

## LECTURE 8

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### CONGESTIVE HEART FAILURE (CHF)

Read Chapter 25 on CHF prior to working through the lecture material below.

The term “**congestive heart failure**” is quite descriptive of the disorder and easily understood when interpreted correctly. Unfortunately the term “**heart failure**” is often misused and misunderstood by being associated exclusively with cardiac arrest. Admittedly, an arrested heart has failed, but failure can occur while the heart is still beating. In fact, heart failure results anytime the heart fails to output sufficient blood to meet the body’s needs. And, the heart does not always fail completely on both sides. Instead, CHF can begin either on the right or left side. However, without intervention, a failure of one side can lead to failure of the other and “**complete CHF**”. Using this broader definition, heart failure can occur under a variety of conditions. Essentially, anything that resists cardiac output can result in heart failure. Similarly, the term “**congestive**” is self-explanatory, but somewhat tricky to assess since the signs and symptoms are often misleading. In a congestive failure when output is diminished, blood “backs up” within parts of the circulatory system and this congestion of blood produces the observed signs and symptoms, which may be different from what might be expected.

**For a clear understanding of these signs and symptoms, knowledge of the directional flow of blood through the heart and great vessels entering and leaving it is essential. It is important to realize that the right heart pumps to the lungs but receives its blood from systemic circulation and vice versa. Thus, to understand congestive failures you must be able to work “backwards” through the normal flow directions of blood as it enters and leaves the chambers of the heart.**

#### Left-Sided CHF

Beginning with failure of the left heart, a number of common causes and clinical manifestations can be seen. Systemic hypertension is a common disorder and serves to illustrate these points. Recall that any hypertension increases the “afterload” on one or both of the ventricles and can cause that ventricle to enlarge and maybe fail to output sufficient blood against such high arterial pressures. If the hypertension is systemic, the left side of the heart will be affected first. Following the progression of this left-sided failure in a step-by-step fashion:

- (1) Left ventricle fails to empty completely because of high aortic pressure.
- (2) Blood congests in left ventricle increasing the left ventricular ESV.
- (3) Left atrium can not empty completely because of the increased ESV in the left ventricle.
- (4) Blood congests in the left atrium increasing the left atrial ESV.
- (5) Blood returning to the left atrium via the pulmonary veins has nowhere to go because of the increased volume remaining in the left atrium.
- (6) Blood congests in the pulmonary veins.
- (7) With the high venous pressure in pulmonary veins, capillary pressures in the lungs increase as blood congests there.
- (8) Increased capillary pressure raises the filtration rate causing fluid to accumulate in the lung interstitial spaces (pulmonary edema) and in the lung airways (moist “rales”) resulting in diminished gas exchange and dyspnea.
- (9) Without intervention, the increased pulmonary congestion of blood can cause (pulmonary artery hypertension, PAH) and impair the emptying of the right ventricle causing the right side to fail as well.

**Notice!!** Failure of the left heart, which outputs blood to systemic circulation, causes signs and symptoms in the pulmonary system—confusing unless you can work backwards through the blood flow direction in the heart and great vessels.

From the flow chart in your text on page 504, be sure you can use the same step-by-step procedure demonstrated above to explain the physiological basis of each of the conditions charted there.

**Post any situations you have problems with to the “Patho Discussion Group” so the entire class can assist in the solutions.**

## **Right-Sided CHF**

Understanding right sided failure is similar to that of the left side. The only differences being in knowing the origins and destinations of blood passing through the right heart. Keep in mind that blood returning to the right heart comes from systemic circulation and is to be pumped to the lungs. Consequently, anything that impairs blood flow through the lungs can cause congestion in the pulmonary artery and interference with right ventricle emptying leading to right-sided failure. Should the right side fail, the congestion of blood occurs in systemic veins as evidenced by peripheral edema and neck vein distension.

From the flow chart in your text on page 507, be sure you can use the same step-by-step procedure demonstrated above to explain the physiological basis of each of the conditions charted there.

**Post any situations you have problems with to the “Patho Discussion Group” so the entire class can assist in the solutions.**

**Notice!!** At this point, the interactions among organ systems is becoming apparent. For example, respiratory and renal problems can lead to cardiovascular signs and symptoms and vice versa. **This is an extremely important concept in this course and must be mastered to avoid distracting signs and symptoms that lead to errors in client assessment!**

### **REVIEW QUESTIONS:**

1. Why would symptoms of left CHF be more pronounced with clients in a recumbant position?
2. Why might renal failure lead to respiratory signs and symptoms?
3. What is a valve stenosis and a regurgitation (incompetence)? How could these valve disorders lead to CHF?

### **DISCUSSION QUESTIONS: (Post answers to the “Patho Discussion Group”)**

1. Why would COPD clients show right heart enlargement (cor pulmonale) on an EKG?
2. Why might a massive left ventricular MI lead to renal failure with low urine output?