Clinical Effect of Amiodarone in the Treatment of Senile Congestive Heart Failure with Ventricular Arrhythmia

L. D. LV, RUI FANG SONG[1] AND YUE MEI HOU*

Department of Cardiovascular Medicine, Fengxian District Central Hospital, Shanghai 201499, [1]Department of Nephrology, The Third Affiliated Hospital of Wenzhou Medical College, Wenzhou, Zhejiang 325200, China

Lv *et al.*: Effect of Amiodarone in Senile Congestive Heart Failure with Ventricular Arrhythmia

To analyze the clinical effect of amiodarone in the treatment of congestive heart failure with ventricular arrhythmias in the elderly is the objective of the study. A total of 62 elderly patients with congestive heart failure complicated with ventricular arrhythmia who received treatment in our hospital from January 2020 to June 2021 were enrolled and randomly divided into conventional group and amiodarone group. The conventional group was given diuretic and cardiotonic treatment, while the amiodarone group was given amiodarone treatment on the basis of the conventional group. The efficacy of congestive heart failure with ventricular arrhythmias, adverse drug reactions, cardiac index, heart rate, left ventricular end-diastolic, left ventricular ejection fraction, tachycardia, ventricular precontraction and QT (min) before and after the intervention, time to electrocardiogram normalization, and time to discharge were compared between the two groups. The efficacy of congestive heart failure with ventricular arrhythmia was higher in the amiodarone group than in the conventional group ($p<0.05$); no serious adverse drug reactions occurred in both groups, and the difference was not statistically significant; cardiac index, heart rate, left ventricular end-diastolic and left ventricular ejection fraction were similar in the two groups before the intervention, and the difference was not statistically significant; cardiac index, heart rate, left ventricular end-diastolic, and left ventricular ejection fraction were better in the amiodarone group than in the conventional group at discharge ($p<0.05$). Tachycardia episodes, ventricular precontraction and QT (min) were similar between the two groups before the intervention and the differences were not statistically significant; tachycardia episodes, ventricular precontraction and QT (min) were better in the amiodarone group than in the conventional group at the time of discharge ($p<0.05$). The amiodarone group had a shorter time to electrocardiogram reversion and discharge than the conventional group ($p<0.05$). Amiodarone is clinically effective and safe in the treatment of congestive heart failure with ventricular arrhythmias in the elderly, and it can effectively improve cardiac function, restore electrocardiogram and vital signs, and shorten hospitalization time, so it is worth promoting its application.

Key words: Amiodarone, congestive heart failure, tachycardia, cardiac index, heart rate

Congestive heart failure is a common and frequent cardiology disease, characterized by insufficient cardiac output to ensure effective perfusion of organs and tissues due to reduced ventricular pumping or filling function, and is a common end-stage manifestation of heart disease[1,2]. Arrhythmia is one of the common clinical symptoms and most elderly patients with congestive heart failure can have ventricular arrhythmia, which is a common critical illness[3,4]. Amiodarone is a class III antiarrhythmic drug with good effect in the treatment of arrhythmias[5,6]. This study analyzed the clinical effects of amiodarone in the treatment of congestive heart failure with ventricular arrhythmias in elderly patients and reported as follows. Elderly patients with congestive heart failure with ventricular arrhythmias were selected from January 2020 to January 2022 and randomly grouped. All patients met the diagnostic criteria[3] for congestive heart failure with ventricular arrhythmias and had cardiac function class II-IV. Patients with severe hepatic and renal insufficiency,

***Address for correspondence**
E-mail: dong86ra@163.com

pathological sinus node syndrome, atrioventricular block of grade II or higher and thyroid abnormalities were excluded. All patients had no contraindications to amiodarone administration and gave informed consent to this study. There were 20 males and 11 females in the amiodarone group, average age 66.2±3.45 (56~72) y. In the conventional group, there were 18 males and 13 females; average age 68.3±4.1 (55~77) y. The general data of the two groups were similar and the differences were not statistically significant. The conventional group was given conventional treatment such as diuretic and cardiotonic, and cardiac muscle nutrition and vasodilator drugs were routinely given. The amiodarone group was given amiodarone treatment on the basis of the conventional group. The initial dose of amiodarone was 600 mg/d, which was reduced to 400 mg/d after 1 w of treatment and then to 200 mg/d after 5 d of continued treatment, and the dose was adjusted according to the condition during the treatment period[4]. Observation indexes were as follows. Compare the efficacy of congestive heart failure with ventricular arrhythmia; adverse drug reactions; Cardiac Index (CI), heart rate, Left Ventricular End-Diastolic (LVED) and Left Ventricular Ejection Fraction (LVEF) of patients before and after intervention; tachycardia episodes, ventricular preterm contractions and QT (min) before and after treatment; time of Electrocardiogram (ECG) normalization, time of discharge. Effective-Normal ECG results, improvement of cardiac function by more than 2 levels, reduction of frequent ventricular premature beats by more than 70 %, complete disappearance of tachycardia, reduction of paired ventricular premature beats by more than 80 %; effective: Improvement of ECG results, improvement of cardiac function by 1 level, reduction of frequent ventricular premature beats by more than 50 %, reduction of tachycardia, reduction of paired ventricular premature beats by more than 60 %; ineffective: Failure to meet the criteria of effective and ineffective, or even death. The efficacy of congestive heart failure with ventricular arrhythmias is the sum of the percentages of significant and effective[5]. Statistical Package for the Social Sciences (SPSS) 22.0 statistical software was used for analysis and the measurement of data were expressed as ($\bar{x}$±s) and t-test was used for comparison between groups. Comparison of the efficacy of congestive heart failure with ventricular arrhythmias between the two groups is shown below. The efficacy of congestive heart failure with ventricular arrhythmias in the amiodarone group was higher than that in the conventional group (χ^2=7.287, p<0.05) (Table 1). Comparison of CI, heart rate, LVED and LVEF before and after intervention was shown below. The CI, heart rate, LVED and LVEF of the two groups were similar before the intervention and the differences were not statistically significant; the CI, heart rate, LVED and LVEF of the amiodarone group were better than those of the conventional group at the time of discharge (p<0.05), (Table 2). Comparison of the time of ECG recurrence and discharge time between the two groups was shown below. The time to ECG recurrence and discharge time in the amiodarone group were shorter than those in the conventional group (p<0.05), (Table 3). Comparison of adverse reactions between the two groups was explained here. No serious adverse drug reactions occurred in both groups and the differences were not statistically significant, (Table 4). Comparison of tachycardia episodes, ventricular prophase contractions and QT (min) before and after the intervention was shown below. The tachycardia episodes, ventricular prophase contractions and QT (min) were similar between the two groups before the intervention, and the differences were not statistically significant; the tachycardia episodes, ventricular prophase contractions and QT (min) in the amiodarone group were better than those in the conventional group at discharge (p<0.05), as shown in Table 5. The high incidence of congestive heart failure with ventricular arrhythmias in the elderly is due to enhanced transverse charge conduction due to intercellular fibrosis in elderly patients with congestive heart failure, resulting in unidirectional block and conduction delay, and inducing ventricular arrhythmias. The high incidence of congestive heart failure with ventricular arrhythmias in elderly patients with declining organisms can further increase sympathetic tone and reduce left heart ejection function, which requires timely treatment[7,8]. Currently, amiodarone is the most widely used class III antiarrhythmic drug, which can effectively block potassium outflow from cardiac myocytes, prolong the duration of atrioventricular node, atrial and ventricular action potentials and effective inactivity, eliminate fold excitation, inhibit or slow down atrial fibrillation, and promote the disappearance of ventricular arrhythmias. Amiodarone can also effectively improve ventricular function, promote higher left heart ejection fraction and exert multiple electrophysiological effects[9,10]. In this study, the conventional group was given diuretic, cardiotonic and other conventional treatments, and the amiodarone group was given amiodarone treatment on the basis of the conventional group. The results showed that the efficacy of congestive heart failure with ventricular arrhythmia was higher in the amiodarone

group than in the conventional group ($p<0.05$); no serious adverse drug reactions occurred in both groups and the differences were not statistically significant; CI, heart rate, LVED and LVEF were similar in both groups before the intervention, and the differences were not statistically significant; CI, heart rate, LVED and LVEF were better in the amiodarone group than in the conventional group at discharge ($p<0.05$). Tachycardia episodes, ventricular precontraction and QT (min) were similar between the two groups before the intervention, and the differences were not statistically significant; tachycardia episodes, ventricular precontraction and QT (min) were better in the amiodarone group than in the conventional group at the time of discharge ($p<0.05$). The amiodarone group had a shorter time to ECG normalization and discharge time than the conventional group ($p<0.05$). In conclusion, amiodarone is clinically effective and safe in the treatment of congestive heart failure with ventricular arrhythmias in the elderly, which can effectively improve cardiac function, restore ECG and vital signs, and shorten hospitalization time, and is worthy in promoting the application.

TABLE 1: COMPARISON OF THE EFFICACY OF CONGESTIVE HEART FAILURE WITH VENTRICULAR ARRHYTHMIAS BETWEEN THE TWO GROUPS

Efficacy	Conventional group (n=31)	Amiodarone group (n=31)
Show effect	13	24
Effective	11	6
Invalid	7	1
Total efficiency [n (%)]	24 (77.4)	30 (96.8)

TABLE 2: COMPARISON OF CI, HEART RATE, LVED AND LVEF BEFORE AND AFTER THE INTERVENTION ($\bar{x}\pm s$)

	Amiodarone group (n=31)		Conventional group (n=31)	
	Pre-intervention	At discharge	Pre-intervention	At discharge
Heart rate (beats/min)	146. 8±14.3	79. 2±5.3[ab]	144. 3±14.2	94. 5±8.6[a]
LVRD (cm)	3.8±0.4	3.2±0.3[ab]	3.8±0.25	3.5±0.6[a]
LVEF (%)	46. 4±3.9	61. 2±6.3[ab]	46. 2±3.9	50.5±4.7[a]
CI (l/min/m^2)	3.5±0.3	3.9±0.5[ab]	3.6±0.2	3.6±0.6[a]

Note: Compared with pre-intervention, [a]$p<0.05$ and compared with conventional group at discharge, [b]$p<0.05$

TABLE 3: COMPARISON OF THE TIME TO ECG RESUMPTION AND DISCHARGE TIME BETWEEN THE TWO GROUPS ($\bar{x}\pm s$)

Projects	Regular group (n=31)	Amiodarone group (n=31)	t	p
Discharge time	21.4±3.8	17.2±1.5	8.428	0.001
ECG resumption time (d)	19.4±3.6	14.5±2.2	9.981	0.001

TABLE 4: COMPARISON OF ADVERSE REACTIONS BETWEEN THE TWO GROUPS [n (%)]

Adverse reactions	Conventional group (n=31)	Amiodarone group (n=31)
Disgusting	1	0
Vomiting	0	1
Weakness	1	1
Incidence	2 (6.5)	2 (6.5)

TABLE 5: COMPARISON OF TACHYCARDIA EPISODES, VENTRICULAR PRETERM CONTRACTIONS AND QT (MIN) BEFORE AND AFTER THE INTERVENTION [n (%)]

Projects	Amiodarone group (n=31)		Conventional group (n=31)	
	Pre-intervention	At discharge	Pre-intervention	At discharge
QT (min) (ms)	312.4±10.5	354.6±42.8[ab]	312.5±12.7	328.5±22.3[a]
Number of ventricular anterior contractions (times/24 h)	3 978.8±126.9	1 968.4±44.6[ab]	3985.6±68.3	2 786.3±91.7[a]
Frequency of tachycardia episodes (times/24 h)	6.8±1.2	1.2±0.3[ab]	6.5±1.2	4.6±0.9[a]

Note: Compared with pre-intervention, [a]$p<0.05$ and compared with conventional group at discharge, [b]$p<0.05$

Conflict of interests:

The authors declared no conflict of interest.

REFERENCES

1. Di Napoli P, Di Giovanni P, Gaeta MA, Taccardi AA, Barsotti A. Trimetazidine and reduction in mortality and hospitalization in patients with ischemic dilated cardiomyopathy: A post hoc analysis of the Villa Pini d'Abruzzo trimetazidine trial. J Cardiovasc Pharmacol 2007;50(5):585-9.
2. Yohe N, Weisberg MD, Ciminero M, Mannino A, Erez O, Saleh A. Complications and readmissions after total hip replacement in octogenarians and nonagenarians. Geriatr Orthop Surg Rehabil 2020;11:1-5.
3. van Wagoner DR. Atrial fibrillation risk: Can we see it now? Trends Cardiovasc Med 2021.
4. Burstein B, Nattel S. Atrial fibrosis: Mechanisms and clinical relevance in atrial fibrillation. J Am Coll Cardiol 2008;51(8):802-9.
5. Meng XD, Gao WQ, Sun Z. Amiodarone and acupuncture for cardiac arrhythmia: Study protocol for a systematic review. Medicine 2019;98(7):e14544.
6. Nagasawa Y, Chen J, Hashimoto K. Antiarrhythmic properties of a prior oral loading of amiodarone in *in vivo* canine coronary ligation/reperfusion-induced arrhythmia model: Comparison with other class III antiarrhythmic drugs. J Pharmacol Sci 2005;97(3):393-9.
7. Khoshnevis GR, Massumi A. Ventricular arrhythmias in congestive heart failure: Clinical significance and management. Tex Heart Inst J 1999;26(1):42-59.
8. Aronson D, Burger AJ. Neurohumoral activation and ventricular arrhythmias in patients with decompensated congestive heart failure: Role of endothelin. Pacing Clin Electrophysiol 2003;26(3):703-10.
9. Pohlgeers A, Villafane J. Ventricular fibrillation in two infants treated with amiodarone hydrochloride. Pediatr Cardiol 1995;16(2):82-4.
10. Geng DF, Jin DM, Wang JF, Luo YJ, Wu W. Clinical study of amiodarone-associated torsade de pointes in Chinese people. Pacing Clin Electrophysiol 2006;29(7):712-8.

This article was originally published in a special issue, "Modern Applications in Biomedical Research and Pharmaceutical Sciences" Indian J Pharm Sci 2022:84(3) Spl Issue "230-233"