

Congestive Heart Failure

Acute congestive heart failure is one of the most common syndromes encountered in emergency care settings. According to data from the American Heart Association, approximately 6.2 million adults in the United States have heart failure, with about 870,000 new cases diagnosed each year. Correct diagnosis and treatment for pulmonary edema, the most common acute manifestation of CHF, are of primary importance as misdiagnosis can result in deleterious consequences to patients.

CHF Pathophysiology Video

<https://youtu.be/sEg-a5KFcTY>

The following is taken from JEMS- "Mastering CHF"

"Generally, signs and symptoms suggest which side of the heart is involved. If the right ventricle fails, blood will accumulate, and pressure will increase in the venous system. This causes edema of the legs and feet (pre-sacral area in bedbound patients), distension of the jugular veins, engorgement and enlargement of the liver, and weight gain. Typically, the pulse rate will be increased to help compensate for the fall in cardiac output. Failure of the left ventricle causes accumulation of fluid in the pulmonary system (pulmonary edema). Pulmonary edema is the accumulation of fluids in the lung spaces outside the blood vessels. This results in dyspnea, the inability to breathe while lying flat (orthopnea), and abnormal lung sounds (crackles or rales) from fluid accumulation. As more of the lungs are affected, hypoxemia will develop, and the patient will develop altered mental status (e.g., agitation, confusion, anxiety). If untreated, this may progress to coma and death. CHF is often detected and treated before it becomes severe, and your patient's medications will be clues in your assessment. Initially, a diuretic is prescribed to help promote the elimination of water through the kidneys. Usually, furosemide (Lasix) or a similar loop diuretic is used. In addition, many patients are started on digoxin (Lanoxin). Digoxin is a cardiac glycoside that increases the strength of the cardiac contraction. Most patients are also placed on blood pressure medication to counter some of the effects on other body systems involved in the development of CHF. The various findings seen in congestive heart failure all point to failure of the heart as an effective forward pump. As CHF worsens, oxygen delivery to essential tissues, such as the brain, declines, and the patient becomes symptomatic, exhibiting confusion, malaise, and agitation. When oxygen delivery begins to fall, the condition is emergent."

CHF Auscultation

Auscultation has long been important for the diagnosis of heart diseases. Heart sounds heard by a stethoscope can be seen as mechanical instructions that indicate the operation of the cardiac system. The third and fourth heart sounds, which are two abnormal components of heart sounds during diastolic periods, have been found to have relationships with myocardial dysfunction. The third heart sound (S3) occurs in the rapid filling period of early diastole. It is often present in systolic dysfunction. Abnormal S3 is considered to be caused by altered physical properties of the ventricle or an increase in the rate and volume of blood flow in the rapid filling phase during ventricle diastole. Sometimes it occurs in children. However, the auscultation of S3 in adults, especially individuals older than 40 years old, is abnormal and is connected with heart failure. The fourth heart sound (S4) occurs in late diastolic periods right before the first heart sound. The presence of S4 is due to the forceful contraction of the atria in an effort to overcome an abnormally stiff or hypertrophic ventricle. It can be detected in patients with diseases of diminished left ventricular compliance, such as acute myocardial infarction or ischemia.

1) Folland ED, Kriegel BJ, Henderson WG, Hammermeister KE, Sethi GK. Implications of 3rd Heart Sounds in Patients with Valvular Heart-Disease. *New Engl J Med*. 1992;327:458–462.

2) Shah PM, Gramiak R, Kramer DH, Yu PN. Determinants of atrial (S4) and ventricular (S3) gallop sounds in primary myocardial disease. *N Engl J Med*. 1968;278:753–758.

3) Michaels AD, Shah SJ, Nakamura K, Marcus GM, Gerber IL, McKeown BH, Jordan MV, Huddleston M, Foster E. Association of the fourth heart sound with increased left ventricular end-diastolic stiffness. *Journal of Cardiac Failure*. 2008;14:431–436.

Sounds of Heart Failure Video

<https://youtu.be/F2YciEhVJ10>

Treatment Video

<https://youtu.be/wuTXMlc9NQM>

GO-PAP Video

<https://youtu.be/Yh4Z3UbnA7k>