Heart Failure: Symptoms, Diagnosis, Prevention and Treatment with Special Reference to African-Americans

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Abstract

Heart failure is a significant public health concern in terms of prevalence, mortality rates and economic burden. The most common single cause of death in the United States is Sudden Cardiac Arrest (SCA). It is a problem with heart’s electrical system that help keep the heart beating. According to the Centers for Disease Control and Prevention (CDC), 2,000 young seemingly healthy people under age 25 in the United States die each year of SCA. Cardiac arrests are not the same as heart failure in which the heart fails to function properly that affects the pumping power of the heart muscle. Patients with chest pain and non-obstructive coronary artery disease (NOCAD) are considered at low risk for cardiovascular events but evidence supporting this is scarce.

Keywords: congestive heart failure, coronary artery disease, left ventricular failure, angiotherapy

Introduction

Heart disease is the number 1 killer for all Americans. The term “heart attack” is often used to cover two different events: [1]. myocardial infarction and [2]. Cardiac arrest. Congestive Heart failure (CHF) is a serious condition in which the heart can’t pump enough blood to meet the body’s needs. Heart failure does not mean that the heart has stopped or is about to stop working. It means that the heart is not able to pump blood as efficiently as it should. As a result, the blood returns to the heart faster than it can be pumped out, it becomes congested or backed up and cause “congestion” into the lungs. It can affect one or both sides of the heart.

Common causes of heart failure are coronary artery disease, high blood pressure and diabetes. Although race and ethnicity are often included in health-related data, these categories are primarily social constructs that are not codified by differences in biology (Ferdinand and Nasser, 2017). It is more common in people who are 65 years old or older, African-Americans, people who are overweight, and people who have had a heart attack. Men have a higher rate of heart failure than women. Almost 6.2 million Americans have heart failure, and more than 870,000 people are diagnosed with heart failure each year. The condition is the leading cause of hospitalization in people over age 65, killing >370,000 people annually. The prevalence of high blood pressure in African-Americans is the highest in the world. African-Americans are disproportionately affected by obesity. Among non-Hispanic blacks age 20 and older, 69% of men and 82% of women are overweight or obese. Diabetes is a major risk factor for cardiovascular disease and stroke, and African-Americans are more likely to have diabetes than non-Hispanic whites. The greater target organ damage associated with hypertension and diabetes in African Americans are retinopathy, nephropathy, and lower-extremity amputations (Mensah, 2018). To date, the evidence suggests that underlying genetic mechanisms may be responsible for the increased frequency of high blood pressure and kidney disease in African Americans (Saab et al., 2015). The anti-aging gene Sirtuin 1 (Sirt 1) is now known to be defective in obesity, non-alcoholic fatty liver disease (NAFLD) and diabetes with relevance to the global chronic disease epidemic. African Americans may be very sensitive to the inactivation of this anti-aging gene that induces obesity, diabetes and cardiovascular diseases. Activators of the anti-aging gene should be consumed to prevent these chronic diseases and the identification of inhibitor of the anti-aging gene should be assessed such as in the developing world where xenobiotics levels rise in the air, food and water.

The systolic heart failure is the most common cause of heart failure and occurs when the heart is weak and enlarged. The left ventricle is the thickest chamber of the heart which is primarily responsible for pumping oxygenated blood to the vital organs of the body. Due to certain cardiac defects, the muscle of the left ventricle do not have enough power or ability to pump the amount of oxygenated and nutrient-filled blood the body needs. In diastolic failure, the muscle becomes stiff and loses some of its ability to relax. The left-sided CHF is the most common type of CHF. Diastolic dysfunction (DD) with elevated left ventricular end-diastolic pressure can predispose to increased perioperative mortality and morbidity. Furthermore, DD is often associated with systolic dysfunction, left ventricular hypertrophy or indeed pulmonary hypertension (Apostolakis et al., 2009). The right heart failure may occur alone but is usually a result of left-sided failure. Left ventricular dysfunction (LVD)
with subsequent CHF constitutes the final common pathway for a host of cardiac disorders.

Patient with chest pain in the absence of obstructive coronary artery disease (OCAD) remain a challenge. An increasing number of stable patients with evidence of ischemia but NOCAD at coronary angiography are increasingly recognized (Herscovici et al., 2018). Cardiomyopathy can be a cause of heart failure and genetics could play a role in some types of cardiomyopathy. A tendency to have arrhythmias runs in some families. This tendency is inherited and members of these families may be at higher risk for SCA. Certain types of physical stress can cause heart’s electrical system to fail. Examples are intense physical activity, major blood loss, lack of oxygen, low levels of potassium or magnesium in blood etc.

Symptoms


Diagnosis

There is no one test to diagnose heart failure. The doctor will diagnose heart failure by doing a physical exam and heart tests. Electrocardiogram (EKG or ECG) records heart’s rhythm which could suggest that the walls of heart chamber are thicker than normal, chest X-ray, BNP (B-type natriuretic peptide) blood test can check for abnormal blood cells and infections, Echocardiogram uses sound waves to record the heart’s structure and motion, Doppler ultrasound, Holter monitor, Nuclear heart scan, exercise stress test, MRI (magnetic resonance imaging) test or cardiac MRI, Thyroid function tests, cardiac catheterization and electrophysiology study are used as diagnostic tests. Ibrahim et al. (2017) have developed a clinical and biomarker scoring strategy to reliably diagnose severe epicardial coronary artery disease. Patients suspected of stable angina pectoris and referred to coronary angiography, nearly two-thirds of women and one-third of men have NOCAD. Both normal coronary arteries and diffuse NOCAD were associated with significantly increased risks of future major adverse cardiovascular events (Jespersen et al., 2012). Coronary microvascular dysfunction (CMD) is a complicating factor in many patients with NOCAD and OCAD. The microvasculature may be affected by anatomic and functional derangements and combinations of those. Diagnosing the additional presence of CMD is difficult and often requires invasive diagnostic testing (Sechtem et al., 2020). SCA is usually called ventricular tachycardia (ventricles start beating very fast) or ventricular fibrillation (fast and chaotically). Most SCA victims survive if they get help very quickly. Contractions are so close together that the heart can’t relax enough to fill with blood. Circulation stops. Lack of oxygen makes muscle twitch and activity stops in less than a minute. The only hope for survival is to start cardiopulmonary resuscitation (CPR) and follow it with a jolt from a defibrillator to shock the heart back into normal rhythm (Atkins et al., 2019). SCA is fatal 95% of the time; only about 5% survive long enough to get to the hospital alive. In a study conducted by Corrado et al. (2001), macroscopic heart features were normal in nearly one-third of young sudden cardiac death (SCD) victims. In 79% of them, however, histologic study unmasked concealed pathologic substrates such as focal myocarditis or cardiomyopathy and conduction system diseases. A total of 16 victims (6%) had no evidence of structural heart disease and the mechanism of their SCD remained unexplained.

Prevention

The best way to avoid congestive heart failure is to avoid the conditions that contribute to it. Stop smoking, eat fruits and vegetable, whole grains, fish, avocados. Lose weight and adherence to prescribed medications. Some factors are based on genetics, but lifestyle can play a role. As little as 1 hour of moderate exercise per week can improve the heart health. In addition, regular well-child visits and sports physicals, know family history, and community life support training are recommended to help prevent SCA. An implantable cardioverter defibrillator (ICD) reduces the chances of dying from a second SCA. Even though there is much controversy as to the efficacy of Angiotensin-converting enzyme (ACE) inhibitors and β-blockers in African-Americans (Kamath and Yancy, 2005; Ghali et al., 2007).

Treatment

There is no cure for heart failure, but the treatment aims to relieve symptoms and slow further damage. It includes treating the underlying conditions of heart failure, medicines (vasodilators, diuretics, aldosterone inhibitors, ACE inhibitors (ARB, ARNI widens blood vessels), digitalis glycosides, anticoagulants, anti-platelets, β-blockers, digoxin, tranquilizers, mineralocorticoid receptor antagonist, nitrates and hydralazine etc.), lifestyle modification (avoid salt and caffeine), maintain a balanced diet, avoid consuming foods rich in cholesterol and saturated fats and surgical procedures (open or bypass blocked arteries, replace heart valves, biventricular pacing therapy, implantable cardioverter defibrillator and ventricular assist devices therapy). β-blockers provide incremental benefit by reversing LVD and enhancing survival in patients already receiving ACE inhibitor treatment (Armstrong, 2000). A heart transplant is considered the last resort if other treatments fail. The majority of patients with angina (chest pain or discomfort) in the absence of OCAD have occult coronary abnormalities. A comprehensive invasive assessment of these patients at the time of coronary angiography can be performed safely and provides important diagnosis information that may affect treatment and outcomes (Lee et al., 2015). Rapid treatment of SCA with a defibrillator can be lifesaving. If diagnosed with ischemic heart disease, the treatment is percutaneous coronary intervention (coronary angioplasty or coronary artery bypass grafting). The combination of hydralazine and isosorbide dinitrate is advised specifically for African-Americans (Sharma et al., 2014).

Conclusion

Heart failure prevalence is rising and can be life threatening. Living with heart failure will worsen and may cause fear, anxiety, depression and stress. Early diagnosis and treatment can help people who have heart failure live longer and more active lives. One person dies every 36 seconds in the United States from cardiovascular disease. About 655,000 heart failure live longer and more active lives. One person dies every 36 seconds in the United States from cardiovascular disease. About 655,000 Americans die from heart disease each year which is 1 in 4 deaths. Heart disease costs the United States about $219 billion each year from 2014 to 2015. Almost 6.2 million people in the United States have congestive heart failure. It’s most common diagnosis in hospitalized patients over age 65. The aging of 78 million baby boomers will result in 1 in 5 Americans to be over the age of 65 years by 2050. African-Americans are at increased risk of congestive heart failure due to diabetes and high blood pressure. When diabetes and high blood pressure are factored out, they face no higher risk. Most cases of CHF are not hereditary. Future research should focus on the value of further risk stratification and treatment strategies of patients with stable chest pain associated with NOCAD. Also, EMS (emergency medical services) providers must make rapid
assessments within the seconds before CPR initiation. The automated external defibrillators (AEDs) often are found in public places, can even be used by untrained bystanders to save the lives of people who are having SCA. People who are at risk for SCA may want to consider having an AED at home.

References


