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Clinical Study and Mechanism of Traditional Chinese Medicine Combined with Western Medicine in the Treatment of Arrhythmia

Zhuoyang Yu

The Third Clinical College, Shanxi University of Chinese Medicine, Jinzhong, 030619, China

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Abstract: Arrhythmia seriously affects human health, so it is very important to explore effective treatment methods. This article discusses the treatment of arrhythmia with traditional Chinese medicine combined with western medicine. This article expounds the pathophysiological mechanism of arrhythmia, the present situation and characteristics of western medicine and traditional Chinese medicine treatment, analyzes the synergistic effect of traditional Chinese medicine combined with western medicine in enhancing curative effect, reducing adverse reactions of western medicine and optimizing treatment scheme, and lists relevant research data. Based on this, the mechanism of its action was deeply analyzed, including the effects on cardiac electrophysiology, ion channel regulation, neurohumoral regulation, anti-oxidation and anti-inflammatory effects, and the effect of combined medication was presented through tabular data. The research shows that the combination of traditional Chinese medicine and western medicine in the treatment of arrhythmia can play a synergistic role in many aspects, regulate the heart function from multiple channels and multiple targets, correct arrhythmia, improve the curative effect and reduce the adverse reactions of western medicine, and provide more scientific and effective treatment options for clinic, which is of great significance.

1. Introduction

Arrhythmia, as a common cardiovascular disease, seriously threatens human health. Its pathogenesis is complex, which can not only cause uncomfortable symptoms such as palpitation, chest tightness and dizziness, but also lead to heart failure and sudden cardiac death in severe cases, which has a great impact on the quality of life and safety of patients [1]. According to relevant statistics, arrhythmia has a high incidence in people of all ages, and with the aging of the population, its prevalence rate is on the rise [2]. Therefore, exploring safe and effective treatment methods has become an important research topic in the cardiovascular field.

At present, western medicine plays a leading role in the treatment of arrhythmia. However, although most western medicines can control arrhythmia to some extent, there are many limitations [3]. Long-term use of some antiarrhythmic drugs may lead to new arrhythmia, which is called "arrhythmogenic effect"; Some drugs will also have obvious side effects, such as liver and kidney

function damage, gastrointestinal reaction, etc., which will affect the treatment compliance and long-term prognosis of patients [4]. In addition, the single western medicine treatment is not effective for some complex or refractory arrhythmia.

Traditional Chinese medicine has a long history of application in China, and its multi-component and multi-target characteristics provide a new idea for arrhythmia treatment [5]. Modern research shows that many kinds of traditional Chinese medicines and their extracts have the functions of regulating cardiac electrophysiology, stabilizing cell membrane and improving myocardial blood supply, and can effectively fight arrhythmia [6]. Traditional Chinese medicine has high safety and relatively few side effects, and has unique advantages in regulating the body function as a whole.

Under this background, the treatment of arrhythmia with traditional Chinese medicine combined with western medicine has attracted more and more attention. This combined treatment mode aims to give full play to the respective advantages of traditional Chinese medicine and western medicine, synergize, reduce the adverse reactions of western medicine and optimize the treatment scheme. In recent years, many clinical studies have preliminarily confirmed its effectiveness and safety, but the in-depth discussion on its mechanism of action is still insufficient. Therefore, it is of great significance to carry out clinical research on the treatment of arrhythmia with traditional Chinese medicine combined with western medicine and deeply analyze its mechanism, so as to improve the treatment level of arrhythmia and improve the prognosis of patients. This article will discuss this topic in detail in order to provide reference for clinical practice.

2. Overview and treatment status of arrhythmia

Arrhythmia refers to the abnormality of the frequency, rhythm, origin, conduction velocity or excitation sequence of cardiac impulses [7]. Normal cardiac electrical activity depends on the orderly operation of the cardiac conduction system. When the electrophysiological characteristics of myocardial cells change, the ion channel function is abnormal or the cardiac conduction system is diseased, arrhythmia may be caused. Western medicine treatment of arrhythmia is mainly achieved by affecting the electrophysiological characteristics of myocardial cells. Common drugs such as sodium channel blockers, beta-blockers, potassium channel blockers and calcium channel blockers. They act on different ion channels or receptors respectively to correct abnormal electrical activity [8]. However, there are some limitations in western medicine treatment. Long-term use of some drugs is prone to tolerance and reduced curative effect; Some drugs have obvious adverse reactions, such as amiodarone may lead to serious complications such as thyroid dysfunction and pulmonary fibrosis, which limits its clinical application. Moreover, for some complex arrhythmia, it is difficult to achieve the ideal effect by single western medicine treatment.

In contrast, Chinese medicine has unique advantages in treating arrhythmia. Traditional Chinese medicine has a variety of components, which can play a role through multiple targets and channels [9]. Traditional Chinese medicine pays attention to holistic conditioning, which can not only improve arrhythmia symptoms, but also regulate the body's immunity, reduce oxidative stress damage and improve the quality of life of patients.

3. Synergistic effect of traditional Chinese medicine combined with western medicine on arrhythmia

(1) Enhance therapeutic effect

The combination of traditional Chinese medicine and Western medicine can significantly enhance the synergistic effect in improving arrhythmia symptoms and improving cardiac function indicators. Taking common premature beats as an example, western medicine metoprolol mainly blocks β - receptors, reduces myocardial cell autonomy, and reduces the occurrence of premature

beats. And the traditional Chinese medicine Wenxin Granules, mainly composed of Codonopsis pilosula, Polygonatum sibiricum, Panax notoginseng, Amber, Gansong, etc., have the effects of nourishing qi and yin, promoting blood circulation and removing blood stasis, and calming the heart and mind. Research has shown that the combination of Wenxin granules and metoprolol in the treatment of premature beats can significantly reduce the number of premature beats and improve symptoms such as palpitations and chest tightness in patients compared to using metoprolol alone (see Table 1). Under the treatment regimen of Wenxin granules combined with metoprolol, the average reduction rate of premature beats was (85.6 ± 5.2)%, while it was (68.4 ± 4.9)% when metoprolol was used alone. This indicates that combination therapy is more effective in reducing premature beats compared to monotherapy. Combination therapy can significantly reduce the frequency of premature beats and may have a stronger regulatory effect on cardiac rhythm. The improvement rate of palpitations in the combination therapy group was (82.3 ± 6.1)%, while in the metoprolol group alone it was (65.2 ± 5.5)%. From this, it can be seen that the combination of Wenxin granules and metoprolol has a better effect on improving palpitations than using metoprolol alone, further demonstrating the advantages of combination therapy in relieving patients' subjective discomfort symptoms. The improvement rate of chest tightness symptoms in the combination therapy group was (78.5 ± 5.8)%, while in the metoprolol group alone it was (62.1 ± 5.3)%. This indicates that the combination therapy also has significant advantages in relieving chest tightness symptoms, which may be related to the more comprehensive regulation of overall cardiac function by the combination therapy.

Table 1: Comparison of Efficacy between Wenxin Keli Combined with Metoprolol and Metoprolol Alone in the Treatment of Premature Beats

Treatment Regimen	Reduction Rate of Premature Beats (%)	Improvement Rate of Palpitation Symptoms (%)	Improvement Rate of Chest Tightness Symptoms (%)
Wenxin Keli Combined with Metoprolol	85.6 ±5.2	82.3 ±6.1	78.5 ±5.8
Metoprolol Alone	68.4 ±4.9	65.2 ±5.5	62.1 ±5.3

Amiodarone is a commonly used Western medicine for the treatment of atrial fibrillation, which can prolong the duration of action potential of myocardial cells, effectively convert and maintain sinus rhythm. However, using amiodarone alone, some patients still find it difficult to maintain long-term sinus rhythm. At this time, in combination with the traditional Chinese medicine Shensong Yangxin Capsules, it can regulate the multi ion channels and autonomic nervous system function of the heart, and work synergistically with amiodarone to improve the conversion rate of atrial fibrillation and the maintenance rate of sinus rhythm, further improving the patient's cardiac function.

(2) Reduce adverse reactions of Western medicine

Western medicine often accompanies varying degrees of adverse reactions in the treatment of arrhythmia. Traditional Chinese medicine can effectively alleviate these adverse reactions through its own characteristics. As mentioned earlier, long-term use of amiodarone can lead to serious adverse reactions such as thyroid dysfunction and pulmonary fibrosis. Research has found that adding traditional Chinese medicine Shengmai Yin to the use of amiodarone can alleviate its impact on thyroid function. Ginseng, Ophiopogon japonicus, and Schisandra chinensis in Shengmai drink have the effects of nourishing qi and yin, strengthening the body's immune system, and reducing the damage of amiodarone to thyroid cells. For example, the beta blocker metoprolol may cause adverse reactions such as bradycardia and fatigue in some patients after taking it. Combined with traditional Chinese medicine Huangqi, the active ingredients in Huangqi can improve myocardial contractility, increase heart rate, and to some extent alleviate bradycardia and fatigue symptoms caused by metoprolol.

(3) Optimize treatment plan

Combination therapy can develop more targeted and personalized treatment plans based on factors such as different types of arrhythmias and individual differences in patients. For elderly patients with arrhythmia, due to the decline of organ function and poor drug tolerance, high-dose use of Western medicine alone can easily cause adverse reactions. At this point, using a combination of low-dose Western medicine and traditional Chinese medicine can ensure treatment effectiveness and reduce the risk of adverse drug reactions. For patients with arrhythmia who have multiple underlying diseases such as coronary heart disease and hypertension, a combination of traditional Chinese medicine and Western medicine that can treat arrhythmia and improve underlying diseases can be selected according to their specific conditions. For patients with coronary heart disease complicated with arrhythmia, traditional Chinese medicine with blood activating and stasis removing effects such as Danshen Dripping Pills combined with antiarrhythmic western medicine can be used to treat arrhythmia while improving myocardial blood supply, achieving the effect of killing two birds with one stone.

4. The mechanism of action of traditional Chinese medicine combined with Western medicine in the treatment of arrhythmia

The maintenance of normal heart rhythm relies on stable electrophysiological activity. The combination of traditional Chinese medicine and Western medicine can correct abnormal electrical activity by regulating the action potential, autonomy, and conductivity of myocardial cells. As shown in Table 2, the action potential duration of the control group was (200 ± 15) ms, while that of the verapamil group was prolonged to (230 ± 18) ms. The combination of verapamil and coptis further prolonged to (250 ± 20) ms. This indicates that verapamil itself can prolong the action potential duration of myocardial cells, and the prolonged effect is more pronounced when coptis and verapamil are used in combination. The changes in action potential duration can affect the excitation and contraction processes of myocardial cells, and its prolongation may enhance the refractory period of myocardial cells and reduce the occurrence of abnormal impulses. The effective refractory period of the control group was (150 ± 10) ms, which increased to (170 ± 12) ms in the verapamil group, and reached (190 ± 15) ms in the combination of verapamil and coptis. This indicates that verapamil can prolong the effective refractory period, and the combination of coptis further prolongs the effective refractory period. Extending the effective refractory period helps prevent myocardial cells from being excited again during the refractory period, thereby reducing the risk of arrhythmia. The self-discipline of the control group was (120 ± 8) times/minute, while that of the verapamil group decreased to (100 ± 7) times/minute. The combination of verapamil and coptis further decreased to (80 ± 6) times/minute. This indicates that verapamil can reduce the autonomy of myocardial cells, and the combination of Huanglian and it has a stronger inhibitory effect on autonomy. The decreased autonomy of myocardial cells helps maintain the stability of cardiac rhythm.

Table 2: Effects of Verapamil Combined with Coptis Chinensis on Electrophysiological Parameters of Cardiomyocytes

Group	Action Potential Duration (ms)	Effective Refractory Period (ms)	Automaticity (beats/minute)
Control Group	200 ± 15	150 ± 10	120 ± 8
Verapamil Group	230 ± 18	170 ± 12	100 ± 7
Verapamil Combined with Coptis Chinensis Group	250 ± 20	190 ± 15	80 ± 6

Abnormal function of potassium, sodium, and calcium plasma channels is an important cause of

arrhythmia. The combination of traditional Chinese medicine and Western medicine can accurately regulate these ion channels, stabilize ion flow, and restore normal heart rhythm. Western medicine quinidine can block sodium channels and inhibit rapid influx of sodium ions. The active ingredient in traditional Chinese medicine aconite, demethylamine, not only regulates the function of cardiac beta receptors, but also has a certain regulatory effect on sodium, potassium, and calcium ion channels. The combination of the two can more comprehensively correct ion channel abnormalities and maintain cardiac electrical stability. For example, when amiodarone is used as a potassium channel blocker in combination with traditional Chinese medicine Sophora flavescens, the matrine in Sophora flavescens can synergistically enhance the inhibition of potassium ion efflux with amiodarone, prolong the repolarization time of myocardial cells, and reduce the occurrence of arrhythmia.

The human neurohumoral regulatory system plays an indirect but important role in regulating cardiac rhythm. The combination of traditional Chinese medicine and Western medicine can exert regulatory effects by affecting neurotransmitters, hormones, and other factors. Taking the beta blocker metoprolol as an example, it reduces the stimulation of catecholamines on the heart by blocking beta receptors, lowering heart rate and myocardial contractility. When combined with traditional Chinese medicine sour jujube kernels, the active ingredients in sour jujube kernels can regulate the central nervous system, reduce sympathetic nervous system excitability, and decrease catecholamine release in children. The two work together to stabilize heart rhythm from a neural regulatory perspective. Oxidative stress and inflammatory response play important roles in the occurrence and development of arrhythmia. The combination of traditional Chinese medicine and Western medicine can protect myocardial cells and improve the internal environment of the heart by antioxidant stress, reducing inflammatory reactions. For example, atorvastatin not only has a lipid-lowering effect, but also has anti-inflammatory and antioxidant effects. Combined with traditional Chinese medicine Danshen, Danshen ketone and other components in Danshen can significantly increase the activity of antioxidant enzymes in the body, reduce the level of oxidative stress products, synergistically reduce inflammatory reactions with atorvastatin, protect myocardial cells from damage, and thereby reduce the occurrence of arrhythmia.

5. Conclusions

The combination of traditional Chinese medicine and Western medicine has shown significant advantages and potential in the treatment of arrhythmia. From the clinical treatment effect, the combination of the two can not only enhance the therapeutic effect, but also effectively improve arrhythmia symptoms and enhance cardiac function indicators. The combination of Wenxin granules and metoprolol in the treatment of premature beats can significantly reduce the number of premature beats and improve related symptoms compared to using metoprolol alone; It can also alleviate adverse reactions during Western medicine treatment, such as Shengmai Yin reducing the impact of amiodarone on thyroid function, and Huangqi relieving bradycardia caused by metoprolol. This combination therapy model optimizes the treatment plan based on different types of arrhythmias and individual differences of patients, providing more possibilities for personalized clinical treatment.

In terms of mechanism of action, the combination of traditional Chinese medicine and Western medicine fundamentally corrects abnormal cardiac rhythms by exerting effects on cardiac electrophysiology, ion channel regulation, neurohumoral regulation, as well as antioxidant and anti-inflammatory properties. Verapamil combined with Huanglian can regulate cardiac electrophysiological parameters at different stages. Traditional Chinese medicine and Western medicine work together to regulate ion channels and stabilize ion flow, jointly acting on the

neurohumoral regulatory system and reducing oxidative stress and inflammatory reactions, comprehensively protecting myocardial cells and maintaining normal cardiac function.

In the future, we can further conduct in-depth basic research and multi center large-scale clinical trials to clarify the optimal combination therapy regimen and dosage, providing a more solid basis for clinical practice.

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