

Research Progress of Chinese Medicine in the Treatment of Acute Myocardial Infarction

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Abstract: *With the aging of the global population and changes in lifestyle, cardiovascular diseases, especially acute myocardial infarction (AMI), have become one of the major diseases threatening human health. Traditional Chinese medicine (TCM) has been practiced for thousands of years and has accumulated rich theories and methods for the treatment of acute myocardial infarction (AMI). Traditional Chinese medicine has unique advantages in the treatment of acute myocardial infarction and has made some progress in recent years. Modern medical research has also paid increasing attention to the mechanism of action and clinical application of TCM in the treatment of AMI. This article focuses on the unique advantages of TCM in the treatment of AMI from the perspective of integrating Chinese and Western medicine, and systematically reviews the research progress of TCM in the treatment of AMI through extensive literature combing.*

Keywords: Acute myocardial infarction; Chinese medicine treatment; Mechanism of action.

1. Introduction

Acute myocardial infarction (AMI) is myocardial necrosis caused by acute and persistent ischemia and hypoxia of coronary arteries. Clinically, it is characterized by severe and persistent retrosternal pain, which cannot be completely relieved by rest and nitrate drugs, accompanied by increased serum cardiac myosin activity and progressive electrocardiographic changes, and can be complicated by arrhythmia, shock, or heart failure, which can often be life-threatening. In traditional Chinese medicine, there is no specific disease name such as "acute myocardial infarction". Instead, the condition is categorized as "chest paralysis" or "true heart pain" [1]. Instead, the condition was categorized as "chest paralysis" or "true heartache". Descriptions of this condition can be found in many ancient texts, especially the *Neijing*. For example, the "Ling Shu - syncope theory chapter" recorded: "true heart pain, hands and feet green to the joints, heart pain is very, the night hair and died. "It was not until the Han Dynasty that Zhang Zhongjing first formally introduced the term "chest paralysis" and specifically elaborated on it [2]. The term "chest paralysis" was first formally introduced by Zhang Zhongjing in the Han Dynasty and was specifically elaborated. Therefore, we can put the acute myocardial infarction in Chinese medicine is categorized as "thoracic paralysis heart pain".

Modern Chinese medicine has also conducted many innovative explorations and empirical studies in AMI treatment. Closely integrating cellular and animal models, experimental data have quantitatively verified the promotional effect of Chinese herbs such as *Salvia miltiorrhiza* and *Astragalus* on AMI treatment, as well as the remarkable efficacy of their active ingredients in regulating coronary blood flow, protecting cardiomyocytes, reducing inflammatory response and promoting myocardial repair. Clinical observations show that the comprehensive treatment approach based on the concept of TCM evidence-based therapy not only improves the overall symptoms of AMI patients, but also significantly reduces the risk of complications and enhances the quality of life of patients. It

was found that TCM demonstrated its unique advantages in the reconstruction of coronary blood flow, the prevention and control of ventricular remodeling, and the improvement of cardiac function, providing patients with comprehensive and personalized treatment options. With the deep integration of Chinese medicine and modern medical theories and techniques, a unique new model of combined Chinese and Western medicine in the treatment of acute myocardial infarction has been formed, which not only demonstrates the great potential of Chinese medicine in the field of AMI treatment, but also provides new ideas for future research directions and modernization of traditional medicine.

2. Status of Research

2.1 Overview of Treatment Options for Acute Myocardial Infarction

The burden of cardiovascular disease continues to increase globally, with acute myocardial infarction (AMI) as one of the severe types with high morbidity and mortality rates. In the face of the serious consequences of AMI, researchers have been exploring more effective treatments. Traditional Western medical treatments, including emergency coronary intervention (PCI) and drug therapy, have become the mainstay of acute myocardial infarction (AMI) treatment. PCI mechanically opens up occluded blood vessels and restores blood supply to the myocardium, greatly reducing the extent of the infarcted area and dramatically improving the patient's prognosis. In addition, medications such as antiplatelet agents, beta-blockers, and angiotensin-converting enzyme inhibitors further reduce the risk of AMI recurrence and have a positive effect on cardiac reconstruction. However, PCI is not suitable for all patients, and many patients are unable to receive interventional therapy due to comorbidities and other reasons; and long-term use of drug therapy may bring adverse effects and drug-drug interactions problems [3]. The use of drug therapy in the long term may bring problems of adverse effects and drug-drug interactions. In addition, the management of the sequelae of myocardial infarction and the improvement of patients' quality of life are also urgent issues

that need to be addressed in the treatment process. Therefore, the search for more comprehensive and personalized treatment strategies has become a hot topic and trend in current research. Traditional Chinese medicine (TCM) has shown unique value in the comprehensive treatment of AMI due to its unique dialectical approach. After the acute stage of AMI patients is effectively controlled, TCM evidence-based treatment is often used in the recovery stage of the disease, with the aim of achieving regeneration and functional repair through harmonization therapy. A series of studies have shown that TCM prescriptions, such as Shengmu injection and Fuxin anti-decay injection, can effectively benefit qi and nourish yin, restore veins and stabilize detachment [4]. In addition, it is also effective in activating blood vessels and removing stasis. In addition, TCM treatment modalities such as activating collaterals and removing blood stasis, clearing the heart and detoxifying toxins have also been continuously explored and validated. For example, Zheng Huibei categorized AMI into three stages of symptoms, proposed different treatment strategies and prescriptions for the initial, intermediate and recovery phases, and explicitly pointed out that qi and blood stasis was the main line of pathology [5]. He also clearly pointed out that qi and blood stagnation was the main line of pathology. This therapeutic mode of interpenetration and mutual promotion between TCM theories and modern medicine makes up for the inadequacy of single Western medicine treatment in myocardial repair and functional reconstruction, and at the same time enriches the scope of application of traditional Chinese medicine therapies. In addition, the multi-component and multi-target characteristics of TCM also require modern medical researchers to adopt more precise and systematic scientific methods to evaluate its mechanism of action and clinical effects. In the future, with the deepening of the theory and further expansion of the practice of combining Chinese and Western medicine, the clinical application of TCM in the treatment of myocardial infarction will form a more complete treatment system, meet the needs of personalized medicine, and provide a more solid theoretical support and practical guidance for the improvement of the quality of life of patients with cardiovascular disease.

2.2 Review of Studies on TCM Treatment of Acute Myocardial Infarction

Studies on Chinese medicine in the treatment of AMI have been gradually incorporated into the system of scientific research and continue to demonstrate its unique therapeutic advantages. Recent studies have not only focused on the therapeutic effects of single or compound Chinese medicines on AMI, but also explored the therapeutic mechanism of Chinese medicines and how they play a role in the aspects of vascular neovascularization, cardiomyocyte protection and cardiac rhythm adjustment. In the treatment of AMI, Chinese medicine theory suggests that the etiology of AMI is mainly related to "blood stasis" and "qi stagnation and blood stasis", and the corresponding therapeutic approach focuses on "activating blood circulation and removing blood stasis" and "promoting qi flow and collateral circulation". Under the guidance of this theory, researchers have carried out in-depth experimental studies and clinical observations, and verified that Chinese medicinal herbs including *Salvia Miltiorrhiza* and *Astragalus* and their active ingredients have positive

effects on the restoration of coronary blood flow, the alleviation of inflammatory reaction of cells in the infarcted area of the myocardium and myocardial repair [5][6]. In addition, in the pathophysiological process of ventricular remodeling and arrhythmia triggered by acute myocardial infarction, TCM treatment is able to restore and maintain cardiovascular and cerebrovascular health by adjusting the balance of yin and yang and the operation of the five elements in the body. The results of animal models and in vitro cellular experiments show that TCM can effectively inhibit the inflammatory infiltration of cardiomyocytes in the infarcted area, reduce the fibrotic process, and promote the repair and functional recovery of damaged myocardium [4][7]. Studies have shown that the treatment of AMI with TCM has significant effects in reducing the patient's morbidity and mortality and improving the quality of life, which provides important evidence for the application of TCM in the field of modern cardiovascular disease prevention and treatment. Clinical research data further confirm that the overall symptoms of AMI patients can be significantly improved and the risk of complications can be reduced by adopting a personalized TCM treatment plan through TCM evidence-based treatment [8]. Taking into account the results of various studies, the mechanism of TCM in the treatment of AMI is becoming clearer, demonstrating the potential for modernizing the use of traditional Chinese medicine combinations and proprietary Chinese medicines. At the same time, studies have also pointed out that the combination of Chinese and Western medicine in the treatment of AMI is becoming more mature, providing patients with more systematic treatment options. Overall, modern studies on the treatment of AMI with TCM have confirmed its value in the field of medical science, providing more treatment options for clinical medicine and promoting the modernization of traditional medicine.

3. Analysis of the Therapeutic Mechanism of Chinese Medicine

3.1 Mechanisms of Action of Chinese Herbal Medicinal Components

Traditional Chinese medicine (TCM) has gradually shown its unique advantages in the field of cardiovascular disease treatment, especially in the treatment of AMI, where the medicinal components of TCM have become a research hotspot by promoting angiogenesis, enhancing myocardial regeneration and repair, and alleviating inflammatory response. According to TCM theory, by activating blood circulation and removing blood stasis, it can effectively promote the repair and functional recovery of myocardium after injury. One of the widely used Chinese medicines is *Salvia divinorum*. According to *The Essentials of the Golden Chamber*, *Salvia miltiorrhiza* has the efficacy of activating blood circulation and removing blood stasis, and is able to improve blood circulation in the heart [9] and modern research has also confirmed that *Salvia miltiorrhiza* can improve blood circulation in the heart. Modern research has also confirmed that the active ingredients in *Salvia miltiorrhiza* have positive effects on inhibiting platelet aggregation, promoting coronary artery dilatation and protecting cardiomyocytes. In addition to *Salvia miltiorrhiza*, Chinese medicines such as *Rhizoma Coptidis* and *Rhizoma*

Ligustici Chuanxiong have also been widely used in the treatment of acute myocardial infarction [10] Yellow rhizome has the efficacy of clearing heat and removing toxins. Huanglian has the effect of clearing heat and removing toxins, which can reduce the inflammatory response in the body and protect cardiomyocytes from further damage. Chuanxiong, on the other hand, can activate blood circulation and remove blood stasis, improve blood circulation in the heart, and reduce the occurrence of myocardial ischemia and necrosis. In addition, modern studies have confirmed that various Chinese herbal ingredients such as danshensu and astragaloside can significantly enhance the expression of vascular endothelial growth factor (VEGF) and activate angiogenesis-related signaling pathways, thereby promoting microvascular proliferation in the area of myocardial infarction [6]. In addition, by affecting the microenvironment of stem cells, herbal components not only promote the ability of stem cells to vascularize and regenerate, but also improve the transduction of cell signaling molecules such as miRNAs, which can be efficiently transmitted between cardiomyocytes via exosomes and activate downstream repair signaling pathways [6] The effect of the cell signaling molecules on the cardiomyocytes was also improved. At the level of antioxidant protection of cardiomyocytes, studies such as magnesium tanshinone IIA sulfonate have shown that it can effectively reduce the extent of myocardial infarction, reflecting its protective effect on acute myocardial infarction by enhancing the activity of superoxide dismutase (SOD) and decreasing the content of malondialdehyde (MDA), and this protective mechanism is closely related to its antioxidant free radical action [11]. This protective mechanism is closely related to its antioxidant free radical effect. The above studies illustrate the mechanism of action of TCM components in the treatment of myocardial infarction, and provide a scientific basis and research direction for future in-depth exploration of the potential value of TCM in the treatment of cardiovascular diseases. Although the current study has made progress in analyzing the mechanism of vascular regeneration promoted by the pharmacodynamic components of traditional Chinese medicines, the comprehensive regulatory mechanism of multi-components, multi-targets and multi-pathways of traditional Chinese medicine formulations still needs to be explored in depth.

3.2 Efficacy of Meridian and Acupuncture Points Conditioning

As Chinese medicine increasingly shows its unique advantages in AMI treatment, the scientific explanation of the mechanism of action of meridians and acupoints conditioning has become a research focus. Starting from the meridian theory, traditional Chinese medicine considers human meridians as the pathways for qi and blood to run and an important system for regulating the balance relationship between yin and yang in the body. In the first aid and rehabilitation stage of AMI, through the stimulation and regulation of specific acupoints, the meridians can be unblocked to restore the smooth operation of qi and blood, and then effectively intervene in the heart function. Based on modern medical testing technology, the study reveals that acupuncture traction points can significantly improve the coronary blood flow status, increase the blood flow and blood oxygen content of the myocardium, and provide more

nutrients and oxygen for the ischemic myocardium [12]. In addition, acupuncture is able to regulate the function of the body's immune and endocrine systems through the central nervous system, thereby promoting the release of hormones such as endothelin and brain-derived neurotrophic factor, which helps to reduce the degree of damage to cardiomyocytes [13]. Studies have shown that acupuncture points such as Neiguan can reduce the extent of necrosis in cardiomyocytes after AMI, enhance their antioxidant capacity and anti-inflammatory effects, and further reduce the extent of inflammatory response due to reperfusion injury [6]. In addition, acupuncture can play a positive role in the treatment of myocardial infarction by regulating cardiomyocyte metabolism, improving cardiac neurological function, and promoting myocardial regeneration [14]. In addition to acupuncture stimulation, TCM Tui Na is a therapy that uses manipulation techniques to stimulate specific points and meridians in the body to improve the function of the cardiovascular system. In the treatment of acute myocardial infarction, acupoints commonly used in TCM massage include the dorsal acupoint, the cardiac acupoint, and the shenmen acupoint, etc. Among them, the dorsal acupoint is pushed by hand. Among these points, the hand-pushed Dorsal Yu point, located below the spinous process of the 6th thoracic vertebra on the back, is believed to regulate cardiac function and relieve myocardial infarction [15]. It has been found that TCM acupressure can improve indicators such as electrocardiogram and cardiac ultrasound, reduce myocardial injury and inflammatory response, help improve cardiac function, alleviate angina pectoris, palpitations and other symptoms, and improve the quality of life of patients [16]. In addition, TCM Tui Na also has the function of adjusting the neuroendocrine system and improving cardiovascular autonomic nervous function. Through the stimulation of Tui Na techniques, it can promote blood circulation, increase blood supply to the heart, and reduce the occurrence of myocardial ischemia and necrosis [17] The stimulation of Tui Na can promote blood circulation, increase blood supply to the heart and reduce the occurrence of myocardial ischemia and necrosis.

Overall, Chinese medicine realizes the holistic treatment of AMI through meridian and acupoint regulation, which comprehensively improves the treatment effect of AMI and the quality of life of patients. Its scientific mechanism has been supported and verified by modern medical research methods.

4. Comparison of Chinese and Western Medical Treatments

For the treatment of patients with myocardial infarction, traditional Western medicine monotherapy has achieved certain results, but clinical data show that the combination of TCM and Western medicine is more advantageous in improving patients' cardiac function, reducing the incidence of complications and improving the quality of life. In a comparative study of the effects of traditional Chinese medicine and modern Western medicine in the treatment of myocardial infarction, the huge difference also reveals the potential unique advantages of Chinese medicine treatment.

In treating myocardial infarction, Chinese medicine upholds

the concepts of holistic view and dialectical treatment, and regulates the etiology of the disease in an all-round manner through the multi-target and multi-pathway interventions of Chinese medicine compound. In the principle of treatment, TCM focuses on measures such as clearing heat and removing toxins, activating blood circulation and removing blood stasis, and warming yang to save the heart, which can promote the repair of infarcted area and the recovery of cardiac function by improving microcirculation, alleviating the state of cellular hypoxia, and preventing further necrosis of cardiac myocytes [3]. The potential value and mechanisms of Chinese herbs in the prevention and treatment of acute myocardial infarction have been demonstrated in the existing literature review, such as lowering blood lipids and improving blood rheological parameters through Chinese herbs, as well as having pleiotropic properties that provide both antioxidant and anti-inflammatory effects [7]. In contrast, Western medicine in the treatment of acute myocardial infarction tends to focus on the recanalization of diseased blood vessels and myocardial perfusion, as well as the application of antiplatelet drugs and β -blockers to minimize myocardial damage and improve long-term outcomes.

However, the clinical results achieved by combining Chinese and Western medicine in the treatment of AMI are significantly better than those achieved by Western medicine alone, both in terms of the rate of revascularization and the recovery of cardiac function [18]. The study showed that by comparing with Western medicine alone, the combined Studies have shown that by comparing with Western medicine treatment alone, patients who have integrated Chinese medicine treatment, their left ventricular ejection fraction (LVEF) was significantly higher, and the improvement of ventricular remodeling and function was more pronounced, suggesting that Chinese medicine has a unique benefit in improving cardiac functional status after myocardial infarction [3]. Specifically, the TCM-treated group outperformed the Western medicine-only group in key indicators such as left ventricular end-diastolic volume (LVEDV), left ventricular end-systolic volume (LVESV), and cardiac output (CO), and the improvement in these indicators directly affects the quality of survival and long-term prognosis of patients [3]. The improvement of these indexes directly affects the survival quality and long-term prognosis of the patients. Meanwhile, the combination of Chinese and Western medicine treatment also demonstrated high clinical value in reducing patients' adverse emotions and shortening hospitalization time [19]. The combination of Western medicine and traditional Chinese medicine treatment is not only beneficial to the psychological recovery of patients, but also reduces medical costs to a certain extent. Combining traditional Chinese medicine theories with modern medicine, TCM demonstrates unique therapeutic advantages and great potential in the treatment of AMI. Further, we observed that the combination of TCM treatment showed remarkable efficacy in the clinic, with a treatment effectiveness rate of 95.45%, while the effectiveness rate of the conventional treatment group was only 75%, and the difference between the two groups was statistically significant [20]. The difference between the two groups is statistically significant. Obviously, the combination of Chinese and Western medicine in the treatment of myocardial infarction is better than the single Western medicine treatment in terms of reducing the adverse

effects of treatment, improving the quality of life and reducing the mortality of patients.

5. Conclusion

Through the combination of modern medical technology, TCM has demonstrated unique advantages in the treatment of AMI, such as through the traditional techniques of activating blood circulation and removing blood stasis, warming the sun to save the blood, etc.; traditional Chinese medicinal ingredients such as *Salvia miltiorrhiza* and *Astragalus*, as well as the regulation of meridian acupoints through acupuncture and massage, etc., which have shown remarkable effects on improving coronary blood flow, protecting cardiomyocytes, reducing inflammatory reactions and promoting myocardial repair [8]. The following is a summary of the results of this study. In the face of complex and changing clinical situations, treatment with Chinese medicine has shown significant advantages in both theory and practice, and it can provide more personalized and multi-dimensional treatment plans, which are more in line with the needs of modern medicine's humanistic care and precision medicine. For patients, TCM not only shows good efficacy in relieving the sequelae of myocardial infarction, but also demonstrates great potential in promoting health recovery and improving the quality of life.

Fund Project

The effect of Mongolian medicine Dangong-3 on myocardial oxidative stress and the impact of PPAR α and CD36 factors in rats with acute myocardial infarction (YKD2022LH041). 2022 Youth Qihuang Scholar Training Program (National Traditional Chinese Medicine Renjiaohan [2022] No. 256) Inner Mongolia Autonomous Region Traditional Chinese Medicine (Mongolian Medicine) Young and Middle aged Leading Talent Cultivation Project (2022- [RC004]).

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