

# Clinical Effect Analysis of Small and Medium Doses of Betaloc Combined with Amiodarone in the Treatment of Ventricular Arrhythmia

Zhenjie Wang\*

Tongliao City Hospital, Tongliao 028000, Inner Mongolia Autonomous Region, China

\*Corresponding author: Zhenjie Wang, athyne@126.com

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**Abstract:** *Objective:* To explore and analyze the clinical effect of small and medium doses of Betaloc combined with amiodarone in the treatment of ventricular arrhythmia. *Methods:* 60 patients with ventricular arrhythmia that were treated in the Department of Cardiology of our hospital from May 2018–May 2023 were selected for this study, and they were divided into a research group ( $n = 30$ ) and a reference group ( $n = 30$ ). The study group was treated with small doses of Betaloc and amiodarone, while the reference group was treated with conventional treatment. The total efficacy of medication, QRS interval, standard deviation of normal-to-normal (NN) intervals (SDNN), root mean square of successive differences between normal heartbeats (RMSSD), standard deviation of the average NN intervals (SDANN), and incidence of adverse reactions were compared between the groups. *Results:* The effectiveness of medication in the study group was significantly higher than that in the reference group ( $P < 0.05$ ). Besides, there was no statistically significant difference ( $P > 0.05$ ) in the QRS interval and SDNN between the two groups before treatment. After treatment, the QRS interval and SDNN of the study group were significantly lower than those of the reference group ( $P < 0.05$ ). Before treatment, there was no significant difference in RMSSD and SDANN between groups ( $P > 0.05$ ). After treatment, RMSSD and SDANN in the study group were significantly better than those in the reference group ( $P < 0.05$ ), and the difference was statistically significant. The incidence of adverse reactions in the study group was significantly lower than that in the reference group ( $P < 0.05$ ), and the difference was statistically significant. *Conclusion:* Small doses of Betoprolol and amiodarone is more effective in the treatment of ventricular arrhythmia, which has the value of popularization and application.

**Keywords:** Ventricular arrhythmia; Low-dose Betaloc; Amiodarone

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## 1. Introduction

Ventricular arrhythmia is a prevalent cardiac condition characterized by irregular heart rhythms originating in the ventricles. This disorder carries significant risks, including heart failure and sudden death<sup>[1]</sup>. Current clinical practice often employs antiarrhythmic drugs for treatment. However, prolonged use of these drugs can result in adverse effects and may not provide adequate symptom control. Hence, a combined therapeutic approach

is being explored to enhance efficacy<sup>[2,3]</sup>. Betaloc, a commonly used antiarrhythmic medication, forms the basis of this approach. This study investigates the clinical impact of combining moderate doses of Betaloc with amiodarone, aiming to mitigate adverse reactions while enhancing resistance against arrhythmia<sup>[4,5]</sup>. The synergy of these medications is anticipated to restore normal cardiac rhythm and maintain optimal myocardial blood supply. The objective of this research is to assess the therapeutic efficacy of the combined regimen in managing ventricular arrhythmia.

## 2. General information and methods

### 2.1. General information

60 patients with ventricular arrhythmia who were treated in the Department of Cardiology of our hospital from May 2018–May 2023 were included in this study. They were divided into the research group ( $n = 30$ ) and the reference group ( $n = 30$ ). In the research group, there were 16 males and 14 females, aged 48–72 years old, with an average of  $60.25 \pm 1.57$  years old. The types of arrhythmia in the research group: ventricular fibrillation (9 cases), ventricular premature systole (12 cases), and tachycardia (9 cases). In the reference group, there were 15 males and 15 females, aged 49–72 years old, with an average of  $60.43 \pm 1.61$  years old. The types of arrhythmia in the reference group: ventricular fibrillation (9 cases), ventricular premature contraction (11 cases), ventricular premature systole (11 cases), and ventricular tachycardia (10 cases). There was no statistically significant difference in general information such as gender, age, and type of arrhythmia between the groups ( $P > 0.05$ ).

Inclusion criteria: (1) Diagnosed with ventricular arrhythmia, (2) signed an informed consent. (3) has normal cognitive function, (4) treated with this regimen for the first time and are not allergic to drugs.

Exclusion criteria: (1) history of pulmonary heart disease, (2) atrioventricular block, (3) hyperthyroidism, (4) drug-induced ventricular arrhythmia, (5) history of mental illness.

### 2.2. Methods

The reference group underwent conventional treatment: 12.5 mg Betaloc was administered 2 times/d orally. The dosage could be increased up to 25 mg depending on the patient's condition. The treatment lasted for 12 weeks.

The research group was treated with low-dose Betaloc and amiodarone: (1) Betaloc treatment was administered the same way as the reference group; (2) 200 mg amiodarone was divided into 3 portions a day, after 7 days, the 200 mg was divided into 2 times, and the dosage was reduced according to the patient's condition. The treatment lasted for 12 weeks.

### 2.3. Observation indicators

- (1) The overall effectiveness of the medication in both groups was compared, considering three categories: “very effective” (complete symptom resolution, normalized electrocardiogram [ECG] and cardiac function tests), “effective” (significant symptom improvement, notable ECG and cardiac function enhancement), and “ineffective” (no change in symptoms, ECG, or cardiac function).
- (2) The QRS duration and standard deviation of normal-to-normal intervals (SDNN) were compared between the groups. The QRS duration reflects the electrical activity of ventricular depolarization.
- (3) The RMSSD and SDANN of both groups were compared, RMSSD is the root mean square of the difference between adjacent sinus beat intervals throughout the whole process, and SDANN is the standard deviation of the average sinus beat interval every 5 minutes.
- (4) The incidence of adverse reactions of both groups were compared, including nausea and vomiting, sinus bradycardia, and phlebitis.

## 2.4. Statistical analysis

The data was processed and analyzed using SPSS 21.0 software. Count data were presented as the number of cases ( $n$ ) and percentage (%), analyzed using the  $\chi^2$  test. Measurement data were presented as mean  $\pm$  standard deviation and analyzed using the  $t$ -test. A significance level of  $P < 0.05$  was used to determine statistical significance.

## 3. Results

### 3.1. Effectiveness of medication

The total efficacy of medication in the study group was significantly higher than that in the reference group ( $P < 0.05$ ) as shown in **Table 1**.

**Table 1.** The comparison of the total curative effect of medication among the groups is as follows ( $n$  [%])

Group	Number of cases	Very effective	Effective	Ineffective	Effectiveness of medication
Research group	30	19 (63.33)	11 (36.67)	0 (0.00)	30 (100.00)
Reference group	30	13 (43.33)	13 (43.33)	4 (13.33)	26 (86.67)
$\chi^2$	-	-	-	-	4.2857
$P$	-	-	-	-	0.0384

### 3.2. QRS interval and SDNN

Before treatment, the QRS interval and SDNN between the groups were compared, and there was no statistically significant difference ( $P > 0.05$ ); after treatment, the QRS interval and SDNN of the study group were significantly lower than those of the reference group ( $P < 0.05$ ), and the difference was statistically significant. See **Table 2** for details.

**Table 2.** QRS duration and SDNN of both groups (mean  $\pm$  standard deviation, ms)

Group	Number of cases	QRS time limit		SDNN	
		Before treatment	After treatment	Before treatment	After treatment
Research group	30	75.23 $\pm$ 10.57	90.57 $\pm$ 9.54	83.22 $\pm$ 8.54	103.58 $\pm$ 4.56
Reference group	30	75.64 $\pm$ 10.33	81.22 $\pm$ 8.64	83.57 $\pm$ 8.69	90.57 $\pm$ 5.64
$t$	-	0.1519	3.9788	0.1573	9.8249
$P$	-	0.8798	0.0002	0.8755	0.0000

### 3.3. RMSSD, SDANN

Before treatment, there were no significant differences in RMSSD and SDANN between the groups ( $P > 0.05$ ). However, after treatment, the study group showed significantly improved RMSSD and SDANN compared to the reference group ( $P < 0.05$ ). Further details are shown in **Table 3**.

**Table 3.** RMSSD and SDANN of both groups (mean  $\pm$  standard deviation, ms)

Group	Number of cases	RMSSD		SDANN	
		Before treatment	After treatment	Before treatment	After treatment
Research group	30	21.57 $\pm$ 3.56	38.54 $\pm$ 2.58	91.24 $\pm$ 8.63	109.57 $\pm$ 9.52
Reference group	30	21.62 $\pm$ 3.75	27.55 $\pm$ 2.69	91.57 $\pm$ 8.55	96.37 $\pm$ 8.55
$t$	-	0.0529	16.1498	0.1487	5.6502
$P$	-	0.9579	0.0000	0.8822	0.0000

### 3.4. Incidence of adverse reactions

The incidence of adverse reactions in the study group was significantly lower than that in the reference group ( $P < 0.05$ ). Further details are shown in **Table 4**.

**Table 4.** Incidence of adverse reactions of both groups [(n)%]

Group	Number of cases	Nausea and vomit	Sinus bradycardia	Phlebitis	Total incidence
Research group	30	1 (3.33)	0 (0.00)	0 (0.00)	1 (3.33)
Reference group	30	2 (6.67)	3 (10.00)	1 (3.33)	6 (20.00)
$\chi^2$ value	-	-	-	-	4.0431
$P$ value	-	-	-	-	0.0443

## 4. Conclusion

In recent years, there has been a notable increase in the incidence of ventricular arrhythmia, significantly impacting patients' well-being. Early treatment can lead to a favorable prognosis, as the severity of the disease is directly linked to the extent of heart damage and overall prognosis [6,7]. Ventricular arrhythmia carries a substantial risk of sudden cardiac death, posing a grave threat to the safety and life of patients [8]. The majority of ventricular arrhythmia patients are elderly individuals. Physical fitness tends to decrease with age, making treatment considerably challenging [9]. In the treatment of ventricular arrhythmia, the safety of the drug should be considered as the first consideration. Antiarrhythmic drugs have serious side effects, so the dosage of the drug should be strictly controlled to reduce the side effects of the drug [10]. Betaloc is "metoprolol tartrate," which is a type of  $\beta_2$  receptor blocker used to treat angina pectoris, arrhythmia, and other diseases. The drug works by regulating heart rate and cardiac output [11,12]. Betaloc has a certain inhibitory effect on ectopic pacemakers, controls the excitability of sympathetic nerves, inhibits the proliferation of cardiomyocytes, and increases the survival of patients [13]. To mitigate potential toxic and side effects of the medication, the Betaloc dosage can be reduced while ensuring treatment safety. Amiodarone belongs to a class of antiarrhythmic drugs known for stabilizing heart rate, enhancing peripheral vascular pressure, and relaxing arteries [14]. It can also reduce the excitability of sympathetic nerves, increase the threshold of ventricular fibrillation, improve myocardial oxygen consumption, restore damaged heart function, and maintain normal heart rhythm. Combining Betaloc with amiodarone can strengthen the anti-arrhythmia effect, reduce adverse drug reactions, and strengthen the safety of drug therapy [15].

In summary, low-dose Betaloc and amiodarone in the treatment of ventricular arrhythmia can improve the symptoms more significantly, promote the recovery of heart function, and have higher curative effect. Therefore, it should be widely used and promoted in clinical practice.

## Disclosure statement

The author declares no conflict of interest

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