

Enalapril Combined with Hydrochlorothiazide and Indapamide in the Treatment of Hypertension with Heart Failure

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Abstract: Objective: To explore the effect of enalapril combined with hydrochlorothiazide and indapamide on hypertension and heart failure. **Methods:** 80 patients with hypertension and heart failure admitted to our hospital from January 2019 to January 2020 were selected as the research subjects, and they were divided into two groups with random number table method, 40 cases each. The control group was given conventional treatment regimens, including enalapril and hydrochlorothiazide; the observation group replaced hydrochlorothiazide with indapamide based on the above therapies. The efficacy and systolic blood pressure, diastolic blood pressure and left heart ejection fraction (LVEF) of the two groups were compared. **Results:** After treatment, the effective rate of the observation group was 92.50% (37/40) higher than that of the control group 75.00% (30/40). The systolic and diastolic blood pressure were lower than those of the control group, and the LVEF was higher than that of the control group. The difference was statistically significant ($P<0.05$). **Conclusion:** Enalapril combined with indapamide is effective in the treatment of hypertension with heart failure, which can help lower blood pressure, reduce heart load, increase cardiac output, reverse ventricular remodeling, and delay disease progression.

Keywords: Hypertension; Heart failure; Enalapril; Hydrochlorothiazide; Indapamide

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Hypertension is a preventable and controllable

chronic disease, which is characterized by an increase in systemic arterial blood pressure and may be accompanied by clinical syndromes of damage to the function and structure of target organs such as heart, brain, and kidney^[1]. The heart is one of the target organs of hypertension. Long-term hypertension can cause excessive hypertrophy of myocardial cells, degeneration and necrosis of myocardial cells, decreased fibrosis and compensatory function, and eventually lead to decompensation of myocardial function, resulting in reduced cardiac contraction and diastolic function. Heart failure occurs when stroke volume, ejection fraction, and cardiac output decrease. This study aimed to explore the efficacy of enalapril combined with hydrochlorothiazide and indapamide in the treatment of hypertension with heart failure. Now reported as follows.

1 Materials and methods

1.1 General data

80 patients with hypertension and heart failure admitted to our hospital from January 2019 to January 2020 were selected as the research object, and they were divided into 2 groups with a random number table method, 40 cases each. In the control group, there were 19 males and 21 females; aged 50-71 years, with an average of (57.70±6.21) years; There is hypertension with heart failure lasting 2-10 years, with average time in (4.21±1.53) years. In the observation group, there were 21 males and 19 females; aged 50-72 years, with an average of (58.71±7.01) years; the course of hypertension with heart failure was 2-10 years; with an average of

(5.21±1.03) years. The general data of the two groups of patients were statistically compared, and the difference was not statistically significant ($P>0.05$), and it was comparable. This study was approved by the Medical Ethics Committee of our hospital, and patients and their families voluntarily signed informed consent.

1.2 Inclusion criteria

(1) Inclusion criteria: it meets the diagnostic criteria for essential hypertension^[2]; patients with chronic left ventricular systolic dysfunction; NYHA grade II - III patients; Patients who received enalapril before admission have unsatisfactory lowering of blood pressure after limonotherapy. (2) Exclusion criteria: patients with acute myocardial infarction, severe arrhythmia, unstable angina pectoris within 3 months; patients with electrolyte disorders such as blood potassium and calcium; patients with poor diabetes control; patients with severe liver and kidney dysfunction; patients who are allergic or intolerant to the study drug.

1.3 Methods

The control group improved their lifestyles and were given anticoagulant, antiplatelet, hypolipidemic, cardiogenic, aldosterone receptor antagonist, beta receptor blocker, ACEI/ARB, diuretic and other treatments, of which ACEI/ARB was enalapril (Yangzijiang Pharmaceutical Group Jiangsu Zilong Pharmaceutical Co., Ltd., National Pharmaceutical Standard H32026567, specification: 10mg), the initial dose is 5mg/time/d, and it is increased to 10mg/time/d according to the patient's tolerance during treatment; The diuretic is hydrochlorothiazide (Guangdong Sancai Shiqi Pharmaceutical Co., Ltd., National Pharmaceutical Standard H44023235, specification: 25mg), 25mg/times/day. Both drugs are taken after breakfast. The observation group replaced hydrochlorothiazide with indapamide on the basis of the control group (Guangdong Annuo Pharmaceutical Co., Ltd., National pharmaceutical Standard H44020885, specification: 2.5mg), 2.5 mg/times/day.

It is taken after breakfast. Both groups were treated for 3 months.

1.4 Evaluation index

Efficacy evaluation: Significant effect: systolic/diastolic blood pressure reduced to 130/80mmHg or diastolic blood pressure decreased ≥ 20 mmHg, and pulmonary and systemic congestion symptoms basically disappeared; Effective: diastolic blood pressure decreased in the range of 20-10 mmHg, or reduced systolic blood pressure > 30 mmHg, but did not reach the normal standard. The symptoms of pulmonary circulation and systemic congestion improved; ineffective: the blood pressure did not reach the above standard, and the symptoms of pulmonary circulation and systemic congestion did not improve or worsen. Total effective rate = (significant effect + effective) number of cases / total number of cases. Before treatment and after 3 months of treatment, the blood pressure of the two groups was measured with an electronic BF1112 sphygmomanometer (Shanghai Haier Medical Technology Co., Ltd.); LEVF was measured with cardiac color Doppler ultrasound (Philips EPIQ5 color Doppler ultrasound).

1.5 Statistical method

SPSS 21.0 software is used for data processing, and is used to represent measurement data. Independent sample t test is used between groups. Paired sample t test is used for comparison within the same group. Count data is expressed as a percentage. χ^2 is used for test, and rank data uses rank sum Test. $P<0.05$ was considered statistically significant.

2 Result

2.1 Efficacy

Comparison of treatment efficiency between the two groups was made. The observation group was 92.50% (37/40) higher than the control group 75.00% (30/40), and the difference was statistically significant ($P<0.05$). See Table 1.

Table 1. Comparison of clinical efficacy between two groups *n*(%)

Group	Significant effective	effective	ineffective	Total effectiveness
Control group(<i>n</i> =40)	15(37.50)	16(40.00)	10(25.00)	30(75.00)
Observation group(<i>n</i> =40)	28(70.00)	9(22.50)	3(7.50)	37(92.50)
Z/χ^2		$Z=3.083$		$\chi^2=4.501$
<i>P</i>		0.002		0.034

2.2 Blood pressure and cardiac function

Before treatment of blood pressure and heart function, there was no difference in blood pressure and heart function between the two groups, and the difference was not statistically significant ($P>0.05$);

after treatment, the blood pressure in the observation group was lower than that in the control group, and the LVEF was higher than that in the control group. The difference is statistically significant ($P<0.05$). See Table 2.

Table 2. Comparison of blood pressure and heart function between two groups before and after treatment

Time	Group	Systolic pressure (mmHg)	Diastolic pressure (mmHg)	LVEF (%)
Pre-Treat-ment	Control group (<i>n</i> =40)	165.05±10.01	103.25±5.02	33.89±6.12
	Observation group (<i>n</i> =40)	164.85±9.11	102.86±5.01	33.87±6.41
	<i>t</i>	0.094	0.348	0.014
	<i>P</i>	0.926	0.729	0.989
Post-Treat-ment	Control group (<i>n</i> =40)	140.21±11.98	97.41±5.89	41.45±5.21
	Observation group (<i>n</i> =40)	125.12±10.35	92.56±5.14	47.06±4.05
	<i>t</i>	6.028	3.924	5.377
	<i>P</i>	0.000	0.000	0.000

3 Discussion

One of the common complications of essential hypertension is heart failure. The pathogenesis of the two is mostly the over-activation of sympathetic nervous system and renin-angiotensin-aldosterone system (RAAS), strengthening of blood vessel wall contraction is, retention of sodium water, and increasing of heart load and myocardial remodeling. They eventually lead to heart failure, so clinical treatment of primary hypertension and heart failure is often treated with combined medicine to achieve stable blood pressure reduction, improve heart function and reverse ventricular remodeling^[3-4].

Enalapril is a prodrug that hydrolyzes into active enalaprilat in the liver. The latter is a competitive angiotensin-converting enzyme (ACE) inhibitor that reduces the synthesis of angiotensin II, thereby blocking the excessive activation of RAAS, leading to dilation of blood vessels, reducing peripheral vascular resistance and pulmonary capillary wedge pressure, and reducing the preload and afterload of heart. It inhibits myocardial fibrosis, and reverses ventricular remodeling, thereby improves cardiac output. It can be used for the treatment of congestive heart failure^[5-6]. Hydrochlorothiazide is a medium-effect diuretic, commonly used in the treatment of

hypertension and edema caused by cardiogenic, nephrogenic, and hepatic factors. Potassium should be appropriately supplemented for long-term application^[7]. On the one hand, indapamide antagonizes calcium ion pathways, and relaxes vascular smooth muscle, reduces peripheral vascular resistance, and plays a powerful and long-term effect on reducing blood pressure; on the other hand, it inhibits the reabsorption of distal renal tubules and plays a diuretic role. Both reduce heart load, increase cardiac output, and improve heart failure symptoms^[8-9]. In addition, the drug promotes vascular endothelial cells to produce relaxing factors, inhibits cardiovascular cell proliferation, hinders cardiac hypertrophy, and reverses ventricular remodeling^[10]. The results of this study showed that the observation group had a higher efficiency after treatment, while systolic and diastolic blood pressure were lower than the control group, and LVEF was higher than that of the control group, indicating that enalapril combined with indapamide was more effective in treating hypertension and heart failure, decreasing the patient's blood pressure, and improving the cardiac pressure significantly. The reason is that compared with hydrochlorothiazide, indapamide can block calcium channels, relax vascular smooth muscle, lower blood pressure, and reduce left ventricular afterload in addition to diuretic and reduce left

ventricular preload. It can also increase endothelium Cell-derived relaxation factors inhibit the proliferation of cardiovascular cells, hinder cardiac hypertrophy, and reverse ventricular remodeling. Therefore, enalapril combined with indapamide has multiple mechanisms to lower blood pressure, reduce ventricular load, and increase cardiac output; the dual mechanism inhibits cardiovascular cell proliferation and reverses ventricular remodeling, thereby enhancing efficacy and improving hypertension with heart failure Symptoms, improve the patient's quality of life.

In summary, enalapril combined with indapamide can help reduce blood pressure, reduce heart load, increase cardiac output, reverse ventricular remodeling, and delay disease progression in patients with hypertension and heart failure. It is worthy of clinical promotion.

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