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TREATMENT MEASURES FOR HEART FAILURE FOLLOWING COVID-19

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Abstract. The COVID-19 pandemic has had a significant impact on global healthcare systems. It has been established that the virus affects not only the respiratory system but also has a considerable influence on the cardiovascular system. In particular, the increasing incidence of heart failure observed in the post-infection period has drawn the attention of the medical community[1,2].

Key words: COVID-19, heart failure, clinical manifestations, heart rhythm, pulmonary damage, or psychological stress.

INTRODUCTION

Heart failure is a condition in which the heart is unable to pump enough blood to meet the body's needs. Post-COVID-19 heart failure is often associated with inflammation, myocardial injury, and thromboembolic complications triggered by the virus.

This article provides a comprehensive overview of the pathophysiological mechanisms, clinical manifestations, modern diagnostic tools, and treatment methods for heart failure following COVID-19. The main objective of the article is to contribute to the development of effective treatment strategies for patients suffering from post-COVID heart failure[3,4].

There is substantial scientific evidence that COVID-19 infection, caused by the SARS-CoV-2 virus, can adversely affect multiple organ systems in the body, particularly the cardiovascular system. The virus's direct or indirect impact on cardiac muscle may lead to the development of serious complications such as heart failure.

SARS-CoV-2 enters human cells via angiotensin-converting enzyme 2 (ACE2) receptors. These receptors are present in the heart, lungs, kidneys, and other organs. Their presence in the heart facilitates the virus's direct effects on myocardial tissue[5,6].

One major cardiac complication of COVID-19 is myocarditis—an inflammation of the heart muscle—which reduces myocardial contractility and can lead to heart failure. In some cases, the infection may also trigger cardiac arrhythmias or thrombosis in the coronary arteries.

Furthermore, patients with severe COVID-19 often experience hypoxia (oxygen deficiency), hypervolemia, and a cytokine storm—a hyperinflammatory response—which places additional strain on the heart. This increased workload diminishes cardiac contractile function and leads to decompensation.

COVID-19-associated coagulopathy, characterized by dysregulation of the blood clotting system, can result in thromboembolic complications—especially pulmonary embolism—which significantly increase pressure on the heart. Consequently, this can lead to right ventricular failure[7,8].

In addition, immune responses to the virus, such as multisystem inflammatory syndrome (MIS), may cause diffuse myocardial injury. Some patients also show signs of myocardial fibrosis (scarring) following COVID-19 infection. Therefore, COVID-19 should not only be considered an acute infectious disease but also a potential cardiovascular risk factor with long-term consequences for heart function.

The clinical presentation of heart failure developing after COVID-19 infection is diverse. Most symptoms are associated with impaired cardiac pump function and reduced oxygen delivery throughout the body[9,10].

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One of the most common symptoms is shortness of breath (dyspnea), which may initially occur during physical exertion and later even at rest. This is due to pulmonary congestion resulting from inadequate contraction of the left or right ventricle.

Patients often report fatigue, generalized weakness, and exercise intolerance. When cardiac contractility declines, oxygen delivery to peripheral tissues and organs becomes insufficient, contributing to overall deterioration in clinical condition.

Other frequently observed signs include an increased heart rate (tachycardia) and cardiac arrhythmias. In some cases, patients may experience chest pain or discomfort, pressure, or a sensation of tightness in the chest area[11].

On physical examination, peripheral edema—especially in the lower extremities in the evening—hepatomegaly (enlarged liver), and jugular venous distension may be present. These findings are typical of right ventricular heart failure.

Laboratory and instrumental diagnostic methods play a crucial role in identifying post-COVID heart failure. Biomarkers specific to heart failure, such as elevated levels of NT-proBNP or BNP, are commonly detected. Electrocardiography (ECG) may reveal arrhythmias, conduction blocks, or other rhythm abnormalities[12,13].

Echocardiography (ultrasound imaging) is used to assess ejection fraction (EF), chamber dimensions, and valvular function. These parameters help determine the type (systolic or diastolic) and severity of heart failure.

Differential diagnosis is also essential, as post-COVID symptoms like fatigue, dyspnea, or chest discomfort may result from other causes such as anemia, pulmonary damage, or psychological stress.

TREATMENT

Heart failure developing after COVID-19 infection requires a comprehensive approach. The treatment strategy is determined based on the functional status of the heart, the patient's age, comorbidities, and the severity of the previous COVID-19 infection.

1. Conservative Treatment Methods

The main therapeutic approach to post-COVID heart failure is based on standard heart failure management protocols, which include the following:

ACE inhibitors (e.g., enalapril, ramipril) – reduce cardiac workload, lower blood pressure, and help restore myocardial structure.

Beta-blockers (e.g., metoprolol, bisoprolol) – slow the heart rate, reduce oxygen consumption, and protect the myocardium.

Diuretics (e.g., furosemide, torasemide) – eliminate excess fluid from the body, reduce edema, and ease breathing.

Aldosterone antagonists (e.g., spironolactone) – play an important role in preventing cardiac fibrosis and facilitating fluid removal.

2. Anticoagulant Therapy- Due to the high risk of thrombosis associated with COVID-19, anticoagulant therapy (e.g., rivaroxaban, apixaban, or warfarin) is essential. This is especially important in patients with arrhythmias or those who develop pulmonary embolism.

3. Rehabilitation and Cardiac Support

Rehabilitation programs should be tailored according to the patient’s general condition and may include:

Physical exercise through personalized cardiac rehabilitation programs.

Proper nutrition, particularly limiting sodium and fluid intake.

Stress reduction and provision of psychological support.

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4. Additional Symptomatic Treatment- In severe cases of heart failure or in the presence of arrhythmias, medications to manage heart rhythm (e.g., amiodarone, digoxin) or implantable devices (e.g., cardioverter-defibrillators) may be recommended.
5. Individualized Approach- since heart failure manifests differently in each patient:
Medication dosages should be carefully adjusted, especially in elderly patients. Comorbid conditions such as diabetes and renal insufficiency should be taken into account. Monthly follow-up using ECG and echocardiography is essential to monitor cardiac function.

PREVENTION

Recovery from post-COVID heart failure depends not only on medication but also on adopting a healthy lifestyle. Preventive measures and lifestyle changes support cardiac function and help prevent disease recurrence.
1.Healthy Nutrition -Diet plays a vital role for patients with heart failure. Recommendations include:
Limiting salt (sodium) intake – should not exceed 5 grams per day.
Controlling fluid intake – in the presence of fluid retention, limit daily intake to no more than 1.5 liters.
Avoiding animal fats, sausages, canned foods, and fast food.
Increasing consumption of fruits, vegetables, and mineral-rich foods (e.g., bananas, oats, spinach).
2. Physical Activity- Exercise is essential for restoring heart health: Daily walking for 20–30 minutes. Avoiding strenuous exercise. Participation in rehabilitation programs under medical supervision.
3. Avoidance of Harmful Habits- Smoking and alcohol consumption are dangerous for the heart. Complete cessation reduces complications of the disease.
4. Stress Reduction -Mental health should also be prioritized after COVID-19: Breathing exercises, meditation, yoga. Psychological support when necessary.
5. Continuous Monitoring- Blood pressure, heart rate, and body weight must be regularly monitored. Medical examinations every 3–6 months[14], including ECG**,** echocardiography**,** and blood tests (BNP, creatinine, electrolytes). The incidence of heart failure and mortality linked to COVID-19 is steadily increasing. This is due to the virus weakening multiple systems in the body, particularly the cardiovascular system, and contributing to thrombosis**,** arrhythmias**, and** oxygen deficiency**.**
Rehabilitation in post-COVID heart failure is essential for restoring quality of life and prolonging survival. This section details key rehabilitation methods for improving cardiac health after COVID-19.
Physical activity: Exercise is vital, but should be tailored to the individual. Initially, light activities such as daily 15–20-minute walks and breathing exercises are recommended. Gradually, more intense activity may be introduced depending on patient status.
Cardiac rehabilitation programs: These programs, monitored by cardiologists, combine exercise regimens, physical activity, and nutritional counseling to improve heart function. Pharmacological support remains essential during rehabilitation. Standard heart failure medications such as ACE inhibitors**,** beta-blockers, and diuretics support myocardial and vascular function. Anticoagulants are indicated to prevent thrombosis. Psychological Support-Many post-COVID patients experience depression and anxiety. Psychological support is a key component of rehabilitation, helping to reduce stress, restore mental stability, and improve overall recovery.
6. Dietary and Nutritional Therapy. Special attention should be given to diet, including: Low-sodium intake**,** Plenty of fruits and vegetables**,** Reduced fat consumption**,** High-potassium foods (e.g., bananas, oats, potatoes).
Rehabilitation for post-COVID heart failure can be prolonged**.** Many patients undergo physical and psychological rehabilitation for several months or even years, under regular medical supervision and individualized treatment plans.
In summary, the clinical manifestations of post-COVID heart failure are complex and multifaceted, and each patient should be evaluated individually.

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