

Study on the Application Value of Amlodipine Combined with Enalapril in the Treatment of Elderly Hypertension

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Abstract: *Objective:* To explore the application value of amlodipine combined with enalapril in the treatment of elderly hypertension. *Methods:* A total of 600 hypertensive patients admitted between May 2020–2023 were recruited and divided into the study group and the control group, with 300 cases in each group, using a double-blind mechanism. The study group was treated with enalapril and amlodipine, while the control group was treated with enalapril. The changes in vascular endothelium, blood pressure performance, pulse pressure level, and drug side effects were compared between the groups. *Results:* Before treatment, the changes in vascular endothelium showed no significant difference between the groups ($P > 0.05$); after treatment, the changes in the study group were significantly better than the control group ($P < 0.05$). Before treatment, the performance of systolic and diastolic blood pressures in the two groups showed no significant difference ($P > 0.05$); after treatment, the performance in the study group was lower than that in the control group ($P < 0.05$). Before treatment, the pulse pressure levels of the two groups showed no significant difference ($P > 0.05$); after treatment, the pulse pressure levels of the study group were significantly better than that of the control group ($P < 0.05$). The side effects of medication in the study group were significantly lower than those in the control group ($P < 0.05$). *Conclusion:* Amlodipine combined with enalapril has a higher curative effect in the treatment of elderly hypertension, which is worthy of promotion.

Keywords: Amlodipine; Enalapril; Elderly hypertension; Treatment

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1. Introduction

Hypertension (high blood pressure, HBP) is a disease caused by abnormal intravascular pressure. It is a chronic disease with a high incidence in the elderly. In recent years, the number of middle-aged hypertensive patients is gradually increasing, and hypertension was found to develop at a younger age over time^[1]. Under the influence of hypertension, the elderly are prone to vascular diseases, such as stroke, myocardial infarction, etc., which aggravate physical damage^[2]. Hypertension requires long-term medication, and the use of drugs cannot be interrupted, otherwise, the risk of blood vessel rupture and bleeding will increase^[3]. The types of

antihypertensive drugs are abundant, and some patients will take combined antihypertensive regimens for hypertension treatment, and the control effect on blood pressure is more significant^[4]. Enalapril is a drug for regulating blood pressure, which is suitable for various types of hypertension treatment. After research, it is found that the combined use of enalapril and amlodipine will strengthen the control of blood vessel pressure, reduce the level of systolic and diastolic blood pressures, and maintain the body's normal blood circulation^[5]. This study aims to investigate and analyze the application value of amlodipine combined with enalapril in the treatment of elderly hypertension.

2. Materials and methods

2.1. General information

A total of 600 hypertensive patients admitted to the Fourth Affiliated Hospital of Inner Mongolia Medical University from May 2020 to May 2023 were recruited and grouped using a double-blind mechanism. They were divided into a study group and a control group, with 300 cases in each group. The number of males and females in the study group were 155 and 145, respectively; the age was between 55 and 85 years old with an average age of 70.54 ± 1.37 years old; the disease existed for 1 to 7 years with the average time of 4.21 ± 0.68 years. The number of men and women in the control group were 156 and 144, respectively; they aged between 54 and 85 years old with an average age of 70.69 ± 1.42 years old; the disease existed for 1 to 8 years with an average time of 4.59 ± 0.71 years. After comparing the general data, the difference was statistically insignificant ($P > 0.05$).

2.2. Methods

The control group was treated with enalapril: enalapril maleate tablet was given 5 mg once a day for the first time, and the dose was increased from the 2nd day to a maximum of 10 mg/d. The treatment was continued for 12 weeks.

The study group was treated with enalapril and amlodipine: (1) the usage of enalapril was the same as the control group; (2) amlodipine besylate tablet was given 2.5mg once daily, and the dose can be adjusted according to the blood pressure. The treatment was continued for 12 weeks.

2.3. Observation indicators

The observation indicators in this study included:

- (1) The changes in vascular endothelium were compared between the groups, including the levels of endothelin-1 (ET-1), prostaglandin F 1α (PGF- 1α), nitric oxide (NO), and thromboxane B 2 (TXB 2).
- (2) The blood pressure performance was compared between the groups, including systolic and diastolic blood pressure.
- (3) The pulse pressure levels were compared between the groups, and comparisons before treatment, 4 weeks after treatment, and 12 weeks after treatment were made.
- (4) Side effects of medication were compared between groups, including nausea and vomiting, dizziness, headache, and rash.

2.4. Statistical analysis

SPSS 21.0 statistical software was selected to process and analyze the data, the count data were expressed by the number of cases (n) and percentage (%), the χ^2 test was implemented; the measurement data were expressed by the mean \pm standard deviation (SD), and the t -test was implemented; $P < 0.05$ was considered statistically significant.

3. Results

3.1. Comparison of the changes in vascular endothelium between the two groups

Before treatment, the levels of ET-1, PGF-1 α , NO, and TXB2 were insignificantly different between the groups ($P > 0.05$). However, after treatment, the levels of ET-1, PGF-1 α , NO, and TXB2 in the study group were significantly better than in the control group ($P = 0.0000$). See **Table 1** for details.

Table 1. Comparison of vascular endothelial changes between groups before and after the treatment (mean \pm SD)

Group	Number of cases	ET-1 (pmol/L)		PGF-1 α (pmol/L)		NO (μ mol/L)		TXB2 (pmol/L)	
		Before	After	Before	After	Before	After	Before	After
Study group	300	81.41 \pm 10.58	53.41 \pm 5.29	58.14 \pm 7.61	88.27 \pm 8.61	63.58 \pm 7.61	86.59 \pm 8.51	84.57 \pm 10.36	46.58 \pm 4.23
Control group	300	81.45 \pm 10.63	62.58 \pm 6.21	58.75 \pm 7.36	71.52 \pm 7.51	63.59 \pm 7.36	77.12 \pm 7.61	84.66 \pm 10.56	55.91 \pm 5.18
<i>t</i> -value	-	0.0461	19.4698	0.9979	25.3931	0.0163	14.3676	0.1053	24.1638
<i>P</i> value	-	0.9632	0.0000	0.3187	0.0000	0.9870	0.0000	0.9161	0.0000

3.2. Comparison of blood pressure performance between the two groups

Before treatment, the performance of systolic and diastolic blood pressures in the two groups showed insignificant differences ($P > 0.05$). However, after treatment, the blood pressure performance in the study group was significantly lower than that in the control group ($P = 0.0000$). See **Table 2** for details.

Table 2. The comparison of blood pressure between groups before and after the treatment (mean \pm SD, mmHg)

Group	Number of cases	Diastolic		Systolic	
		Before	After	Before	After
Study group	300	92.57 \pm 5.12	75.64 \pm 3.56	170.35 \pm 8.12	127.51 \pm 5.32
Control group	300	92.68 \pm 5.34	81.55 \pm 4.36	170.54 \pm 8.33	145.28 \pm 6.33
<i>t</i> -value	-	0.2575	18.1858	0.2828	37.2229
<i>P</i> value	-	0.7969	0.0000	0.7774	0.0000

3.3. Comparison of the pulse pressure levels between the two groups

Before treatment, the pulse pressure levels of the two groups were insignificant different ($P > 0.05$). After treatment, the pulse pressure level of the study group was significantly better than that of the control group ($P = 0.0000$). See **Table 3** for details.

Table 3. Comparison of pulse pressure levels between groups before treatment, 4 weeks, and 12 weeks after treatment (mean \pm SD)

Group	Number of cases	Before treatment	4 weeks after treatment	12 weeks after treatment
Study group	300	75.41 \pm 5.12	64.27 \pm 5.61	50.41 \pm 4.51
Control group	300	75.61 \pm 4.33	72.55 \pm 6.35	58.67 \pm 5.61
<i>t</i> -value	-	0.5166	16.9256	19.8758
<i>P</i> value	-	0.6056	0.0000	0.0000

3.4. Comparison of the side effects between the two groups

Table 4 showed that the side effects of medication in the study group were significantly lower than those in the control group ($P = 0.0140$).

Table 4. The comparison of side effects between groups [n , (%)]

Group	Number of cases	Nausea and vomiting	Dizziness headache	Rash	Total incidence
Study group	300	5 (1.67)	4 (1.33)	3 (1.00)	12 (4.00)
Control group	300	7 (2.33)	8 (2.67)	5 (1.67)	20 (6.67)
χ^2	-	-	-	-	6.0379
P value	-	-	-	-	0.0140

4. Discussion

Hypertension has become a well-known disease, which covers a large scope and is a typical chronic disease of the elderly [6]. Hypertension can reduce the extensibility of the arterial wall, increase the content of some intravascular substances, and lead to changes in blood vessels, mainly manifested by abnormal thickening, contraction, and expansion of blood vessels [7]. Early hypertension does not show physical symptoms. With the continuous increase in blood pressure, symptoms such as dizziness, chest tightness, nausea, and vomiting may appear. At this rate, it has developed into more severe hypertension [8]. Hypertension should be controlled at an early stage, otherwise, it will lead to substantial organ failure, difficulty in maintaining normal circulation, and even death of the patient. Currently, there is no radical measure for the treatment of hypertension, and the long-term application of antihypertensive drugs is the main treatment method [9]. Enalapril is a drug used to control blood pressure. It is an angiotensin-converting enzyme inhibitor. It not only has the effect of controlling blood pressure but also has a certain therapeutic effect on the complications of hypertension [10]. The long-term curative effect of enalapril alone is unsatisfactory, as the patient's body will develop drug resistance to enalapril, and the antihypertensive effect is limited. In order to improve this drawback, a class of antihypertensive drug combination therapy is added on the basis of this drug treatment. The overall curative effect is considerable [11]. Amlodipine is also a drug used to lower blood pressure. It belongs to the dihydropyridine calcium antagonists, and its main function is to control the transport of calcium ions [12]. It can be used as the drug choice of the combined regimen. After amlodipine is taken, the drug's effect lasts for a long time, which is approximately 35 hours. It adjusts the circulation of blood vessels, reduces the pressure of blood flow, relaxes the blood vessels, reduces the influx of calcium ions, and eventually achieves the effect of lowering blood pressure [13]. The combined use of enalapril and amlodipine has a more stable and longer-lasting drug effect, and a lesser impact on other body systems, thereby reducing the incidence of drug side effects [14]. The combined use of these two drugs has a certain synergistic value since amlodipine is selective and allows for high-efficiency drug utilization, leading to a significant control effect of calcium ion influx, a certain maintenance effect on the myocardium, stabilization of blood pressure diseases, and reduction in the impact of the high-pressure state on cardiac load [15]. Complications of hypertension are the key factors leading to the death of patients. Under the combined treatment of enalapril and amlodipine, the occurrence of hypertension complications can be controlled and the damage of hypertension to other organs can be reduced.

The experimental results are as follows: the levels of ET-1, PGF-1 α , NO, and TXB2 were insignificantly different between the two groups before treatment ($P > 0.05$), but the levels were significantly better in the study group than the control group ($P < 0.05$); the performance of systolic and diastolic blood pressures in the two

groups before treatment was insignificantly different ($P > 0.05$), but it was lower in the study group than that in the control group after treatment ($P < 0.05$). The pulse pressure levels of the two groups before the treatment were insignificantly different ($P > 0.05$), but it was significantly better in the study group than that in the control group ($P < 0.05$). The side effects of medication in the study group were significantly lower than those in the control group ($P < 0.05$). The combination treatment of amlodipine and enalapril reduces the damage to the vascular endothelium caused by the high-pressure state, and the vascular endothelium has recovered better than before. Both systolic and diastolic blood pressures were significantly reduced, the blood pressure level was relatively stable, and the pulse pressure was reduced. The drug safety performance of the combination therapy is satisfactory, and the occurrence of adverse drug reactions is relatively rare. During treatment, the dosage can be adjusted to meet the drug needs of the patient's condition and strengthen the control of blood pressure.

In conclusion, amlodipine combined with enalapril has an evident curative effect on the treatment of elderly hypertension, and this treatment plan is worthy of widespread promotion and application.

Disclosure statement

The author declares no conflicts of interest.

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