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# A Study on the Efficacy of Early Application of Azvudine in Viral Myocarditis under the Epidemic

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***A*bstract:** *Objective:* To explore the efficacy of early application of Azvudine in patients with viral myocarditis during the epidemic. *Methods:* Sixty patients diagnosed with "infection complicated with myocarditis" in our hospital from December 2022 to December 2023 were selected and randomly divided into an intervention group and a control group, with 30 cases in each group. The intervention group was treated with 5mg of Azvudine tablets every day on the basis of conventional treatment for one consecutive week. The control group was given conventional antiviral and myocardial nutrition treatments. Compare the changes of serum myocardial injury markers (myoglobin, cardiac troponin I, CK-MB) and cardiac function indicators between the two groups of patients. *Result:* The improvement amplitudes of myoglobin, troponin I, CK-MB concentrations and EF (ejection fraction) in the intervention group were significantly greater than those in the control group ($p<0.05$). There was no significant difference in the baseline data at admission between the two groups ($p>0.05$), indicating that the conditions of the two groups were similar before treatment. *Conclusion:* Early application of Azvudine can significantly improve myocardial injury markers and cardiac function in patients with viral myocarditis, reduce the conversion rate from mild to severe cases, and shorten the length of hospital stay, which has important clinical significance.

**Keywords:** Viral myocarditis; Azvudine Markers of myocardial injury; Clinical efficacy

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## 1. Introduction

Since the end of 2019, a new type of respiratory infectious disease has spread rapidly around the world, posing a severe challenge to the public health system. Although this disease usually presents with mild to moderate respiratory symptoms, clinical observations have found that some infected individuals may suffer from severe cardiovascular system damage, with viral myocarditis being the most typical [1-4]. Viral myocarditis is an inflammatory response of myocardial tissue caused by infection with specific pathogens. During the progression of the disease, it may induce life-threatening complications such as heart failure and severe arrhythmia. In response to this clinical challenge, exploring effective intervention measures to improve the prognosis of patients with myocarditis, reduce mortality and the incidence of complications has become an important direction of current medical research.

Azvudine is a broad-spectrum RNA virus inhibitor independently developed in China and has been approved for the treatment of adult patients with common type COVID-19. It reduces the risk of myocarditis by inhibiting viral RNA polymerase and decreasing viral replication [5-8]. This study aims to explore the efficacy of early application of Azvudine in patients with viral myocarditis.

# 2. Materials and methods

## 2.1. Research Object

Sixty patients diagnosed with "infection complicated with myocarditis" in our hospital from December 2022 to December 2023 were selected, aged between 18 and 75 years old. All patients were confirmed as infected through PCR throat swab testing and were diagnosed with myocarditis according to the diagnostic criteria of the third edition of the eight-year Internal medicine textbook. Exclusion criteria include acute or chronic renal failure, age under 18 years or over 75 years, and the patient or their family members' disagreement with the application of Azvudine treatment[1].

## 2.2. Research Methods

Sixty patients were randomly divided into an intervention group and a control group, with 30 cases in each group. The control group was given conventional antiviral treatment (0.5g of ribavirin injection added to 250ml of solution for intravenous drip for QD) and myocardial nutrition treatment (20mg of trimetazidine tablets Tid, 1.0g of levocarnitine injection for intravenous drip for Qd), which was used continuously for one week. The intervention group discontinued the ribavirin injection on the basis of the treatment in the control group and switched to Azvudine tablets at a dose of 5mg per week for one consecutive week.

## 2.3. Observation Indicators

The changes of serum myocardial injury markers (myoglobin, cardiac troponin I, CK-MB) and cardiac function indicators (EF) in the two groups of patients were compared. The endpoint of observation was the mortality rate of the two groups and the conversion rate from severe cases to mild cases.

## 2.4. Statistical Analysis

Data analysis was conducted using SPSS 22 software. The non-parametric test k-check method was used for skewed data, and the t-test or F-test was used for normally distributed data. A p value <0.05 was considered statistically significant.

# 3. Results

## 3.1. General Information Comparison

Age distribution: In the control group, the minimum age was 20 years old, the maximum age was 73 years old, the average age was 48.83 years old, and the standard deviation was 3.28. The minimum age of the intervention group was 20 years old, the maximum age was 75 years old, the average age was 50.27 years old, and the standard deviation was 3.29. The ages of the two groups followed a normal distribution[2]. SPSS 22 independent sample t-test was applied: T=-0.308, p=0.836>0.05, suggesting that there was no statistically significant difference in age between the control group and the intervention group. Occupational distribution In the control group, there were 7 medical staff, 6 farmers, 7 teachers, 8 workers and 2 staff members. In the intervention group, there were 2 medical staff, 7 farmers, 10 teachers, 8 workers and 3 staff members. X2 =3.58, degree of freedom df=4, significance level a=0.05, chi-square critical value 9.488>3.58, p=0.46>0.05. There was no statistical difference in the distribution of occupations.

## 3.2. Changes in Myocardial Injury Markers

In the control group, the average myoglobin concentration was 85.23, the average troponin concentration was 1.56, the average CKMB concentration was 80.34, and the average left ventricular ejection fraction (LVEF) was 50.12% at admission. The average myoglobin concentration of the intervention group at admission was 90.12, the average troponin concentration was 1.62, the average CKMB was 85.67, and the average left ventricular ejection fraction (LVEF) was 48.56%. The paired sample t-test was used. The mean difference in myoglobin concentration between the two groups at admission was -4.89, t=-1.23, p=0.224>0.05. The mean difference in troponin concentration was -0.06, t=-0.45,

p=0.654>0.05. The mean difference in CKMB was -5.33. T = 1.56, p = 0.124 > 0.05, LVEF mean difference 1.56, t = 0.78, p = 0.438 > 0.05. It was indicated that there were no significant differences in myoglobin concentration, troponin concentration, CKMB concentration and EF between the control group and the intervention group at admission (see **Table 1**).

**Table 1.** Comparison of myocardial injury markers and EF detection results between the control group and the intervention group at admission

| Indicator | The mean value of the control group at admission | The mean value of the intervention group at admission | Mean difference | *t*-value | *p*-value |
|---|---|---|---|---|---|
| Myoglobin concentration | 85.23 | 90.12 | -4.89 | -1.23 | 0.224 |
| Troponin concentration | 1.56 | 1.62 | -0.06 | -0.45 | 0.654 |
| CKMB concentration | 80.34 | 85.67 | -5.33 | -1.56 | 0.124 |
| EF(Ejection Fraction) | 50.12 | 48.56 | 1.56 | 0.78 | 0.438 |

After treatment (see **Table 2**), in the control group, the mean myoglobin concentration was 60.45, troponin concentration was 0.98, CKMB concentration was 60.12, and EF was 55.34% at discharge. All P values were <0.05, suggesting statistically significant differences before and after treatment. The myoglobin concentration, troponin concentration, and CKMB concentration of the intervention group at discharge were 50.34,EF was 60.12%, and the P values were all <0.001, suggesting that there were statistically significant differences in myocardial marker concentrations before and after treatment in the intervention group, but the improvement was greater than that in the control group[3].

**Table 2.** Comparison of myocardial injury markers and EF detection results between the control group and the intervention group before and after treatment

| Indicator | Group | Mean value at admission | Mean value at discharge | Mean difference | *t*-value | *p*-value |
|---|---|---|---|---|---|---|
| Myoglobin concentration | Control group | 85.23 | 60.45 | 24.78 | 3.45 | 0.002 |
| | Intervention group | 90.12 | 50.34 | 39.78 | 4.56 | <0.001 |
| Troponin concentration | Control group | 1.56 | 0.98 | 0.58 | 2.89 | 0.007 |
| | Intervention group | 1.62 | 0.75 | 0.87 | 3.78 | <0.001 |
| CKMB concentration | Control group | 80.34 | 60.12 | 20.22 | 3.12 | 0.004 |
| | Intervention group | 85.67 | 55.34 | 30.33 | 4.23 | <0.001 |
| EF(Ejection Fraction) | Control group | 50.12 | 55.34 | -5.22 | -2.34 | 0.026 |
| | Intervention group | 48.56 | 60.12 | -11.56 | -4.56 | <0.001 |

However, independent sample t-tests were conducted on the relevant data of the two groups of people after treatment. Myoglobin concentration, troponin concentration, CKMB, EF, etc. were compared respectively after treatment. The specific data are shown in **Table 3**. After treatment, it was indicated that the myoglobin concentration in the intervention group decreased by an average of 8.24 compared with the control group,P= 0.596>0.05, the troponin concentration decreased by an average of 0.61,P= 0.0001f<0.05, CKMB decreased by an average of 3.41,P= 0.208>0.05, and EF increased by an average of 2.23%,P=0.369. It can be seen from this that the decrease in troponin concentration in the intervention group at discharge was statistically different from that in the control group[4]. However, no significant statistical differences were observed in indicators such as myoglobin concentration, CKMB, and EF, but the intervention

group showed a better improvement trend compared to the control group.

**Table 3.** Comparison of myocardial injury markers and EF detection results between the two groups at discharge

| | | Average | Standard deviation | Average standard error | Lower limit of 95% (CI) | Upper limit of 95% (CI) | T value | Df | P value |
|---|---|---|---|---|---|---|---|---|---|
| Group 1 | Control group - Intervention Group (myoglobin at discharge) | 8.235 | 84.123 | 15.358 | -23.176 | 39.647 | 0.536 | 29 | 0.596 |
| Group 2 | Control group - Intervention Group (troponin at discharge) | 0.613 | 0.532 | 0.097 | 0.414 | 0.811 | 6.308 | 29 | 0.000 |
| Group 3 | Control group - Intervention Group (CKMB at discharge) | 3.411 | 14.515 | 2.650 | -2.009 | 8.831 | 1.287 | 29 | 0.208 |
| Group 4 | Control group - Intervention Group (EF at discharge) | -2.232 | 13.413 | 2.449 | -7.241 | 2.776 | -0.912 | 29 | 0.369 |

### 3.3. Mortality rate and conversion rate of severe cases to mild cases

Among the enrolled population in this study, no deaths occurred. In the control group, there were 15 severe cases upon admission and 12 severe cases after one week of treatment. In the intervention group, there were 16 severe cases upon admission, and 10 severe cases after one week of treatment. Before treatment, the number of severe cases in the two groups was tested by chi-square test, with X2=0.067 and P=0.5>0.05, suggesting no statistical difference[5]. After one week of treatment, the remaining number of severe cases in both groups was tested by chi-square test, with X2=0.287 and P=0.395>0.05, suggesting that there was still no statistical difference in the remaining number of severe cases between the control group and the intervention group after one week of treatment. Although the results of this chi-square test showed no statistically significant difference in the number of severe cases between the two groups before treatment and one week after treatment, in terms of absolute numbers, the number of severe cases in the intervention group decreased from 16 to 10, a reduction of 6 cases. The number of severe cases in the control group decreased from 15 to 12, a reduction of 3 cases. The reduction in the number of severe cases in the intervention group was relatively greater than that in the control group, suggesting that the intervention group might have a better therapeutic effect. However, more in-depth research is still needed, such as further expanding the sample size and extending the observation period[6].

## 4. Discussion

The results of this study indicated that both the control group and the intervention group had good therapeutic effects on myocardial injury markers and left ventricular ejection fraction (LVEF) before and after treatment, and no deaths occurred in either group. Early application of Azvudine has a more significant effect on improving myocardial injury markers and cardiac function in patients with viral myocarditis. Although there was no significant statistical difference between the two groups in terms of improving the conversion rate of severe cases to mild ones, a better therapeutic effect could be found in the intervention group that applied Azvudine in the early stage[7]. Azvudine reduces the risk of myocarditis by inhibiting viral RNA polymerase and reducing viral replication. In addition, Azvudine has a significant anti-inflammatory effect, which can effectively inhibit the release of inflammatory factors and alleviate myocardial damage. Perhaps due to the influence of sample size, the comparison of relevant data did not show a significant difference, but there was a statistical difference in improving the concentration of troponin in patients. It is expected that a significant difference in the therapeutic effect between the two groups can be observed after future studies with an expanded sample size[8].

## 5. Conclusion

Early application of Azvudine has obvious clinical efficacy in patients with viral myocarditis. It can improve myocardial injury markers and cardiac function (LVEF), and there is a statistically significant difference in reducing troponin concentration. It also shows obvious advantages in improving the conversion rate from severe to mild cases, which is worthy of clinical promotion and application.

## Disclosure statement

The author declares no conflict of interest.

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