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Analysis of the Efficacy of Low-Dose Betaloc Combined with Amiodarone in Treating Ventricular Arrhythmia

Guo Xiong*

Yibin Third People's Hospital, Yibin 644000, Sichuan Province, China

***Corresponding author:** Guo Xiong, 13684160788@163.com

Abstract: *Objective:* To explore and analyze the clinical effect of low-dose Betaloc combined with amiodarone in treating ventricular arrhythmia. *Methods:* 70 patients with ventricular arrhythmia who were admitted to the Department of Cardiology of our hospital between August 2022 and August 2023 were selected as research subjects. They were divided into two groups using the coin-tossing method: the combination group (n = 35) and the reference group (n = 35). The combination group was treated with low-dose Betaloc and amiodarone, and the control group was treated with low-dose Betaloc alone. The treatment efficacy, cardiac function indicators, and related tested indicators of the two groups were compared. *Results:* The total efficacy of the treatment received by the combination group was much higher than that of the control group ($P < 0.05$). Besides, after treatment, the cardiac function indicators such as left ventricular ejection fraction (LVEF), left ventricular end-systolic volume (LVESV), and cardiac index (CI) of the patients in the combination group were significantly better than those of the reference group ($P < 0.05$). Furthermore, the high-sensitivity C-reactive protein (Hs-CRP), N-terminal prohormone of brain natriuretic peptide (NT-proBNP), *adiponectin* (APN), and other related test indicators of the patients in the combination group were significantly better than those of the reference group ($P < 0.05$). *Conclusion:* Low-dose Betaloc combined with amiodarone has a noticeable effect in treating ventricular arrhythmia and deserves to be widely promoted.

Keywords: Ventricular arrhythmia; Low-dose Betaloc; Amiodarone; Clinical effect; Treatment

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1. Introduction

Ventricular arrhythmia is a relatively common condition. The types of ventricular arrhythmia include premature ventricular contractions, ventricular fibrillation, ventricular tachycardia, and so on [1]. This disease should be diagnosed and treated early to prevent organ failure, sudden death, and other serious consequences [2]. This disease is usually treated with antiarrhythmic drugs. These drugs can stabilize the heart rate and restore normal hemodynamics. However, these drugs may produce various adverse reactions and cause negative inotropy. Therefore, a combination of different drugs is usually administered to reduce the side effects [3]. Betaloc can

reduce heart rate and cardiac output, making it suitable for combating arrhythmias. Amiodarone is a Class III antiarrhythmic drug that can effectively control reentry excitement, affecting the rhythm of the sinoatrial node [4]. Combining these two drugs has the potential to enhance the therapeutic effect while concurrently reducing the toxic effects associated with each drug. This article aims to study and analyze the clinical effect of low-dose Betaloc combined with amiodarone in treating ventricular arrhythmias.

2. General information and methodology

2.1. General information

70 patients with ventricular arrhythmia who were admitted to the Department of Cardiology of our hospital between August 2022 and August 2023 were selected as research subjects. They were divided into two groups using the coin-tossing method: the combination group (n = 35) and the reference group (n = 35). There were 17 males and 18 females in the combination group; their ages ranged from 49 to 84 years old, with an average age of 66.21 ± 1.23 years. There were 19 males and 16 females in the reference group; their ages ranged from 50 to 84 years old, with an average age of 66.27 ± 1.26 years. There was no statistically significant difference in general information such as gender and age between the two groups ($P > 0.05$).

Inclusion criteria: (1) Diagnosed with ventricular arrhythmia, (2) signed an informed consent, (3) had complete clinical data.

Exclusion criteria: (1) Presence of mental illness, (2) arrhythmia caused by digitalis, (3) medication allergy.

2.2. Methods

All patients were given primary treatment for ventricular arrhythmia.

The reference group was treated with low-dose Betaloc alone: 12 mg Betaloc (metoprolol tartrate 25 mg/tablet) was administered orally two times/d. The dosage was adjusted according to the therapeutic effect, with a maximum of 25 mg each time. The treatment lasted for three months.

The combination group was treated with low-dose Betaloc and amiodarone: (1) Betaloc was administered the same way as the reference group. (2) 200 mg Amiodarone was administered 3 times/d. After seven days of treatment, the frequency of administration was reduced to 2 times/d. The dosage was gradually reduced to 200 mg/d according to the patient's condition. The treatment lasted for three months.

2.3. Observation indicators

(1) The efficacy of the two treatments was compared. Treatment was deemed effective if the patient's cardiac function returned to normal and premature beats were almost restored, effective if there was an improvement in heart function with a 50% reduction in premature beats, and ineffective if cardiac function did not improve.

(2) The cardiac function indicators of both groups were compared, including left ventricular ejection fraction (LVEF), left ventricular end-systolic volume (LVESV), and *cardiac index (*CI).

(3) Other relevant including high-sensitivity C-reactive protein (Hs-CRP), N-terminal prohormone of brain natriuretic peptide *(*NT-proBNP), and *adiponectin* (APN) of the two were also compared.

2.4. Statistical analysis

SPSS 21.0 statistical software was used to process and analyze the data. The count data was expressed by the number of cases (n) and percentage (%), and the data were compared using a χ^2 test. The measurement data were expressed as mean ± standard deviation and compared using a t-test. $P < 0.05$ indicated a statistically

significant difference.

3. Results

3.1. Treatment efficacy

The total efficacy of the treatment in the combination group was significantly higher than that of the reference group ($P < 0.05$), and the difference was statistically significant (**Table 1**).

Table 1. Comparison of treatment efficacy between the two groups (n [%])

Group	Number of examples	Markedly effective	Effective	Ineffective	Total effective rate
Combination group	35	24 (68.57)	11 (31.43)	0 (0.00)	35(100.00)
Reference group	35	17 (48.57)	14 (40.00)	4 (11.43)	31 (88.57)
χ^2	-	-	-	-	4.2424
P	-	-	-	-	0.0394

3.2. Cardiac function indicators

Before treatment, there was no statistically significant difference in the cardiac function indicators such as LVEF, LVESV, and CI between the two groups ($P > 0.05$). After treatment, the cardiac function indicators of the combination group were significantly better than those of the reference group ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of cardiac function indicators between the two groups (mean ± standard deviation)

Group	Number of cases	LVEF (%)		LVESV (mL)		CI (L·min· m^2)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Combination group	35	35.84 ± 5.21	53.87 ± 4.12	66.89 ± 5.63	45.21 ± 4.23	8.15 ± 2.35	3.04 ± 0.85
Reference group	35	35.97 ± 5.46	42.89 ± 4.59	66.93 ± 5.48	53.87 ± 5.62	8.19 ± 2.27	4.91 ± 1.25
t	-	0.1019	10.5317	0.0301	7.2836	0.0724	7.3186
P	-	0.9191	0.0000	0.9761	0.0000	0.9425	0.0000

3.3. Other relevant indicators

Before treatment, there was no statistically significant difference in the Hs-CRP, the NT-proBNP, and the APN between the two groups ($P > 0.05$). After treatment, the combination group demonstrated a better improvement of the relevant indicators, and the difference was statistically significant ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of other related test indicators between the two groups ($\bar{x} \pm s$)

Group	Number of cases	Hs-CRP (mg·L^{-1})		NT-proBNP (pg·ml^{-1})		APN (ng·L^{-1})	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Combination group	35	23.27 ± 3.12	6.27 ± 1.11	707.86 ± 75.69	436.89 ± 44.21	3.19 ± 0.75	6.97 ± 1.24
Reference group	35	23.35 ± 3.29	11.59 ± 2.53	707.93 ± 75.01	581.47 ± 51.63	3.26 ± 0.86	5.61 ± 1.02
t	-	0.3653	11.3919	0.0038	12.5838	0.3629	5.0110
P	-	0.7160	0.0000	0.9969	0.0000	0.7178	0.0000

4. Discussion

Arrhythmia is a disease in which the heart rhythm is disordered. The disease can be inherited or acquired. After clinical treatment, a good prognosis can be achieved [5]. Ventricular arrhythmia is the most common type of arrhythmia and mainly affects older people. In recent years, the prevalence of this disease has been on the rise [6]. Coronary heart disease, myocardial infarction, myocarditis, and acute myocardial infarction are all causes of this disease, which can be diagnosed through electrocardiogram [7]. Older people have poor immunity and suffer from various chronic diseases. Treatment should focus on safe medication to reduce the impact of adverse drug reactions on the patient's body [8-9]. Betaloc is a β1 receptor blocker with specific selectivity and is used in treating arrhythmia and angina pectoris [10]. The therapeutic effect of this drug alone is not ideal. It cannot improve cardiac function as quickly as possible and can cause adverse reactions. Therefore, this drug can be used in a small dose together with amiodarone for a better effect [11]. Amiodarone is an antiarrhythmic drug that can be used to combat ventricular arrhythmias when administered orally. The drug is a mild noncompetitive alpha and beta-adrenoceptor blocker that inhibits sodium ion reverse flow, prolongs conduction time, and inhibits the autonomic activity of the sinoatrial node [12].

Based on the results of this study, the combination of Betaloc and amiodarone can enhance the efficacy and improve the patient's cardiac function. This is because Betaloc can antagonize the excitability of sympathetic nerves, inhibit over-activation, prevent excessive heart rate, control myocardial cell proliferation, and prolong the death time of myocardial cells [13]. When combined with amiodarone, it relaxes coronary arteries, reduces blood vessel resistance, slows down the heart rate, decreases sympathetic nerve activity, increases the threshold of ventricular fibrillation, reduces oxygen consumption by the myocardium, and restores the normal state of cardiac function [14]. Besides, the results also showed that this combination of drugs can optimize various laboratory indicators. This is because the active ingredients of amiodarone can block myocardial action potential by prolonging K^+ flow, and at the same time, it can eliminate the sinus node's self-motility, inhibiting sinoatrial node activation, thereby controlling the heart rhythm and inhibiting atrial fibrillation. According to pharmacological analysis, amiodarone combined with a small dose of Betaloc has minimal impact on intraventricular conduction in patients with arrhythmia. It also exerts little effect on the torsion of ventricular tachycardia and does not worsen the patient's heart failure [15,16]. In addition, amiodarone + Betaloc can inhibit the activity of adrenergic receptors and inactivate sympathetic nerves. It can also reduce myocardial oxygen consumption and stabilize the patient's heart rhythm. It can also enhance the reversal of myocardial remodeling and inhibit myocardial cell apoptosis, resulting in an improvement of various laboratory indicators [17,18].

5. Conclusion

In summary, low-dose Betaloc combined with amiodarone in treating ventricular arrhythmia can effectively improve cardiac function and related treatment indicators. Therefore, this treatment regime should be popularized.

Disclosure statement

The author declares no conflict of interest.

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