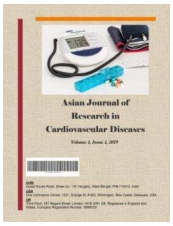

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Heart Failure: Causes, Investigations and Updates on Management

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

Background: HF heart failure is a serious cardiovascular disease with its increased incidence, serious illness, high mortality and rapidly increasing medical costs. HF patients are increasing worldwide and South Korea is no exception. Over the past 40 years, there have been significant improvements in the definition, diagnosis, and treatment of HF. There are ongoing efforts to improve HF risk classification using biomarkers, imaging and genetic testing. Newly developed drugs and HF devices are widely accepted in clinical practice. In addition, specific treatments for end-stage renal disease, including left ventricular defense devices and heart transplants, will soon emerge. This review summarizes recent HF management and new diagnostic and therapeutic approaches to improve outcomes in HF patients.
Conclusion: Heart failure is a public health burden that has far-reaching consequences for the future of health care and human health.

Keywords: Heart failure; multiple organ failure; venous congestion; pathophysiology.

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1. INTRODUCTION

Heart failure (HF) is a major disease of the heart and blood vessels due to its high incidence and high mortality. HF is associated with various complications, such as hospitalization, life-threatening arrhythmias, and death during the development of the disease. Additionally, HF can be a life-threatening disease for many heart conditions, including myocardial infarction (MI), valvular heart disease and various cardiomyopathies. Because of these unique features, various medical and non-pharmacological treatments have been developed that not only improve cardiovascular disease but also prevent hospitalization and death. In this review, we focus on high quality HF management and ongoing studies [1].

2. CAUSES AND RISK FACTORS

Coronary artery disease and heart disease: Coronary artery disease is the most common form of heart disease and the most common cause of heart failure. The disease is caused by the accumulation of fat in the arteries, which reduces blood flow and can lead to heart attack. When the arteries of the heart are completely blocked, a sudden heart attack occurs. Damage to the heart muscle as a result of a heart attack can mean that the heart cannot pump properly. Hypertension. When blood pressure is high, the heart needs to work harder instead of circulating blood throughout the body. Over time, this extra effort can strengthen or weaken the heart muscle to pump blood properly. Improper heart valve, The heart valves regulate blood flow. Valves that fail due to heart failure, coronary artery disease, or heart disease can make the heart weaker over time. Heart attack There are many possible causes of heart damage, including certain diseases, infections, excessive alcohol consumption, and toxic effects of drugs such as cocaine and other drugs used in chemotherapy. Genetic factors may also play a role and Myocardial inflammation (myocarditis) [2].

Myocarditis is usually caused by a virus, which includes the COVID-19 virus, and can cause left heart disease, congenital heart disease (congenital heart disease). If your heart and its chambers or valves are not formed properly, the healthy parts of your heart should work harder to pump blood, which can lead to heart failure, abnormal heart rhythm (arrhythmias). Irregular heartbeats can speed up your heartbeat, which can lead to increased heart activity. Slow heartbeats can also lead to heart failure and other diseases. Chronic diseases such as diabetes, HIV, overactive thyroid, or too much iron or protein can also contribute to chronic heart failure. Causes of sudden (severe) heart failure include: allergies, any disease that affects the whole body, blood clots in the lungs, serious illness, use of certain medications, and viruses that attack the heart tissue [3].

2.1 Mechanism of Heart Failure

The pathophysiology of HF is complex and includes structural, neurohumoral, cellular and cellular processes to maintain physiological function (maladjustment, myocytic hypertrophy, myocyte death / apoptosis / regeneration and remodeling). Left ventricular function and stroke volume should be monitored prior to exercise (venous return and ventricular volume at end of diastole), myocardial contraction, and posterior loading (achieved during aortic dislocation and wall compression). The Frank-Starling curve describes the relationship between stroke / heart rate and ventricular end diastolic pressure (LVEDP) or pulmonary capillary pressure (PCWP), where there is a strong and positive relationship between increased heart rate and increased stroke volume and heartbeat. This ratio is changed to the right, which means a decrease in contraction, and high pressure is needed to achieve the same cardiovascular result and to plan for advanced disease, which means an increase in venous recurrence, and LVEDP cannot not increase impact capacity. HFpEF has the same pathophysiological processes as HFrEF, but due to greater ventricular stiffness and altered relaxation than CO in HFrEF. This alteration of rigidity and rest induces stabilization of the HVG (instead of an eccentric HVG as in the HFrEF) and shifts the pressure-volume curve to the left [4].

HF (HFrEF, HFPEF and HFMREF) activates neurohumoral systems to maintain vital organs: sensory and sensory systems (SNS), renin-angiotensin-aldosterone system (RAAS), antidiuretic hormone and other vasoactive substances (cerebral natriuretic peptides) (BNP), nitric oxide and endothelin). HF causes a decrease in carotid baroreceptor response, which in turn increases sensitivity to sensory function (SNS) and leads to increased heart rate and heart rate, vasoconstriction and increased load. Activation of the RAAS in response to poor IC kidney transplantation causes water and salt retention and increases preload. RASS activity

increases angiotensin II resulting in blockage of vasoconstriction and excess salt and water retention, which further stresses the ventricular wall and causes hypertrophy (remodeling) and ventricular dysfunction and increased blood pressure. These compensatory mechanisms lead to unwanted cardiac changes (inflammation, apoptosis, hypertrophy and fibrosis) and left ventricular dysfunction (Fig. 1) [5].

2.2 Classification of Heart Failure

Left Heart Failure: Left heart failure is the most common type of heart failure. The left ventricle is just below the left ventricle. This area pumps oxygenated blood throughout your body. Left heart failure occurs when the left ventricle does not pump properly. This prevents your body from getting enough oxygen-rich blood. Instead, blood flows back to your lungs, causing shortness of breath and fluid retention. Right-sided heart failure: The right ventricle is responsible for pumping blood to your lungs to collect oxygen. Right side heart failure occurs when the right side of your heart is unable to do its job successfully. This is usually due to left heart failure. Heart failure in the left ventricle causes the right ventricle to work harder due to the accumulation of blood in the lungs. This can put pressure on the right side of the heart and cause failure. Right-sided heart failure can be caused by other conditions, such as lung disease. Right-sided heart failure is characterized by swelling of the lower extremities. This swelling is caused by fluid accumulation in the legs, feet and abdomen [6]

Diastolic heart failure: Diastolic heart failure occurs when the heart muscle becomes stiffer than normal. Stiffness, which is often caused by heart disease, means that your heart does not fill with blood easily. This is known as diastolic dysfunction. This leads to decreased blood flow to all the other organs in your body. Diastolic heart failure is more common in women than in men. Systolic heart failure: Systolic heart failure occurs when the heart muscle loses its ability to hold. Heart rate is necessary to pump oxygen-rich blood out of the body. This condition is known as systolic dysfunction, and it usually occurs when your heart is weak and enlarged. Systolic heart failure is more common in men than women. Both diastolic and systolic heart failure can occur on the left or right side of the heart. You can have any disease on either side of the heart [7].

New York Heart Association Division: This scale groups heart failure into four categories. Heart failure class I. There are no signs of heart failure. Stage II heart failure. Daily activities can be done without difficulty, but physical activity causes shortness of breath or fatigue. Stage III heart failure:; Difficulty performing daily activities. Stage IV heart failure: Shortness of breath occurs even during rest. This stage includes severe heart failure. American College of Cardiology / American Heart Association Classification: This stage-based classification program uses the letters A through D and targets a variety of people at risk of heart failure. Physicians use this classification system to identify risk factors and initiate early aggressive treatment that helps prevent or delay heart failure. Stage A. There are several risk factors for heart failure, but there are no symptoms. Stage B is heart disease, but there are no signs or symptoms of heart failure. Stage C: Signs or symptoms of heart disease and heart failure. Stage D. Advanced heart failure requires specialized treatment (Fig. 2) [8].

2.3 Signs and Symptoms

The main symptoms: The most common symptoms of heart failure are shortness of breath. This can happen after work or rest; it can be worse if you sleep and wake up at night holding your breath or being tired. Most of the time, you can feel tired and find tiring workouts due to swollen ankles and legs. This is due to fluid retention (edema); can get better in the morning and worse in the afternoon. Unusual Symptoms: Other symptoms of heart failure may include a persistent cough that may worsen at night, shortness of breath, constipation, loss of appetite, obesity or weight loss, confusion, dizziness and fainting, palpitations, palpitations, wheezing or an irregular heartbeat (heartbeat) and in some People with heart disease can experience depression and anxiety [9].

2.4 Complications

Abnormal heart rhythm: In the normal heart, the upper chambers (called the atrium) and the lower chambers (ventricles) become compressed and relaxed, and blood circulates in your body. If your tick is weak, these places may not be stable at the right time. Your heart may be beating, very fast, or abnormal. When the rhythm is off, your heart cannot pump enough blood into your body. Atrial fibrillation (AFib) is a type of abnormal heartbeat that can cause a heart attack. It makes

your heart tremble and bounce instead of bruising. Abnormal heartbeat can lead to blood clots, which can lead to blood clots. Clots can travel to your brain. If the blood vessels clog there, it can cause paralysis. Heart Valve Problems: Your heart has four valves that allow blood to flow in and out of your heart. As the damage gets more severe and your heart has to work harder to pump blood and it gets bigger. Changing the size can damage the valves [10].

Kidney Injury or Failure: Your kidneys filter excess waste and fluid into the bloodstream. Like your other organs, they need a constant blood supply to function properly. Without the right amount of blood, they will not be able to throw enough waste into your bloodstream. It can cause kidney failure. It is treated with dialysis or kidney transplant. Kidney disease can make heart failure worse. The damaged kidney cannot produce as much fluid in the blood as a healthy kidney. You will start sticking to fluids, which will raise your blood pressure. High blood pressure makes your heart work harder. Anemia: This is a deficiency of red blood cells that carry oxygen to your body's tissues. If you have anemia, your body does not get enough oxygen. Your kidneys make a protein called erythropoietin (EPO), which helps your body make new red blood cells. Kidney damage due to heart failure prevents the body from producing enough EPO. Liver Damage: Your liver breaks down toxins so that your body can get rid of them. It also traps bile, a fluid used in digestion. Heart failure can deprive the liver of the blood it needs to function. The accumulation of fluid puts extra pressure on the portal artery, which carries blood to the liver. This can damage the organ until it can function normally [11].

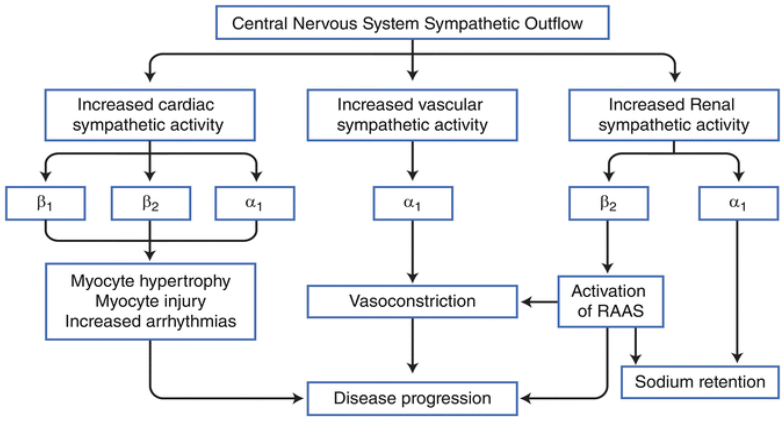

Fig. 1. Mechanism of heart failure [5]

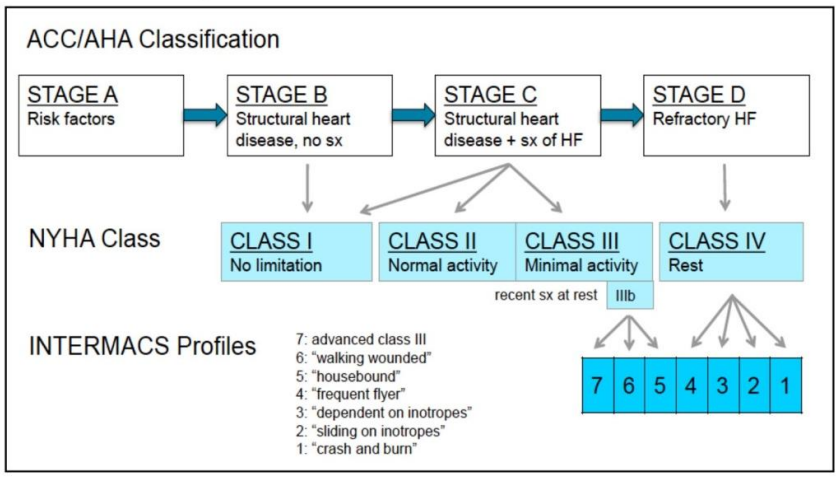

Fig. 2. Classification of heart failure [8]

A broken heart cannot effectively pump blood from your lungs to your body. The blood comes back, increasing the pressure in the arteries. It pushes fluid into your alveoli. As the fluid increases, it becomes difficult to breathe. This is called pulmonary edema. Severe Weight Loss and Weight Loss. Heart failure can affect muscle and fat metabolism. In later stages, you can lose a lot of weight and body weight. Your muscles may become thin and weak [12].

2.5 How to Prevent Complications

If you don't treat it, heart failure can get worse over time. Severe heart failure can be dangerous to your health. Treatments such as weight loss, healthy diet, exercise and medication can protect and keep your heart healthy. Follow your doctor's advice and stick to your treatment plan. The better you take care of your heart, the less likely you are to have problems [13].

3. INVESTIGATIONS

3.1 Diagnostic Workup for Acute Heart Failure

The AHF diagnostic test begins at the time of the initial physician consultation, and continues throughout the patient's first course, aimed at identifying clinical presentation and diagnosing and managing any delayed causes / potential complications / life-threatening conditions in a timely manner. way. In addition to clinical signs and symptoms, diagnostic functioning includes ECG and echocardiography, if possible. Additional investigations, namely chest X-ray and pulmonary ultrasound may be used to confirm the diagnosis of AHF, especially when NP tests are not available. Plasma NP levels (BNP or NT-proBNP or MRproANP) should be measured if the diagnosis is uncertain and a care point test is available. The normal concentration of NPs makes AHF detection impossible. Acute HF antibodies are: BNP <100 pg / mL, NT-proBNP <300 pg / mL and MR-proANP <120 pg / mL. However, high levels of NP are associated with many cardiovascular and non-cardiovascular conditions. Low concentrations can be found in some patients with reduced end-stage HF, obesity, flash pulmonary edema or right AHF. High levels can be found in patients with AF and / or reduced kidney function [13].

Among other laboratory tests, troponin is helpful in diagnosing acute coronary syndrome (ACS) although higher levels are found in most patients with AHF. Blood urea nitrogen or urea, serum creatinine, electrolyte (sodium, potassium, chloride), and antigen carbohydrate 125. may help to combine treatment. Abnormal liver function detection identifies patients with serious illness. Since both hypothyroidism and hyperthyroidism can cause AHF, thyroid-stimulating hormone (TSH) should be tested in those with newly diagnosed AHF. Arterial blood pressure analysis should be performed when an accurate measure of O2 and CO2 component pressure is required (i.e. patients with respiratory depression). Lactate and pH levels should be measured in patients with heart attack. D-dimer should be measured when acute pulmonary embolism is suspected. Procalcitonin may be used to diagnose pneumonia and antibiotic treatment may be indicative of plasma levels above 0.2 lg / L. However, there is no strategic effect based on standard procalcitonin dosage on the results shown in a future, controlled trial. Pulse oximetry should be measured normally during the first introduction of patients with AHF and further monitoring may be required in the first hours or early days [13].

To diagnose heart failure, your doctor will take a careful medical history, examine your symptoms, and physically examine you. Your doctor will also check for risk factors for heart failure, such as high blood pressure, coronary heart disease, or diabetes. Your doctor can listen to your lungs for signs of fluid build-up (pneumonia) and heart palpitations (sounds) that may suggest heart failure. The doctor can examine your arteries and examine the excess fluid in your abdomen and legs. After a physical exam, your doctor may also schedule some of the following workup and tests (Fig. 3) [14].

3.2 Blood Tests

Blood tests are done to look for signs of diseases that can affect the heart [14].

3.3 Chest X-ray

X-rays can show the condition of the lungs and heart (Fig. 4) [14].

3.4 Electrocardiogram (ECG)

This quick and painless test records electrical signals in the heart. It can indicate the time and duration of the heartbeat (Fig. 5) [15].

3.5 Echocardiogram

Sound waves are used to create moving heart images. These tests show the size and shape of the heart and valves and blood flow to the heart. An echocardiogram can be used to measure the area of the sputum that shows how well the heart is beating and can help distinguish heart failure from direct treatment (Fig. 6) [16].

3.6 Stress Test

Depression tests measure heart health during exercise. You may be asked to walk on a treadmill while staying on an EKG machine, or you may be given an IV drug that stimulates the effects of cardiovascular exercise. Sometimes stress tests are done while wearing a mask, which measures how well the heart and lungs are absorbing oxygen and breathing carbon dioxide [17].

3.7 Cardiac Computerized Tomography (CT) Scan

For a CT scan of the heart, you lie on a table in a donut-shaped device. An X-ray tube inside the device surrounds your body and collects images of your heart and chest. Sometimes a difference is made. As the comparator can affect the way your kidneys work, talk to your doctor if you have kidney problems (Fig. 7) [18].

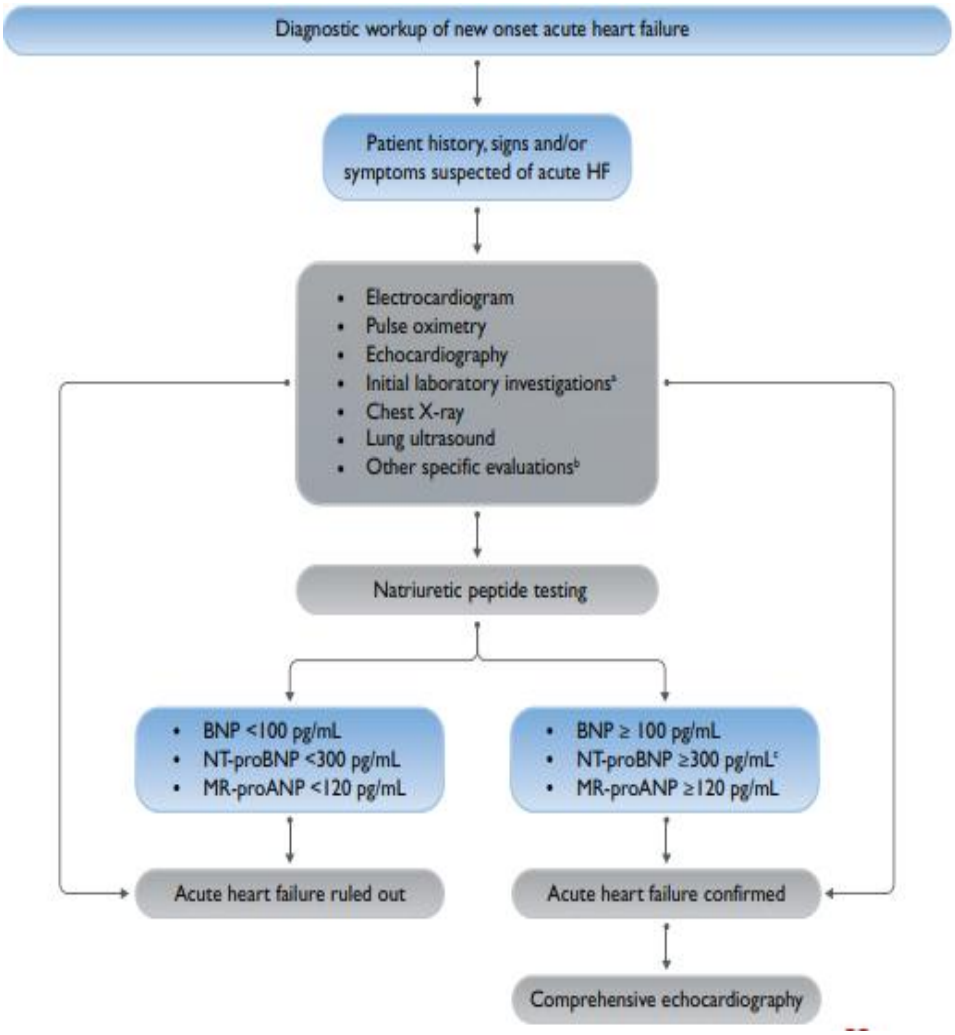

Fig. 3. Diagnostic workup of new onset acute heart failure. BNP = B-type natriuretic peptide; HF= heart failure; MR-proANP = mid-regional pro-atrial natriuretic peptide; NT-proBNP = N-terminal pro-B-type natriuretic peptide [14]

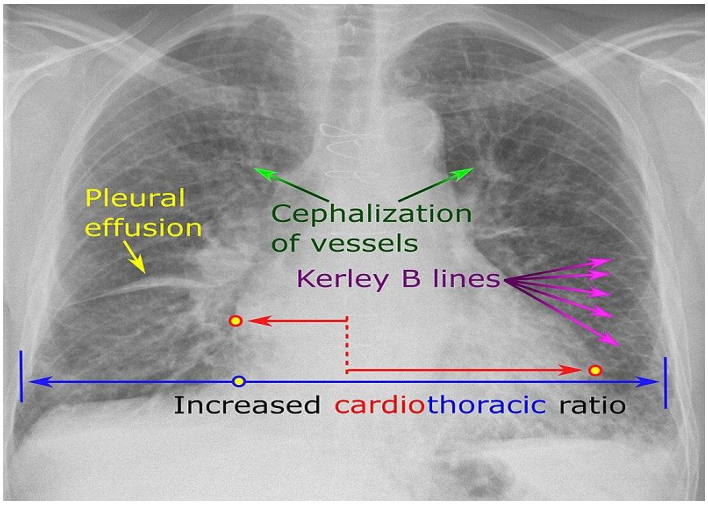

Fig. 4. Chest X-ray of congestive heart failure [14]

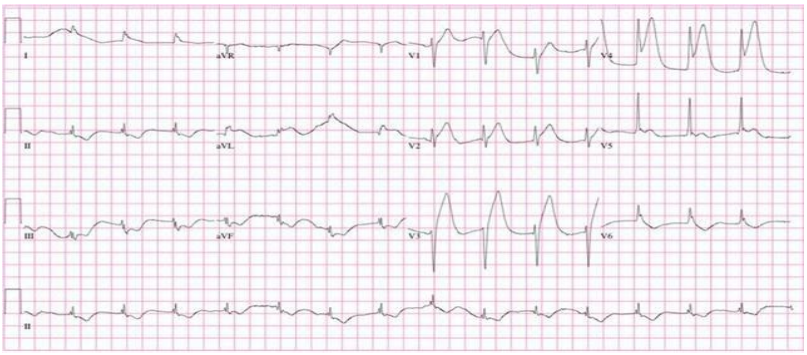

Fig. 5. Electrocardiogram (ECG) of heart failure [15]

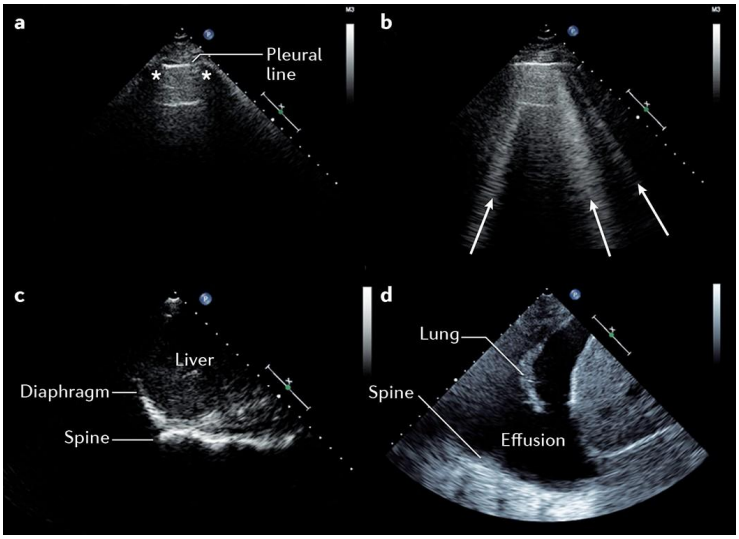

Fig. 6. Echocardiography and Lung Ultrasonography for the Assessment and Management of Acute Heart Failure [16]

3.8 Magnetic Resonance Imaging (MRI)

On a heart MRI, you lie on a table inside a long tube-shaped machine. Radio waves create images of the heart. Cardiac MRI can be done with dye (opposite). It is important to tell your doctor about any kidney problems before having a cardiac MRI or other MRI, as comparisons can cause a very rare and serious problem in people with kidney disease (Fig. 8) [19].

3.9 Coronary Angiogram

In this test, a small flexible tube (catheter) is inserted into the blood vessel, usually into the vein, and it is sent to the coronary arteries. A dye (second) is inserted into the catheter so that the veins can be clearly seen on the X-ray and help the doctor see the obstruction (Fig. 9) [20].

3.10 Myocardial biopsy

In this test, the doctor inserts a small, flexible cord into a vein in the neck or chest and removes very small parts of the heart muscle for examination. These tests can be done to diagnose certain types of heart muscle disorders that cause heart failure (Fig. 10) [21].

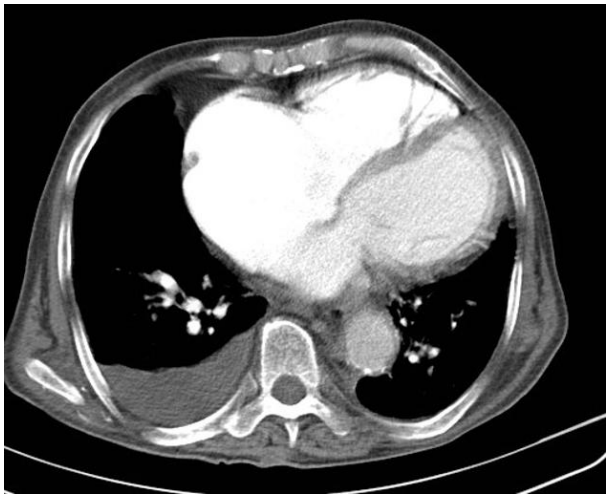

Fig. 7. Cardiac computerized tomography (CT) scan for heart failure [18]

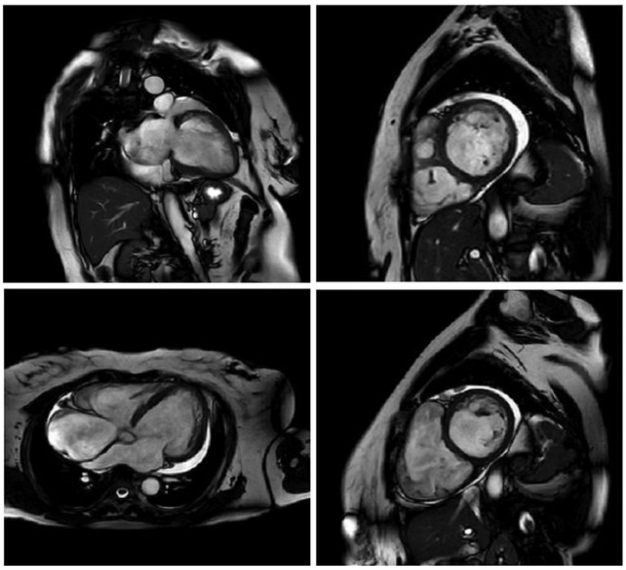

Fig. 8. Magnetic resonance imaging (MRI) for Heart Failure [19]

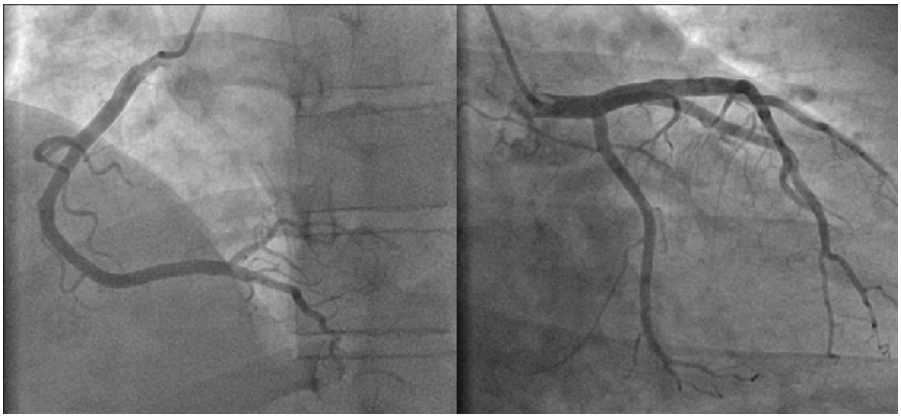

Fig. 9. Coronary angiogram [20]

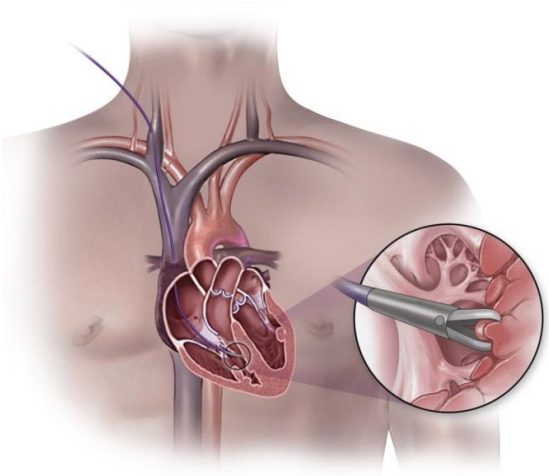

Fig. 10. Myocardial biopsy [21]

3.11 Treatment

Heart failure is an incurable disease that needs to be treated for life. However, treatment may improve the signs and symptoms of heart failure and strengthen the heart. Your doctor may be able to correct heart failure by addressing the root cause. For example, adjusting the heart valves and monitoring heart rate can change heart failure. However, for many, treatment of heart failure involves the use of appropriate drugs, and in some cases, the use of substances that properly help the heart beat and contract [21].

4. MEDICATIONS

Doctors often treat heart failure with a combination of medications. Depending on your symptoms, you may be taking one or more medications, including: Angiotensin-converting enzyme (ACE) inhibitors. These drugs relax the arteries to lower blood pressure, improve blood flow, and lower heart pressure. Examples include enalapril (Vasotec, Epaned), lisinopril (Zestril, Qbrelis, Prinivil) and captopril. Angiotensin II receptor blockers. These drugs, which include losartan (Cozaar), valsartan (Diovan) and candesartan (Atacand), have many of the same benefits as ACE inhibitors. It may be an option for people who cannot tolerate ACE inhibitors. Beta blockers. These drugs lower your heart rate and lower your blood pressure. Beta blockers can reduce the symptoms and signs of heart failure, improve heart function, and help you live longer. Examples include carvedilol (Coreg), metoprolol (Lopressor, Toprol-XL, Kapspargo Sprinkle) and bisoprolol. Diuretics: Commonly called water pills, diuretics make you urinate more often and prevent fluid from accumulating

in your body. Diuretics, such as furosemide (Lasix), also reduce fluid in your lungs so that you can breathe more easily. Because diuretics cause your body to lose potassium and magnesium, your doctor may also prescribe supplements for these minerals. If you are taking a diuretic, your doctor will probably monitor your potassium and magnesium levels in your blood with regular blood tests. Aldosterone antagonists. These medications include spironolactone (Aldactone, Carospir) and eplerenone (Inspra): These potassium-sparing diuretics have additional properties that can help people with systolic heart failure that are difficult to live long [22].

Unlike other diuretics, spironolactone and eplerenone can increase the level of potassium in your blood to dangerous levels, so talk to your doctor if a rise in potassium is a concern, and learn if you need to adjust your high-potassium diet. Inotropes: These drugs are given IV by people with a serious heart condition in the hospital. Inotropes help the heart pump blood more efficiently and maintain blood pressure. Digoxin (Lanoxin): This drug, also called digitalis, increases the ability to contract your heart muscle. It also likes to slow down the heartbeat. Digoxin reduces the symptoms of heart failure in systolic heart failure. It may be more likely to be given to someone with a heart problem, such as atrial fibrillation. Hydralazine and isosorbide dinitrate (BiDil). This combination of drugs helps to clear the blood vessels. It may be added to your treatment plan if you have severe symptoms of heart failure and ACE inhibitors or beta blockers did not help you. Vericiguat (Verquvo): This new drug for chronic heart failure is taken once a day orally. It is a type of drug called oral soluble guanylate cyclase (sGC) stimulator. In the studies, people at high risk of heart failure taking vericiguat had fewer hospitals due to heart failure and heart disease-related deaths compared to those receiving the ineffective pill (placebo). Other medications: Your doctor may prescribe additional medications to treat certain symptoms [22].

For example, some people may be exposed to nitrates for chest pain, statins that lower cholesterol, or antihypertensive drugs that help prevent blood clots. Your doctor may need to adjust your dose regularly, especially if you are just starting new medications or when your condition worsens. You may be hospitalized if you have symptoms of heart failure. While you are in the hospital, you may receive additional medications to help your heart work better and relieve symptoms. You can also get supplemental oxygen with a mask or small tubes that are placed over your nose. If you have severe heart failure, you may need supplemental oxygen for a long time [23].

4.1 Surgery or Other Procedures

Surgery or other cardiac procedures may be recommended to treat the underlying problem that led to heart failure. Surgery or other procedures for heart failure may include: Coronary bypass surgery: If severely blocked arteries cause your heart failure, your doctor may recommend coronary bypass surgery. The procedure involves taking a healthy blood vessel to your leg, arm or chest and connecting it below and beyond the blocked arteries in your heart. The new method improves blood flow to your heart muscle. Cardiac valve repair or replacement: If a wrong heart valve causes your heart failure, your doctor may recommend repair or replacement of the valve. Surgeons can repair a valve by reconnecting the flap valves or by removing excess valve tissue so that the valves close tightly. Sometimes valve adjustment involves tightening or changing the ring around the valve. Repair or replacement of the heart valve can be performed as an open heart surgery, minimally invasive surgery or cardiac procedure using flexible tubes called catheters (cardiac catheterization). Incomplete cardioverter-defibrillators (ICDs): ICD is used to prevent heart failure problems. It is not a heart treatment itself. ICD is a pacemaker-like tool. It is inserted under the skin on your chest with cords running through your veins and into your heart. ICD monitors heart rhythm. When the heart starts beating at a dangerous rhythm, or when your heart stops, the ICD tries to move your heart or frighten it back to normal. ICD can also act as a pacemaker and speed up your heart rate if it moves too slowly [24].

Cardiac Resynchronization Therapy (CRT): Also known as biventricular pacing, CRT is a treatment for heart failure in people with low heart rate (ventricles) who do not pump the sink. A device called biventricular pacemaker sends electrical signals to the ventricles. Symptoms compress your ventricles more slowly, which improves blood flow to your heart. CRT can be used with ICD. Ventricular assist devices (VADs). VAD is also known as a mechanical circulatory aid device that helps pump blood from the lower extremities (ventricles) of your heart to your

body. Although VAD can be implanted in one or both ventricles of your heart, it is usually concentrated in the left ventricle. Your doctor may recommend VAD if you are expecting a heart transplant. In some cases, VAD is used as a permanent treatment for people with heart disease but not a good heart transplant. Heart transplant: Some people have such a serious heart failure, surgery or medication does not help. These people may need a healthy heart change. Heart transplantation is not the best treatment for everyone. A team of doctors at the rehabilitation center will examine you to determine if the procedure is safe and beneficial to you [24].

4.2 Palliative Care and End-of-life Care

Your doctor may recommend incorporating palliative care into your treatment plan. Palliative care is specialized medical care that focuses on relieving your symptoms and improving your quality of life. Anyone with a serious or life-threatening illness can benefit from palliative care to treat symptoms such as pain or shortness of breath, or to reduce treatment side effects such as fatigue or nausea. Heart or device is not an option. If this happens, you may need to care for a seriously ill person. Hospice care provides a specialized course of treatment for temporarily ill patients. Hospice care allows family and friends to care for and comfort a loved one at home or in a nursing home with the help of trained nurses, social workers, and volunteers. Hospice care provides emotional, psychological, social and spiritual support to the sick and those close to them. Hospice care is available in your home or nursing home and there are assisted living facilities. For those in hospital, health care professionals can provide comfort, compassion, and dignity [25].

It can be difficult, but it is important to discuss end-of-life issues with your family and medical team. Part of this discussion usually includes general language and written instructions, along with precautions you may provide about medical care if you are unable to speak for yourself. If you are using an ICD, one of the important things to discuss with your family and doctor is to turn off the ICD to avoid shock and keep your heart beating [25].

4.3 Updates on Heart Failure Management

Here are some important points to keep in mind from the 2021 update to the ACC 2017 Expert Consensus Decision Rate for Optimizing Treatment of Heart Failure: Reduced Ejection Fraction (HFrEF), Beta Blocker, and Enzyme Inhibition (ACE) in patients newly diagnosed with stage C heart failure with angiotensin-modification. ARB) / angiotensin receptor inhibitor-neprilysin (ARNI) should be initiated by any method. Each agent should be increased to the maximum allowable or targeted dose. Introduction of beta-blocker is better tolerated when patients are thirsty and ACEI / ARB / RNAI when patients are wet. Only prescription-recommended beta-blockers (ie, carvedilol, metoprolol succinate, or bisoprolol) should be used in patients with ICrEF. In angiotensin antagonists, RNAi are the preferred agents. Kidney and potassium function should be monitored for the first 1-2 weeks or for increased doses of ACEI / ARB / RNAI. Diuretics should be prescribed as needed and dosage for congestion. If you need more than 80 mg of furosemide twice a day, another loop should be considered a diuretic or add thiazide. After the introduction of beta-blockers and angiotensin antagonists, it should be noted that the addition of aldosterone antagonists with close monitoring of electrolytes. Sodium-glucose-2 co-transporter inhibitors (SGLT-2) should also be considered for ICFR and New York Heart Association (NYHA) Class II IV patients. In black patients who have symptoms despite continuous treatment, hydralazine and isosorbide dinitrate should be considered despite the high tolerance [26].

HFrEF this is a good time to consider improving treatment during hospitalization. As an outpatient, treatment adjustments should be considered every two weeks to achieve orientation treatment (GDMT) within 3-6 months of initial diagnosis. Echocardiography should be repeated for 3-6 months after receiving the intended therapeutic dose to consider cardioverter-defibrillator (ICD) / cardiac resynchronization therapy (CRT). Surgical treatment is recommended for patients with chronic mitral regurgitation. For chronic mitral regurgitation, the development of GDMT is recommended before percutaneous transcatheter correction is considered only in symptomatic patients. Hyperkalemia and / or renal dysfunction are common barriers to access to target doses. Patients with hyperkalemia should be educated on a low-potassium diet. Potassium bond is possible. Social and economic barriers are the major barriers to the use of ARNI, SGLT-2 inhibitors, and ivabradine. In such cases, you should consider economically

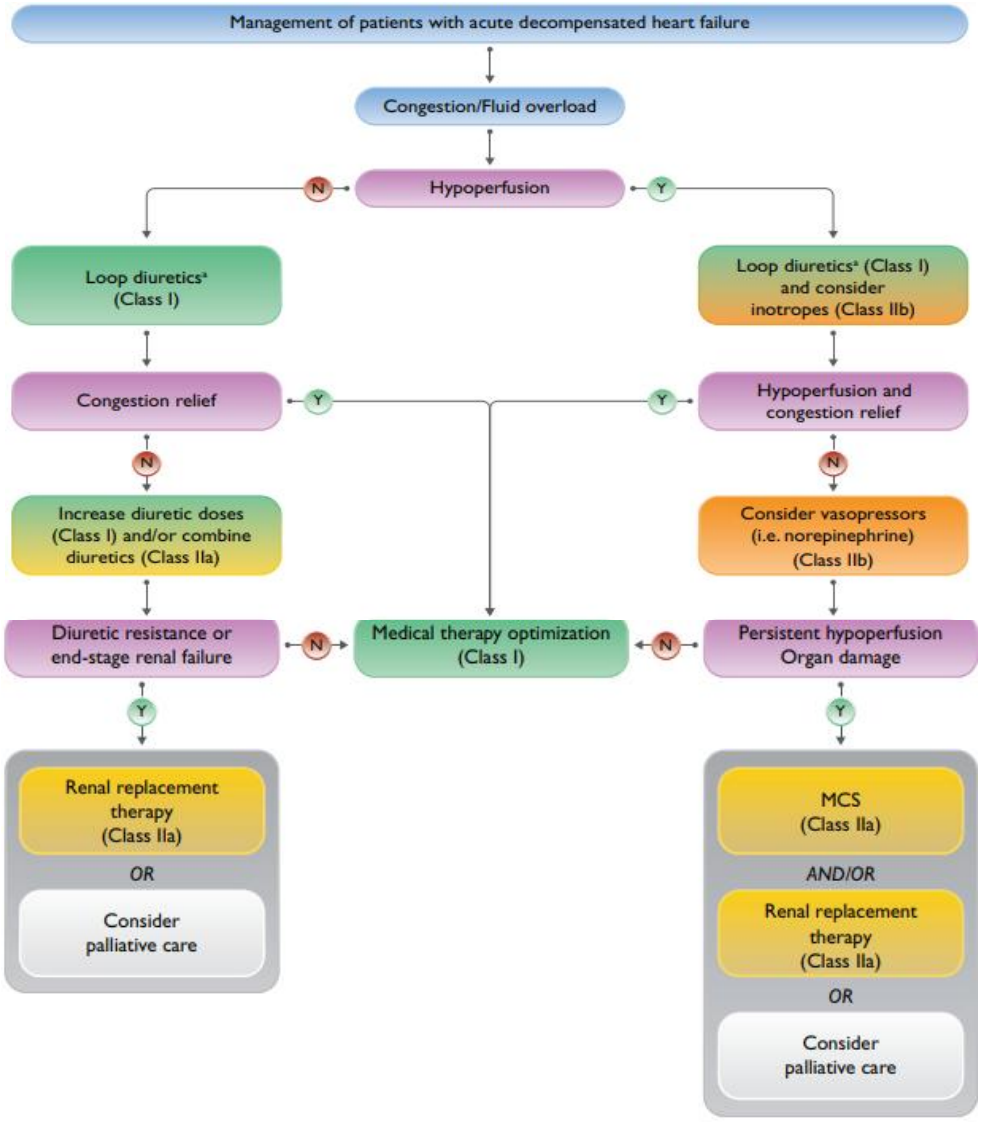

Fig. 11. Management of Acute Heart Failure [27]

viable options. This may include visits to visible care and home care services, especially during the 2019 coronavirus epidemic (COVID-19). Patients with left ventricular ejection fraction (LVEF) of up to 40% should resume GDMT and relapse if there is no known cause. Repeated echocardiography should only be considered in relation to changes in clinical practice or other risk factors. Measuring the type of B-natriuretic peptide (BNP) or N-terminal-proBNP (NT-proBNP) helps in the need to assess risk assessment and referral to RF professionals, or other thought studies. increase. BNP levels can be increased with ARNI treatment, but NT-proBNP levels are not affected [26].

Appropriate cardiac catheterization should be considered when symptoms persist despite adequate abortive dose, decreased renal function in an attempt to use high-dose therapies including diuretics or those often used to reduce compensation. In selected patients with recurrent compression, an implantable sensor for filling pressure testing (eg, CardioMEMS) may be considered in patients with emergency heart failure. Inotropics, NYHA stage IIIB / IV symptoms or persistent natriuretic peptides, organ dysfunction, EF 35%, ICD shock, recurrent hospitalization, increased urine output despite congestive heart failure, low blood pressure and / or high blood pressure in patients requiring

referral to a HF specialist it should be considered. heart rate and continued intolerance to GDMT requiring dose reduction. Heart failure care requires a team-based approach. Infrastructure such as patient monitoring devices (eg, Scales) or the provision of smart phones or electronic medical records can support such group-based care. Adherence to medication should be checked periodically. Interventions that help with regular adherence to medication include patient education, drug administration, drug co-management, psychotherapy, medication reminders, and incentives to improve adherence. During heart failure disease, guidelines for care must be followed and expectations adjusted for timely decision-making. If possible, decision-making tools should be used. Lifelong care for heart failure includes careful management of heart failure treatments, and palliative care counseling can help with other non-cardiac symptoms, such as pain (Fig. 11) [27].

5. DISCUSSION

Heart failure (HF) is known as an epidemic and is a major medical and public health problem associated with significant mortality, morbidity and health care costs, especially for people over 65 years of age. The combination of HF cases varies over time with the increasing number of cases presented with the reserved portion of the non-specific treatment. Despite progress in reducing HF-related deaths, hospital admissions for HF are still relatively frequent and recurrence rates have skyrocketed. To avoid hospitalization, a thorough interpretation of preexisting patients with HF is important and should include the impact of conditions associated with polymorphisms. New models of patient-centered care that utilize community resources to support IC patients with complex life situations are needed to reduce hospital admissions [27].

6. CONCLUSION

Heart failure is a public health burden that has far-reaching implications for health care and the future of human health. Guidelines for the management of heart failure emphasize the progressive and gradual progression of heart failure, focusing on the important role of river obstruction in preventing the occurrence of heart failure. Prevention, treatment and control of hypertension is a major target of efforts at all stages of heart failure, as hypertension plays an important role in structural and mechanical changes that contribute to heart failure. In the clinic, people who are at high risk before a heart attack can reduce the risk of heart failure by experimenting with lowering blood pressure early and potentially.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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