International Journal of Clinical Medicine & Pharmacology

https://doi.org/10.70731/625k6788

Integrated Traditional Chinese and Western Medicine in the Treatment of Heart Failure with Reduced Ejection Fraction Combined with Variant Angina: A Case Report

Siqi Li [a], Xiaowan Han [b], Lanjun Kou [b], Diying Zhang [a], Guozhong Pan [b,*]

[a] *Dongzhimen Hospital, Beijing University of Chinese Medicine, Beijing, China*
[b] *Second Department of Cardiology, Dongzhimen Hospital, Beijing University of Chinese Medicine, Beijing, China*

KEYWORDS

Heart Failure With Reduced Ejection Fraction, Variant Angina, Integration of Traditional Chinese and Western Medicine

ABSTRACT

This article reported a case of heart failure with reduced ejection fraction combined with Variant angina. The patient developed variant angina pectoris after taking the conventional Western medicines for heart failure with reduced ejection fraction. On the basis of adjusting the relevant medications, Zhishi Xiebai Guizhi Decoction and Guo Weiqin's Yiqi Xiefei Decoction were added, after which the cardiac function was improved, the left ventricular ejection fraction was increased, and the symptoms of chest tightness and pain did not recur.

1. Introduction

Heart failure (HF) encompasses a series of clinical syndromes such as dyspnea, fatigue, and fluid retention. Its main feature is systemic and/or pulmonary circulation congestion accompanied by inadequate perfusion of tissues and organs. Different cardiac structural or functional abnormalities can induce these symptoms by reducing the efficiency of the heart's pumping function and its metabolic demands.(1) This disease is a global epidemic. In 2017, the results of a study involving 50 million people aged 25 and above in six provinces in China showed that the incidence rate of HF was 1.10% for both genders, with a total of 12.1 million patients.(2) Heart failure with reduced ejection fraction (HFrEF), as one of the types, refers to that the left ventricular ejection fraction (LVEF) is ≤40%, which is most commonly caused by left ventricular dysfunction and clinically manifested as decreased cardiac output, myocardial hypertrophy, increased end-diastolic ventricular pressure and so on. A survey in the UK showed that the prevalence of HF with HFrEF among hospitalized patients with HF was 41%, and the mortality rate was as high as 47%, imposing a heavy burden on society and families.(3)

Variant angina (VA), also known as vasospastic angina or Prinzmetal's angina, is a special type of unstable angina. It mainly results from coronary artery spasm. During an attack, it can cause transient myocardial ischemia and trigger symptoms such as chest pain and chest tightness. The degree of pain is severe and the duration is variable. It often occurs suddenly during rest or daily activities.(4) Clinically, the incidence of VA also remains high. It has been reported that the prevalence of this disease ranges

* Corresponding author. E-mail address: panguozhong108@sina.com

Received 19 January 2025; Received in revised form 19 February 2025; Accepted 26 February 2025; Available online 28 February 2025.

from 33.4% to 57.6% in Western countries and from 40% to 79% in Asian countries.[5]

The traditional drug treatment for HF is the "new quadruple" therapy, namely renin-angiotensin system inhibitors, beta-blockers (BB) , mineralocorticoid receptor antagonists, and sodium-glucose cotransporter 2 inhibitors. Recently, the Heart Failure Association of the European Society of Cardiology released a clinical consensus on the management of heart failure exacerbation, pointing out that vericiguat has the potential to reduce the risk of cardiovascular death or hospitalization after exacerbation in patients with HFrEF. It is recommended that symptomatic patients with a LVEF < 45% should add vericiguat on the basis of the "HFrEF quadruple treatment" after a heart failure exacerbation event.[6] It can be seen that the current clinical drug treatment for HFrEF has gradually shifted from the "new quadruple" therapy to the "new five-combination" therapy. However, the clinical use of these drugs may all lead to hypotension, resulting in inadequate perfusion of tissues and organs. For VA caused by transient coronary artery stenosis due to coronary artery vasoconstriction and resulting in insufficient blood perfusion, the decrease in blood pressure leads to myocardial ischemia and will further aggravate this spasm. Meanwhile, BB inhibit the vasodilatory effect of beta-receptors on coronary arteries, which makes the excitation of alpha-receptors more significant, so that it is difficult to relieve coronary artery spasm.

Therefore, for patients with HFrEF combined with VA, when contradictions arise in Western medicine treatment, turning to traditional Chinese medicine (TCM) decoctions is a good strategy. Based on this, this article reviews a valid medical record of a patient with HFrEF combined with VA who was treated with a clinical integrated traditional Chinese and Western medicine regimen. The details are as follows.

2. Case Introduction

2.1. Chief Complaint

Mr. Wang, male, 53 years old, was admitted to the hospital due to “intermittent chest tightness and shortness of breath for 10 days”.

2.2. Present Medical History

On August 20, 2024, the patient experienced chest tightness, shortness of breath, weakness and fainted after drinking alcohol. He was conscious and visited the emergency department of a certain hospital in Beijing. The troponin level was found to be 30 ng/ml (normal range: 0 - 17.5). After receiving drug treatment, the symptoms were relieved and the patient refused hospitalization. Since then, the patient had experienced chest tightness and shortness of breath during daily activities, which could relieve spontaneously after about 30 minutes without taking any medication for control. On August 30, the patient had another episode of chest tightness and shortness of breath, with a blood pressure of 170/125 mmHg. He then came to our hospital for hospitalization.

2.3. Past Medical History

The patient had a 15-year history of hypertension, with the highest blood pressure reaching 180/120 mmHg. He regularly took Yufeng Ningxin Capsules orally but did not monitor his blood pressure regularly. He denied a history of coronary heart disease, hyperlipidemia, diabetes mellitus, etc. He had undergone resection of bladder cancer 21 years ago.

2.4. Personal and Family History

He had a 30-year smoking history and had not quit, with an average of 20 - 30 cigarettes per day. He had a 10-year drinking history and had not quit, with an average of 3 liang per day. His mother had a history of hypertension.

2.5. Traditional Chinese Medicine Four Diagnostic Methods

The patient looked listless, was short of breath and disinclined to speak. H His facial complexion and lip color were dark purple. He had frequent urination with light yellow color, and his stools were loose. He had difficulty falling asleep. His tongue was pale, white and tender, with a thick white greasy coating and cracks in the middle. The sublingual collateral vessels were dark-red without significant distension. The pulse was wiry and slippery.

2.6. Physical Examination

Body temperature was 36 °C, heart rate was 92 beats per minute, respiration rate was 18 breaths per minute, and blood pressure was 156/94 mmHg. The breath sounds of both lungs were clear, and no obvious dry or wet rales were heard. The heart rhythm was regular, and no pathological murmurs were heard in each valve. The skin on the feet was desquamating, and there was mild edema in both lower limbs. No other obvious abnormalities were found during the rest of the physical examination.

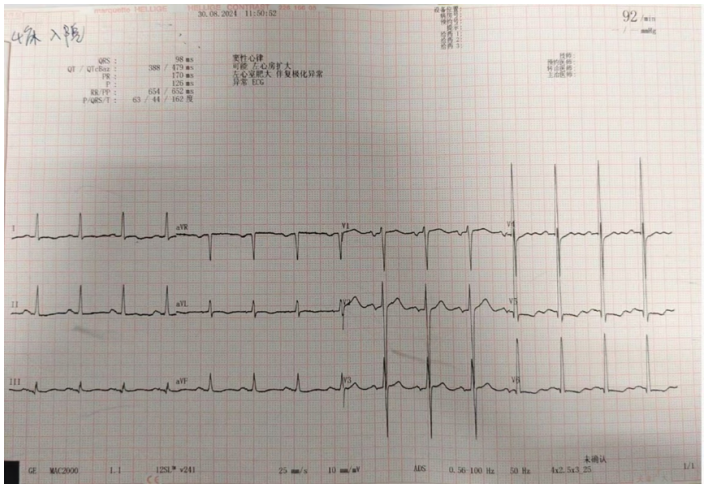

Figure 1 l Electrocardiogram on admission

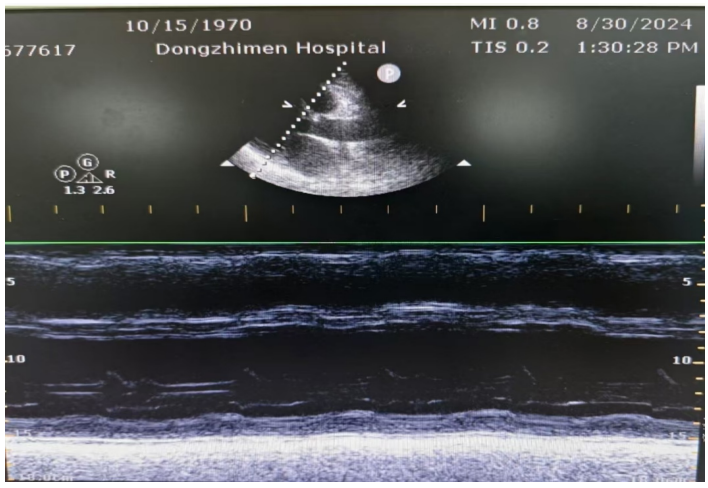

Figure 2 l Echocardiogram on admission

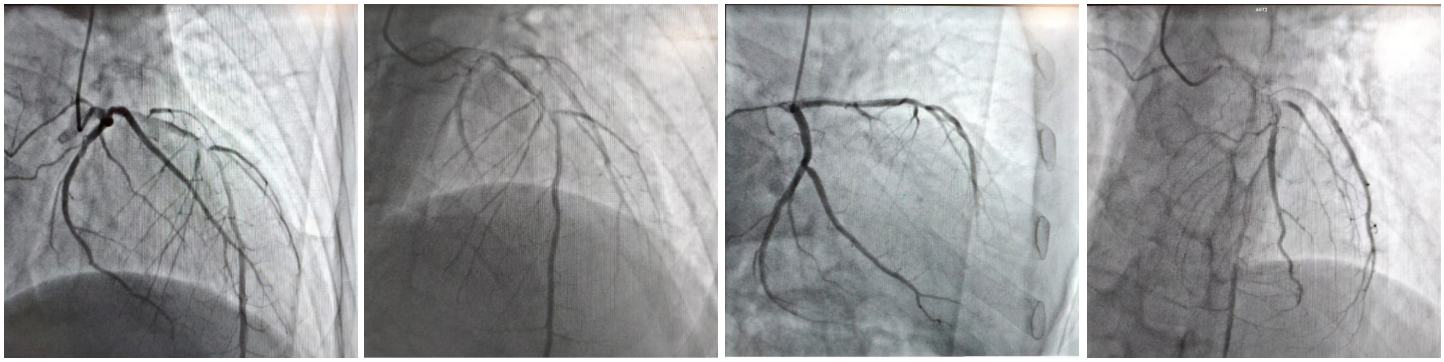

Figure 3 l Coronary Angiography on Admission

2.7. Laboratory Tests

Blood Routine: white blood cell count was 7.56×10^9/L, percentage of neutrophils was 84.2%, red blood cell count was 4.84×10^{12}/L, hemoglobin was 149 g/L, platelet count was 184×10^9/L, and C-reactive protein was 5.74 mg/L.

Blood Biochemistry: serum creatinine was 112 μmol/L, urea was 6.4 mmol/L, uric acid was 581 μmol/L, blood potassium was 3.52 mmol/L, blood sodium was 134 mmol/L, blood calcium was 2.32 mmol/L. Blood Lipids: Total cholesterol was 4.49 mmol/L, triglyceride was 1.57 mmol/L, low-density lipoprotein cholesterol was 3.14 mmol/L, and high-density lipoprotein cholesterol was 1.12 mmol/L.

Myocardial Injury Markers: creatine kinase isoenzyme was 1.7 U/L, troponin I (cTnI) was 0.0221 ng/mL; B-type natriuretic peptide (BNP) was 3214 pg/mL.

2.8. Examinations

The electrocardiogram (ECG) showed sinus rhythm, with a heart rate of 92 beats per minute and regular rhythm. The T waves in leads I, avL, V5, and V6 were inverted (Figure 1).

The echocardiogram showed that the left atrial end-diastolic diameter was 59 mm, the interventricular septum thickness was 10 mm, the left ventricular posterior wall thickness was 10 mm, and the LVEF was 32%. The average E/e' was 24.5, suggesting enlargement of the left heart and right atrium, generally decreased ventricular wall motion, mild to moderate mitral insufficiency, moderate tricuspid insufficiency, mild pulmonary hypertension, and decreased left ventricular function (Figure 2).

Coronary angiography revealed a 50% stenosis in the middle segment of the left anterior descending artery and a 70% stenosis at the opening of the left circumflex artery OM1 (Figure 3).

2.9. Diagnosis

The admission diagnoses were as follows:

Western Medicine Diagnosis:

(1) Coronary atherosclerotic heart disease;

(2) Heart failure with reduced ejection fraction, cardiac function grade III (NYHA classification);

Figure 4 | Tongue manifestation during the onset of variant angina

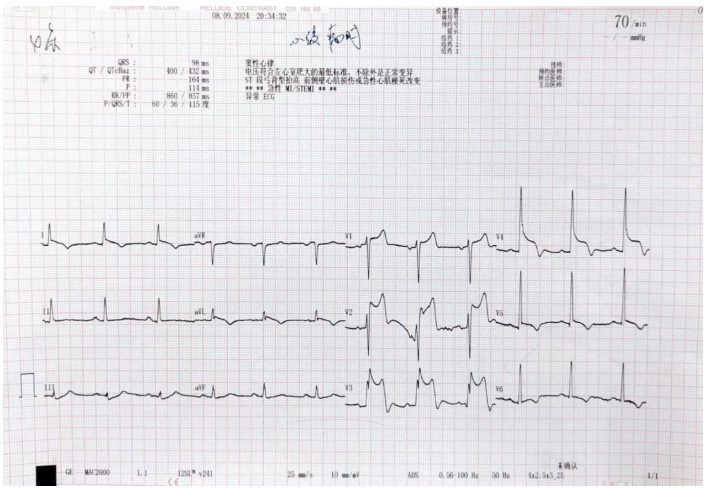

Figure 5 | Electrocardiogram during the onset of variant angina.

(3) Hypertension grade 3 (very high risk);
(4) After bladder surgery;
(5) Tinea pedis.

TCM Diagnosis: Chest pain and heartache, syndrome of qi deficiency, phlegm and blood stasis blocking the collaterals.

2.10.Treatment Plan

In terms of Western medicine, for coronary atherosclerotic heart disease, considering the results of coronary angiography, conservative drug treatment was adopted. The patient was given isosorbide mononitrate at a dose of 20 mg twice a day, enteric-coated aspirin tablets at 100 mg once a day, clopidogrel bisulfate at 75 mg once a day, and atorvastatin calcium at 20 mg once a night. Since the patient's LVEF was 32% and the diagnosis of HFrEF was clear, the "new five-combination" regimen was gradually implemented. The specific drugs included sacubitril/valsartan sodium tablets at 100 mg once a day, metoprolol tartrate at 25 mg twice a day, dapagliflozin at 10 mg once a day, spironolactone at 20 mg once a day, furosemide at 20 mg once a day, and vericiguat tablets at 2.5 mg once a day. Given that the patient's basal heart rate still fluctuated around 90 beats per minute after using metoprolol tartrate, extended-release metoprolol succinate tablets at 47.5 mg once a day were added.

In terms of TCM, appropriate TCM techniques such as acupoint application, auricular point pellet pressing, and wax application therapy were used in combination.

2.11.Disease Progression

On September 8th, the patient experienced severe chest tightness and shortness of breath without obvious precipitating factors while at rest. There was also intense stabbing pain under the xiphoid process, which was aggravated after physical activity, accompanied by radiating pain in the shoulder and back, palpitations, sweating, vomiting (the vomitus was gastric contents), cold limbs, a dark red tongue, a thick white greasy coating with a slightly yellowish root (Figure 4), and a wiry and tight pulse. The blood pressure was 90/60 mmHg. The N-terminal pro-B-type natriuretic peptide (NT-proBNP) was 2273 pg/ml. The blood potassium level was 4.46 mmol/L, the blood sodium level was 136.1 mmol/L, the creatinine level was 226 μmol/L, the alanine aminotransferase level was 19.9 U/L, and the aspartate aminotransferase level was 14.8 U/L. The electrocardiogram showed sinus rhythm, with a heart rate of 70 beats per minute and regular rhythm. The ST segments in leads V_{1-5} were significantly elevated, and the inversion of the T waves in leads I, avL, V_5, and V_6 was deepened (Figure 5).

We suspected that the patient had developed VA and acute kidney injury. Promptly, 0.5 mg of nitroglycerin was administered sublingually. Meanwhile, metoprolol tartrate, metoprolol succinate, sacubitril/valsartan sodium, and spironolactone were discontinued. In parallel, TCM decoctions were introduced into the treatment regimen. Firstly, a modified version of Zhishi Xiebai Guizhi Decoction (ZSXBGZ) was prescribed to invigorate blood circulation, promote qi flow, dredge yang and alleviate chest obstruction. The specific medications and their dosages were as

follows: stir-fried Fructus Aurantii Immaturus (15 g), Allium macrostemon (20 g), Ramulus Cinnamomi (10 g), Magnolia officinalis processed with ginger (20 g), Fructus Trichosanthis (15 g), Rhizoma Coptidis tablets (9 g), Rhizoma Zingiberis (10 g), Poria (15 g), Radix et Rhizoma Rhei (processed with wine and added at the end) (6 g), Radix Salviae Miltiorrhizae (30 g), Lignum Santali Albi (9 g), Fructus Amomi (10 g), Pheretima (10 g), Rhizoma Curcumae (processed with vinegar) (20 g). Subsequently, the modified Guo Weiqin's Yiqi Xiefei Decoction (YQXF) was given to tonify qi and warm yang, activate blood circulation to remove blood stasis, and drain the lung to promote diuresis. The detailed drug prescriptions and dosages were: Radix Codonopsis tablets (15 g), raw Radix Astragali (20 g), Cortex Mori (processed with honey) (12 g), Semen Lepidii (6 g), Herba Lycopi (6 g), Poria (15 g), Polyporus (15 g), Bambusa textilis McClure (6 g), raw Semen Coicis (30 g), Pericarpium Citri Reticulatae (12 g), Pinellia ternata processed with ginger (12 g), Fructus Jujubae (15 g), Radix Glycyrrhizae Praeparata (6 g).

After one week of treatment, the reexamination results were as follows: Blood pressure was 135/89 mmHg, NT-proBNP was 598.2 pg/ml, with blood potassium at 4.14 mmol/L, blood sodium at 136.9 mmol/L, creatinine at 214 μmol/L, alanine aminotransferase at 18.8 U/L, and aspartate aminotransferase at 14.6 U/L. The electrocardiogram showed sinus rhythm, a heart rate of 67 beats/minute and regular rhythm, with ST segments in leads $V_{1\text{-}5}$ having fallen back and the depression of T waves in leads I, avL, V_5, and V_6 alleviated, returning to the admission level (Figure 6). The echocardiogram indicated that the left ventricular end-diastolic diameter was 56 mm, the interventricular septum thickness was 8 mm, the left ventricular posterior wall thickness was 10 mm, and the LVEF was 41%, suggesting left heart enlargement, reduced motion amplitudes of the septum and anterior wall, mild mitral and tricuspid regurgitation, and decreased left ventricular function (Figure 7). The tongue was light purple with a less white and greasy coating than before (Figure 8). After discharge, the patient continued on YQXF. Two weeks later, during follow-up, the patient reported no recurrence of chest tightness, pain, fatigue or shortness of breath. Cardiac MRI results from another hospital showed an LVEF of 40%, demonstrating the obvious effectiveness of the TCM treatment.

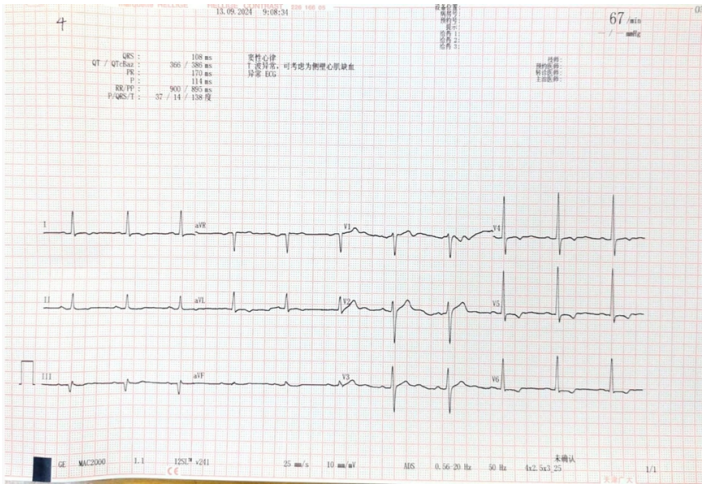

Figure 6 | Electrocardiogram after treatment with traditional Chinese medicine

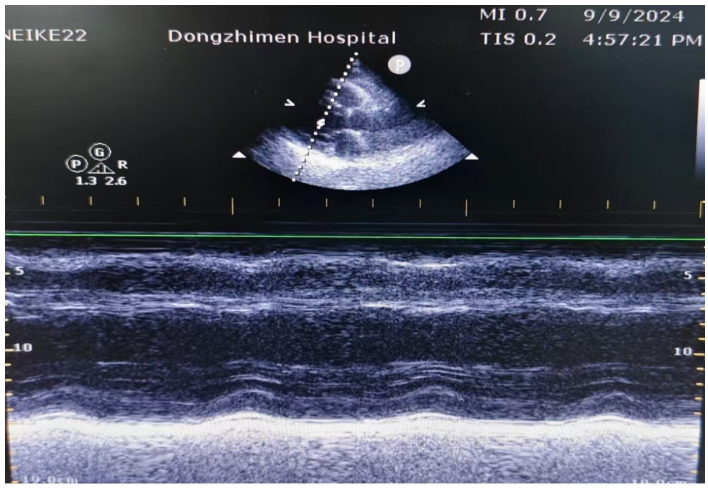

Figure 7 | Echocardiogram after treatment with traditional Chinese medicine

Figure 8 | Tongue manifestation after treatment with traditional Chinese medicine

3. Discussion

3.1. The Contradictions in Western Medicine Treatment

On September 8th, the patient suddenly developed VA complicated by acute kidney injury. Considering the disease characteristics and the patient's treatment regimen, it was speculated that the patient had not developed tolerance to the "new five-combination" drugs, resulting in hypotension and insufficient body perfusion. The HARP-III trial in the UK pointed out that compared with irbesartan, sacubitril/valsartan sodium can reduce the mean systolic and diastolic blood pressures by 5.4 mmHg and 2.1 mmHg respectively through dual inhibition of neprilysin and the renin-angiotensin system.[7] When combined with BB, the hypotensive effect is even more pronounced. Excessively low blood pressure fails to maintain the body's blood circulation, leading to myocardial ischemia and inducing VA. There is evidence suggesting that BB without alpha-1-adrenergic antagonist activity may be harmful to VA by exacerbating coronary epicardial vasospasm. This is due to the antagonistic effect on beta-2-adrenergic receptors, which leads to unopposed activation of alpha-1-adrenergic receptors, thereby enhancing the vasoconstrictive response to sympathetic stimulation. Therefore, it is advisable to avoid their use in VA.[8]

The crux of VA treatment lies in alleviating coronary artery spasm. Calcium channel blockers (CCB) are the commonly prescribed medications, which function by impeding the entry of calcium ions into vascular smooth muscle cells. This leads to the relaxation of vascular smooth muscle, subsequently resulting in the dilation of coronary arteries, the relief of spasms, and the augmentation of coronary blood flow.[9] In the context of patients with HFrEF, the application of CCB demands prudence. Certain CCB variants can exert detrimental effects on cardiac function, particularly those possessing negative inotropic properties. For instance, non-dihydropyridine CCBs, while effectuating coronary artery dilation, concomitantly suppress myocardial contractility, curtail cardiac output, and exacerbate heart failure symptoms.[10] Although dihydropyridine CCBs exhibit a relatively milder inhibitory impact on myocardial contractility, they may precipitate reflex tachycardia, augment myocardial oxygen consumption, and potentially engender adverse consequences for patients with HFrEF as well.[11]

One of the cornerstone drugs for the treatment of HFrEF is BB. They can improve patients' survival rates and quality of life by slowing down the heart rate, reducing myocardial oxygen consumption and improving myocardial remodeling.[10] For patients with both HFrEF and VA, if BB are overused to control the heart rate and improve heart failure, the frequency and severity of angina attacks may increase. However, reducing the use of beta-blockers to avoid inducing coronary artery spasms will affect the treatment effect of HFrEF and miss the opportunity to improve cardiac remodeling and prognosis.

For patients with HFrEF, strengthening myocardial contractility is an important aspect of improving cardiac function. In some cases, positive inotropic drugs, such as digitalis drugs (digoxin), will be used. Digoxin can inhibit the Na^+- K^+- ATPase on the myocardial cell membrane, increase the intracellular sodium ion concentration, and then promote the influx of calcium ions, enhance myocardial contractility and increase cardiac output.[12] In the treatment of VA, the focus is on improving myocardial blood supply. Excessively strengthening myocardial contractility may increase myocardial oxygen consumption. Digoxin may increase systemic vascular resistance due to its direct arteriolar vasoconstrictive effect, which will reduce coronary blood flow and exacerbate myocardial damage.[13]

Given the contradictions in Western medicine treatment for HFrEF combined with VA, TCM has caught our attention due to its unique advantages of holistic regulation and multi-target effects. Based on syndrome differentiation and treatment, TCM starts from aspects like invigorating qi, activating blood circulation, and warming and dredging meridians. It can improve myocardial blood supply, relieve coronary artery spasm, regulate cardiac function, enhance the body's healthy qi, and reduce the adverse reactions of Western medicine, thus opening up a new way for treating such complex cardiovascular diseases.

3.2. Traditional Chinese Medicine's Understanding of the Disease

TCM's understanding of HF originated from the "Huangdi Neijing", which states that "Those with heart distension will have an irritable mood, shortness of breath and be unable to sleep peacefully." It described the clinical features of heart failure and defined such symptoms as "heart distension". Meanwhile, it was pointed out that emotions, external pathogenic factors and so on could all affect cardiac func-

tion. Zhang Zhongjing creatively put forward the term "heart water" on the basis of his predecessors' work. The main characteristics of patients with this condition were "a sense of heaviness in the body, shortness of breath and inability to lie down". The main causes of the disease were deficiency of heart qi and deficiency of heart yang, which led to the overflow of water and dampness, as well as blood stasis. And he left behind classic prescriptions such as Shenfu Decoction, Zhigancao Decoction and Zhenwu Decoction for later generations. The "Mai Jing" written by Wang Shuhe first mentioned the disease name of "heart failure" in traditional Chinese medicine literature and discussed the characteristics of the pulse manifestations and treatment methods of HF. It said that "When the heart fails, the pulse will be hidden; when the liver qi is weak, the pulse will be deep. Therefore, the pulse is hidden and deep." Later generations, based on the experience of predecessors, summarized the main pathogenesis of HF as deficiency of heart qi, weakness of heart yang, deficiency of lung and spleen qi, retention of phlegm-fluid inside the body, and internal obstruction of blood stasis. And they also put forward treatment methods such as tonifying qi and nourishing the heart, warming yang and promoting diuresis, activating blood circulation to remove blood stasis, and resolving phlegm and expelling dampness.

In the theory of TCM, VA falls into the categories of "chest impediment", "true heart pain", and "syncope-induced heart pain". Records about VA can be traced back to the "Huangdi Neijing". For example, in the "Jue Bing" chapter of the "Ling Shu", it is mentioned that "For true heart pain, the hands and feet turn bluish up to the joints, the heart pain is severe, and those suffering from it may die in the evening if it occurs in the morning, or die in the morning if it occurs in the evening." The severity and critical prognosis of true heart pain described here are similar to the severe chest pain and the feeling of impending death during a VA attack, initially revealing the critical situation of sudden severe pain in the heart and the disorder of qi and blood. Later physicians continuously deepened their understanding on this basis. The "Zhu Bing Yuan Hou Lun" in the Sui and Tang Dynasties mentioned that "For the symptoms of chest impediment, there is a feeling of fullness in the chest as if stuffed, with a sense of blockage and discomfort, a tickling sensation, a dry and rough feeling in the throat, and spitting out dry froth." It vividly depicted the symptoms of chest stuffiness and qi stagnation, which are similar to the feeling of chest tightness before a VA attack, laying a foundation for further exploration of this disease. The main pathogenesis of VA is internal obstruction by blood stasis, which is mostly caused by the invasion of cold pathogens and emotional disorders. The common treatment methods include expelling cold and unblocking yang, soothing the liver and regulating qi, resolving phlegm and draining turbidity, and activating blood circulation to remove blood stasis.

3.3. Treatment Strategies in Traditional Chinese Medicine

3.3.1. Syndrome Analysis in Traditional Chinese Medicine

3.3.1.1. At the Time of Admission

The following is an analysis based on the symptoms of TCM when the patient was admitted to the hospital.

Lethargy is one of the typical manifestations of qi deficiency. Qi is the driving force for the vital activities of the human body. When there is qi deficiency, the functional activities of the body will be weakened and it will be unable to maintain a normal mental state. Shortness of breath and reluctance to talk reflect that the patient lacks qi and is thus powerless. Speech can only be carried out normally with the impetus of qi. When there is qi deficiency, there will be insufficient strength for speaking. These two symptoms indicate that the healthy qi in the human body is insufficient and the functions of qi in promoting, warming and so on are weakened. The normal color of the tongue should be light red. A pale tongue indicates that qi and blood fail to nourish the tongue. And the tenderness of the tongue body is due to qi deficiency, as the tongue body cannot obtain sufficient nourishment from qi.

The dark purple complexion and lip color serve as significant external indicators of blood stasis. In cases of blood stasis, qi and blood are unable to flow freely to reach the face and lips. As a result, the stagnated blood manifests as a dark purple hue. The sublingual collaterals' dark red appearance implies the presence of blood stasis within the body. Even though there isn't prominent dilation, the dark red shade already signals that the blood circulation is impeded and shows a propensity for stagnation.

A thick, white and greasy tongue coating is a typical tongue manifestation of phlegm-dampness retention within the body. The pathogenic factors of phlegm-dampness block the spleen, stomach or other

zang-fu organs and meridians, causing the dysfunction of the spleen and stomach in transportation and transformation, and impairing the metabolism of water and dampness. As a result, the turbid qi ascends and spreads onto the tongue. The presence of cracks in the middle of the tongue coating is due to the blockage of phlegm-dampness, which prevents qi, blood, and body fluids from nourishing the tongue. When phlegm-dampness impairs the spleen, the normal function of the spleen in transportation and transformation is disrupted, and the essence of food and water cannot be properly digested and absorbed, leading to loose stools. Phlegm-dampness also blocks qi movement, giving rise to a wiry and slippery pulse.

In the theory of TCM, the kidney and the bladder are externally and internally related, and the kidney yang plays a role in steaming and transforming. When the kidney yang is insufficient, the qi transformation function of the bladder becomes abnormal and it fails to control urine properly, resulting in frequent urination. The light yellow color of the urine indicates that there is no obvious heat sign in the body. Conditions such as qi and blood deficiency and internal blockage by phlegm-dampness can all affect the mind and spirit, leading to sleep disorders.

To sum up, the syndrome of the patient at the time of admission was deficiency of heart yang qi, blood stasis, and internal blockage by phlegm-dampness.

3.3.1.2.During the Progression of the Disease

When alterations occur in the patient's condition, the presence of severe chest distress, pectoral pain, and frigid extremities indicates that yang deficiency engenders cold, and cold congelation induces qi stagnation. Yang deficiency serves as the fundamental basis of this syndrome. In the human body, yang qi plays crucial roles in warming and propelling physiological processes. When yang qi becomes deficient and debilitated, the warming capacity wanes, giving rise to cold manifestations such as cold limbs. Insufficient heart yang fails to effectively impel the circulation of qi and blood, leading to the endogenous generation of cold pathogen which then congeals in the thoracic region. The thorax, being the abode of the heart and lungs, experiences impeded qi and blood flow when cold congeals and induces qi stagnation, thereby resulting in chest distress. The intense pain stems from the fact that the cold-congealing pathogen obstructs the cardiac vessels, rendering the qi and blood within them occluded. According to the principles of traditional Chinese medicine, "obstruction begets pain", and the pain caused by yang deficiency and cold congelation is typically rather acute. A thick, white, and greasy tongue coating with a faintly yellowish radix intimates that phlegm turbidity exhibits signs of transforming into heat due to stagnation. Prolonged accumulation of phlegm turbidity within the body obstructs qi movement, and when qi becomes stagnant, it is prone to transforming into heat. Nevertheless, from an overall perspective, yang deficiency and phlegm turbidity remain preponderant, and the slightly yellowish radix represents merely a localized manifestation of heat transformation.

The dusky red tongue and wiry-taut pulse mirror yang deficiency and blood stasis. The tongue, regarded as the outgrowth of the heart, reflects the stagnation of heart blood as a dusky red coloration on its surface, which is the consequence of the combined influence of feeble propulsion due to yang deficiency and blockade by phlegm turbidity. The wiry-taut pulse comprehensively reflects the pathological state of yang deficiency and cold congelation, internal occlusion by phlegm turbidity, and impeded flow of qi and blood.

In summary, during the progression of the patient's illness, the root lies in the deficiency of heart yang qi, while the manifestations encompass blood stasis and internal blockage by phlegm-dampness, accompanied by a propensity for heat transformation, characterizing a condition of root debility and branch excess.

3.3.2. Thoughts on the Selection of Prescriptions

The "Synopsis of the Golden Chamber" says, "When taking the pulse, one should observe the excessive and insufficient aspects. When the yang pulse is weak and the yin pulse is wiry, it indicates chest impediment accompanied by pain.... The ZSXBGZ should be used as the principal one." It is pointed out that during the acute stage of the onset of chest impediment and heart pain, the ZSXBGZ has a rather good curative effect. Allium macrostemon, Ramulus Cinnamomi and Rhizoma Zingiberis can warm and unblock heart yang, dispel cold and relieve pain. Among them, Allium macrostemon can unblock yang and dissipate masses; Ramulus Cinnamomi can assist yang in transforming qi and warm and unblock the meridians; Rhizoma Zingiberis can warm the middle jiao to dispel cold and restore yang to unblock the vessels. The combination of these three can effectively relieve the symptoms of chest pain and cold limbs caused by cold congealing. Lignum Santali Albi

and Fructus Amomi can promote qi movement and relieve pain, enhance the power of qi movement, make qi movement smooth and relieve chest tightness. Stir-fried Fructus Aurantii Immaturus and Magnolia officinalis processed with ginger can regulate qi and promote qi movement, improving the condition of weak qi and blood circulation caused by qi deficiency. Radix Salviae Miltiorrhizae, Pheretima and Rhizoma Curcumae can activate blood circulation to remove blood stasis. Meanwhile, Pheretima has a good effect on dredging the meridians and activating collaterals for the blockage of heart vessels. Fructus Trichosanthis can clear heat, remove phlegm, relieve chest stuffiness and dissipate masses. Poria can promote diuresis and drain dampness as well as strengthen the spleen. Rhizoma Coptidis tablets can clear heat and dry dampness. The combination of these three can further eliminate phlegm-dampness. Radix et Rhizoma Rhei can purge the bowels to remove heat, expel blood stasis and dredge the meridians.

After the symptoms are relieved, modified YQXF is administered.

Radix Codonopsis tablets and raw Radix Astragali can tonify qi and ascend yang. By replenishing healthy qi, they can enhance the functional activities of the body, improve the state of qi deficiency, and boost the patient's vitality. Both of them have the effects of tonifying qi and warming yang, supplementing yang qi, improving the state of yang deficiency, enabling yang qi to warm the limbs and relieve the coldness of the limbs. Meanwhile, sufficient yang qi is also beneficial to the recovery of heart function and can alleviate angina pectoris. In addition, raw Radix Astragali can promote diuresis and reduce swelling, and it also has a certain improvement effect on the possible slight stagnation of water and dampness. Pericarpium Citri Reticulatae, Pinellia ternata processed with ginger, and Bambusa textilis McClure can dry dampness and resolve phlegm, regulate qi and harmonize the middle jiao. By regulating the qi movement of the spleen and stomach, they can promote the transportation and transformation of phlegm-dampness.

Fructus Jujubae and Radix Glycyrrhizae Praeparata can tonify the spleen and harmonize the stomach, which helps to strengthen the function of the spleen and stomach and fundamentally reduce the generation of phlegm-dampness. They also have the function of nourishing blood and tranquilizing the mind. By tonifying qi and blood and nourishing the mind, they can assist patients in improving sleep quality. Herba Lycopi can activate blood circulation to regulate menstruation, remove blood stasis and dissipate carbuncles, improve blood circulation, eliminate potential blood stasis in the body, prevent the further aggravation of blood stasis, and maintain the smooth flow of qi and blood. Cortex Mori and Semen Lepidii can purge the lung to relieve asthma, promote diuresis and reduce swelling, relieve pulmonary blood stasis and edema, improve respiratory function, and reduce the afterload of the heart. Polyporus, Poria and raw Semen Coicis enhance the power of promoting diuresis and excreting dampness, promote the metabolism of body fluids, reduce the preload of the heart, and thus relieve angina pectoris. This formula comprehensively regulates from multiple aspects such as replenishing qi and warming yang, promoting blood circulation and removing blood stasis, purging the lung and promoting diuresis, resolving phlegm and regulating qi, etc. It has an effect on improving the overall pathological state of patients, including various factors such as qi deficiency, yang deficiency, blood stasis and phlegm turbidity. It can comprehensively adjust the body function and relieve symptoms during the attack of angina pectoris, and is also very important in the subsequent consolidation treatment.

3.4. Summary and Prospects

The integrated treatment of traditional Chinese and Western medicine in this case has achieved remarkable results, accumulating valuable experience for the diagnosis and treatment of similar diseases. Precise syndrome differentiation and treatment is the key. Based on the individual symptoms, tongue manifestations and pulse conditions of the patient, it is accurately differentiated as the syndrome of qi deficiency and blood stasis. Only by prescribing and using medicine on this basis can we directly target the disease location and achieve individualized treatment. The synergistic effect of Chinese and Western medicines is significant. Western medicines control blood pressure, dilate coronary arteries, promote diuresis and resist remodeling, rapidly relieving symptoms and stabilizing the condition; while Chinese medicines tonify qi and activate blood circulation, unblock yang and resolve phlegm, regulating the qi and blood of the zang-fu organs as a whole, reducing the occurrence of angina pectoris and improving heart function. The two complement each other and enhance the curative effect.

The research prospects of the integrated treatment of heart failure with reduced ejection fraction com-

bined with variant angina pectoris are broad. At the basic research level, modern scientific and technological means should be used to deeply explore the mechanism of action of Chinese herbal compound prescriptions, clarify their molecular targets in regulating myocardial cell energy metabolism, inhibiting myocardial fibrosis, improving vascular endothelial function and other aspects, providing theoretical support for precise medication. At the same time, large-sample, multi-center, random-controlled trials urgently need to be carried out to systematically compare the long-term efficacy and safety of the integrated treatment of Chinese and Western medicine with those of single Western medicine and single Chinese medicine treatments, optimize the combined medication regimens, standardize the treatment procedures and raise the level of clinical evidence.

4. Conclusions

The main diagnoses for the patient in this case were HFrEF combined with VA. Although there are quite a number of contradictions in the choice of medications for these two diseases, remarkable curative effects were achieved with the help of traditional Chinese medicine decoctions. After treatment, the patient's blood pressure rose, the cardiac and renal functions were improved, and there were improvements in both symptoms, physical signs and imaging manifestations. The quality of life was greatly enhanced. The author shares this successful case, hoping to provide one more option for the clinical treatment of such diseases.

Statement of Ethics and Consent of Participation

This case has been approved by the Medical Ethics Committee of Dongzhimen Hospital, Beijing University of Chinese Medicine (2024DZMEC-491-01). Meanwhile, we have obtained the written informed consent from the patient for the publication of this case report.

Funding

This article was supported by the Youth Project of the National Natural Science Foundation of China (Grant No. 82204856) and the Clinical Special Project of the Wu Jieping Medical Foundation (Grant No. 320.6750.2022-25-3).

CRediT Authorship Contribution Statement

Siqi Li: Conceptualization, Funding acquisition, Project administration, Writing – original draft. Xiaowan Han: Investigation, Writing – review & editing. Diying Zhang: Writing – review & editing. Lanjun Kou: Supervision, Writing – review & editing. Guozhong Pan: Conceptualization, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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