

The curative effect of carvedilol combined with conventional therapy in treatment of chronic heart failure

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Abstract: This paper aims to investigate the curative effect of carvedilol combined with conventional therapy in treatment of chronic heart failure. 180 patients who have been treated for chronic heart failure were selected as research objects and divided into control group and research group. The control group was given conventional treatment (including oxygen therapy, ACEI, taking digitalis preparations, vasodilators, diuretics, positive inotropic drugs), while research group was given carvedilol combined with conventional therapy. The overall therapeutic effect of the two groups was observed and compared. The research group had significantly higher overall therapeutic efficiency than control group, $P < 0.05$; by comparing the echocardiographic results of the patients between two groups, the results showed LVEF (left ventricular ejection fraction), LVESD (left ventricular end-systolic diameter) and LVEDD (left ventricular end-diastolic diameter) of the research group after treatment were significantly better than that of control group, $P < 0.05$; through recording the quality of life level of the two groups, the results showed that the score advantages of the research group were significant in terms of social function, psychological function and physical function, $P < 0.05$. For patients with chronic heart failure, carvedilol combined with conventional treatment can effectively improve the efficiency of treatment and improve cardiac function, thus improving the quality of life.

Keywords: Carvedilol, conventional therapy, chronic cardiac failure, therapeutic effect.

INTRODUCTION

Chronic heart failure is chronic primary cardiomyopathy, the cause of which is that the ventricle is overloaded for a long time, which weakens the myocardial contractility and fails to maintain the cardiac output. Chronic heart failure can be categorized into left heart failure, right heart failure and whole heart failure (Asif and Kamrunnessa, 2018). The main causes of this disease include rheumatic heart disease, hypertension, ischemic heart disease, myocarditis, aortic stenosis or insufficiency, ventricular septal defect, pulmonary heart disease, pulmonary stenosis, etc (Zhu, 2016; Yu, 2013; Peng, 2017; Ameer *et al.*, 2018). Chronic heart failure can occur at any age. In general, symptomatic control can be achieved, but recurrent episodes are easy to occur.

As a group of clinical syndromes caused by damage to ventricular filling and ejection ability due to cardiac structure or functional diseases, chronic heart failure is normally treated with β receptor blocker, which has been unanimously recognized by the American heart association (ACC), American heart association (AHA) and other international authorities (Manuela *et al.*, 2017; Wang *et al.*, 2013; Hira *et al.*, 2018). This study investigates the curative effect of carvedilol combined with conventional therapy (including oxygen therapy, ACEI, taking digitalis preparations, vasodilators, diuretics, positive inotropic drugs) in treatment of chronic heart failure, in the hope of providing valuable reference and basis for clinical practice.

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MATERIALS AND METHODS

General data

The 180 patients (fig. 1 shows Magnetic resonance image of a patient) who had been diagnosed with chronic heart failure in Weihai Central hospital from August 2016 to August 2018 were selected as research objects. According to the classification standard proposed by New York Heart Association (NYHA), there were 35 cases of grade α chronic cardiac failure, 30 cases of grade β chronic cardiac failure and 115 cases of grade χ chronic cardiac failure. From another point of view, there were 42 cases of dilated cardiomyopathy, 50 cases of ischemic cardiomyopathy, 34 cases of rheumatic heart disease and 54 cases of hypertension heart disease, respectively. The patients meeting inclusion criteria were those who were diagnosed with chronic heart failure, while the patients meeting exclusion criteria were those with severe liver and kidney dysfunction, mental disorder, or drug allergy. Patients and their family members had the right to know, and signed the formal informed consent issued by our hospital. This study has been approved by the ethics committee of hospital. The selected 180 patients were randomly divided into control group and research group, each containing 90. The research group included 50 male patients and 40 female patients, aged 55 to 75 years old, with an average age of 63.9 ± 5.3 years old. The control group included 56 male patients and 34 female patients, aged 52-73, with an average age (64.1 ± 5.7) years old. There was no significant difference in general data between two groups before treatment, $p > 0.05$.

Method

Treatment method for control group. Conventional treatments were given to the patients in the control group, including oral administration of digitalis, vasodilators, diuretics, positive inotropic drug. The treatment for patients in control group was continued for 6 months.



Fig. 1: Coronary angiography of patients with chronic heart failure

Treatment method for research group. The research group was treated with carvedilol combined with the same conventional treatment. Patients were instructed to take carvedilol orally twice a day, 1.25mg each time, and the dosage of carvedilol was reasonably increased according to the evaluation of the patient's condition changes. When the dosage was 6.25 mg per dose, measures were taken to maintain such dosage for twice a day, 6 consecutive months for the whole treatment course.

Observational indices

The total effective rate of patients in the two groups were observed, including three criteria such as significant effective, effective and ineffective. The standard of significantly effectiveness is that patients have cardiac function recovered to grade α , significantly improved clinical symptoms, signs of life, or even disappearance of symptoms after treatment (Hsieh *et al.*, 2017). The standard of effectiveness is that patients have heart function recovered to grade, relieved clinical symptoms and signs of life after treatment. The standard of ineffectiveness is that the patients have no improvements after treatment. The left ventricular ejection fraction (LVEF), left ventricular end-systolic diameter (LVESD) and left ventricular end-diastolic diameter (LVEDD) were compared before and after treatment. The ultrasonic cardiograph was detected with model GELOGIQ7. Quality of life evaluation questionnaire (goql-74) was used to evaluate patients' quality of life (Zheng *et al.*, 2017; Jubaidur *et al.*, 2018).

STATISTICAL ANALYSIS

The data were processed using statistical analysis software SPSS21.0. The measurement data were expressed as mean \pm average ($\bar{x} \pm s$), with t test conducted for comparison of intergroup difference. The counting data were expressed as natural number (n) and percentage (%), with chi-square test conducted for comparison of intergroup difference. The difference was considered statistically significant when $p < 0.05$.

RESULTS

Comparison of total effective rate between the two groups

As shown in table 1, the research group had higher total effective rate than control group, and the difference was of statistical significance, $p < 0.05$. Figs. 2 and 3 show the X-ray image of patient before and after treatment, respectively.

Comparison of echocardiographic results before and after treatment between the two groups

As shown in table 2, there was no significant difference in echocardiographic results between the two groups before treatment, $p > 0.05$. After implementing different treatment measures, the results of the research group accepting carvedilol combined with conventional treatment were significantly better than the control group, $p < 0.05$.

Comparison of quality of life scores between the two groups

As shown in table 3, the quality of life scores of the study group were better than that of the control group, $p < 0.05$.

DISCUSSION

Heart failure is a clinical syndrome caused by ventricular dysfunction. In general, this damage is caused by the insufficiency of systolic function, so the main countermeasure is to reduce the cardiac output. Chronic heart failure in old age can be characterized by physical signs, such as obvious cyanosis, frequent tidal breathing, rapid breathing, slow heart rhythm, mild circulation blood stasis, wet voice, edema, etc. If chronic heart failure cannot be effectively treated, it will eventually endanger the patient's life. Therefore, correct and effective treatment plays a very important role in improving the prognosis (Sun, 2016; Zhang *et al.*, 2015; Peyraga *et al.*, 2017; Song and Lv, 2016).

The goal of treating heart failure is not only to improve symptoms and quality of life, but also to delay and prevent the development of myocardial remodeling in response to the mechanism of myocardial remodeling (Wang, 2017; Li *et al.*, 2017; Wang and Tang, 2018; Gilbert and Muhammad, 2018). In other words, the treatment principle of chronic heart failure is mainly to



Fig. 2: Imaging figure before treatment (Left ventricular heart failure)



Fig. 3: Imaging figure after treatment (normal condition)

Table 1: Comparison of total effective rate between the two groups [n (%)]

Group	Significantly effectiveness	effectiveness	ineffectiveness	Total effective rate
Research group (n = 90)	65	20	5	85 (94.44)
Control group (n = 90)	34	36	20	70 (77.78)
χ^2				9.82
p				<0.05

Table 2: Comparison of echocardiographic results before and after treatment between the two groups ($x \pm s$)

Group	Left ventricular end-diastolic diameter (LVEDD, mm)		Left ventricular end-systolic diamete (LVESD, mm)		Left ventricular ejection fraction (LVEF, %)	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Research group (n = 90)	67.08±4.02	52.19±5.12	53.70±6.25	41.23±6.09	33.22±5.70	51.37±8.04
Control group (n = 90)	65.80±4.26	60.89±4.69	56.88±7.08	50.98±5.83	31.68±4.83	41.35±7.67
t	0.25	10.28	0.93	9.36	0.33	12.52
p	0.75	0.023	0.08	0.02	0.14	0.005

Table 3: Comparison of quality of life scores between the two groups ($x \pm s$)

Group	Psychological function score	Social function score	Physical function score	Emotional life score	Total score
Research group (n = 90)	79.80±6.45	80.19±9.04	80.25±7.23	78.05±8.38	80.25 ± 7.03
Control group (n = 90)	64.33±7.03	70.26±8.26	65.98±9.26	62.46±9.50	65.48 ± 8.31
t	10.29	8.93	11.22	9.03	8.59
p	<0.05	<0.05	<0.05	<0.05	<0.05

correct hemodynamic abnormality, improve exercise tolerance and quality of life while effectively relieving clinical symptoms, and avoid further aggravating myocardial damage, so as to achieve the goal of reducing hospitalization rate and fatality rate of heart failure.

Carvedilol is the β receptor blocker and the function of vasodilation as well. Modern studies have shown that the β receptor blocker can resist sympathetic activation and block harmful effects. As the third generation β blocker and a non-selective β blocker, Carvedilol can exert good vasodilatation effect and reduce the positive rate of autoantibody. During the treatment, carvedilol can also

resist ventricular arrhythmias, up-regulate cardiac receptors, increase brain natriuresis and block and improve ventricular remodeling. In this case, it can well reduce cardiac after load and reduce circulatory resistance, promote hemodynamic improvement in patients with chronic heart failure, enhance exercise tolerance, and achieve the effect of reducing mortality.

The results of this study showed that the total effective rate of the research group was significantly higher than that of the control group, $p < 0.05$; Comparing the echocardiographic results of the patients in the two

groups, the results showed that the LVEF, LVESD and LVEDD of the research group after treatment were significantly better than that of the control group, $p < 0.05$; by recording the quality of life level of the two groups, the results showed that the score advantages of the research group patients were significant in terms of social function, psychological function and physical function. These results are consistent with the results of relevant researches.

CONCLUSION

In conclusion, β receptor blockers are effective in treating heart failure. Carvedilol, as a non-selective β receptor blocker, has many advantages, including expanding peripheral blood vessel, reducing cardiac afterload, enhancing myocardial contraction force, reducing pulmonary artery wedge pressure, increasing ejection fraction, reducing the myocardial oxygen consumption, improving myocardial sarcoplasm ATPase activity, eliminating excessive free radical, antioxidant, etc. Therefore, it can improve the cardiac power, improve the cardiac function, reverse the cardiac remodeling, reduce the apoptosis of cardiac cells and the frequency of ventricular arrhythmia. For patients with chronic heart failure, carvedilol combined with conventional treatment can effectively improve the efficiency of treatment and improve cardiac function, thus improving the quality of life. However, due to the small sample size of this study, more studies are needed to demonstrate the curative effect of carvedilol combined with conventional treatment (including oxygen therapy, ACEI, taking digitalis preparations, vasodilators, diuretics, positive inotropic drugs) in treatment of chronic heart failure.

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