consensus, which both at home and abroad and the research results are consistent. Therefore, plasma NT-proBNP can be used to evaluate heart function. Plasma NT-proBNP level and LVEF significant negative correlation ($r = 0.608$, $P < 0.01$), with the decline, namely the left room LVEF systolic function of reduced, the increased significantly. Our results also show proBNP level and plasma NT-LVIDD, LAESD and RV all related ($r = 0.404$, $P < 0.01$; $r = 0.389$, $P < 0.01$; $r = 0.221$, $P < 0.05$), and the overseas research results are basically the same [10]. This consistent with BNP and physiological characteristics of plasma NT-proBNP the secretion.

This study compared the heart failure and heart function in normal group, cardiac insufficiency Group significantly increased plasma NT-proBNP levels, set of plasma NT-proBNP level of diastolic heart failure is about twice the normal control group, left ventricular systolic dysfunction group higher. Research results are displayed in the same comparison groups of plasma NT-proBNP level value under cardiac function, and diastolic dysfunction group > systolic dysfunction group > diastolic dysfunction Group [11], thinks Plasma NT-proBNP evaluation values of the diastolic function better than systolic function, is the biochemical indicators can only be used for evaluation of left ventricular diastolic function in [12]. This research on heart function does not full patients of heart color Super in the reflect diastolic function of e peak/A peak of ratio and heart function classification Zhijian do has comparison, display prompted diastolic function does not full of E/A ratio as heart function of reduce has obvious of decline trend, but because was heart rate, and contraction function does not full Shi E/A "pseudo normalization" of effect, in diastolic sexual heart failure and contraction sexual heart failure two group Zhijian differences does not significantly, but diastolic sexual heart failure group of E/A and plasma NT-proBNP is negative related ($r=-0.501$, $P<0.01$). And plasma NT-proBNP level more heart color Super compared, is does not by these factors of effect, therefore, we can think plasma NT-proBNP can better, more accurate of evaluation left ventricular of diastolic function, especially heart cavity no expanded and has diastolic sexual heart failure Shi, plasma NT-proBNP level was heart cavity size of effect of factors elimination Shi, its level more heart function normal group still has rise, more can description its level of monitoring can as early heart function does not full of detection means. Therefore, on the clinical application of plasma NT-proBNP to assist in diagnosis of coronary heart disease heart failure, especially for unable or unsuitable for echocardiography examination of patients.

For many years, clinical doctors to cardiac function in patients with heart failure evaluation is the use of NYHA classification scheme. The scheme of subjective feeling on patients were classified, often and objective check had the very big disparity; And plasma NT-proBNP can quantitative, objective reflect heart function. Plasma NT-proBNP level and cardiac function classification and LVEF have better correlation, diastolic function in patients with diastolic heart failure and prompted E/A has good correlation with incomplete. On heart failure diagnosis method to provide a useful supplement to help early diagnosis of diastolic heart failure. On the evaluation of cardiac function and subjective and objective indicators have a high degree of consistency. It is an important biochemical indicators of evaluation of heart function, heart function classification and can provide an objective basis.

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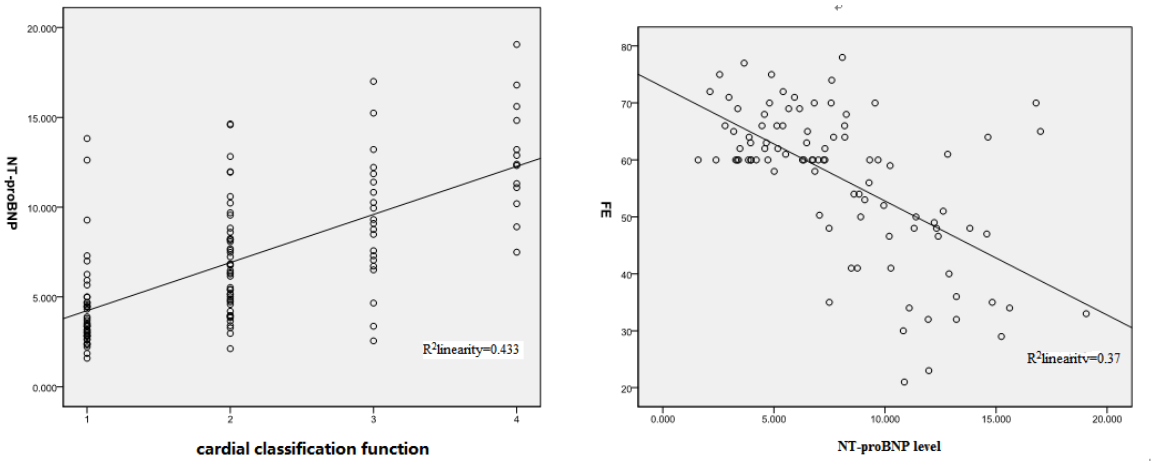

Figure 1. between plasma NT-proBNP and cardiac function classification and LVEF of chart