Managing Acute Decompensated Heart Failure

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KEYWORDS

• Heart failure • Myocardial infarction • Cardiomyopathy • Hospitalizations

KEY POINTS

- In patients with acute decompensated heart failure, an important first step is to determine the factors that precipitated the deterioration in cardiac function or increased the body's demand.
- Such factors can include myocardial ischemia, poorly controlled hypertension, atrial fibrillation, anemia, thyroid disease, noncompliance with medications, excessive salt or fluid intake, as well as deterioration in kidney function.
- Patients often require management in an intensive care unit setting, which allows for gradual volume removal, telemetric monitoring, and ongoing electrolyte replacement.
- Patients with end-stage heart failure may progressively deteriorate despite maximal medical therapy.
- Some patients with end-stage heart failure are candidates for a ventricular assist device or cardiac transplantation; for those who are not, end-of-life care should be openly discussed.
- Precipitants of heart failure can include systolic dysfunction, diastolic dysfunction, acute dysrhythmia, or valvular heart disease.
- Vigilance for the triggers of heart failure exacerbations gives the physician the best chance of recognizing the occasional patient with a reversible cause.

INTRODUCTION: NATURE OF THE PROBLEM

Acute decompensated heart failure (ADHF) refers to the sudden onset of fatigue, breathlessness, and edema that occurs when cardiac function cannot keep pace with the body's demand. This may occur due to impaired contractility during systole, impaired relaxation during diastole, acute abnormalities of rhythm, or valve dysfunction. ADHF may occur de novo, as for example with acute myocardial infarction. Most cases, however, occur due to exacerbation of an underlying chronic cardiomyopathy.

ADHF is a growing medical problem. It is the leading reason for hospital admission among patients over age 65.[1] It is the most costly cardiovascular disorder in Western countries, and the short-term mortality following hospital admission in most studies exceeds 10%.[2]

In evaluating the patient with ADHF caused by cardiomyopathy, consideration of the cause may help the physician identify treatable, reversible causes. Depending on the patient population studied, cases of cardiomyopathy generally segregate with one-third due to hypertensive heart disease, one-third due to ischemic heart disease, and one-third due to myocyte heart disease (Fig. 1). Myocyte heart disease is predominantly made up of patients with idiopathic cardiomyopathy. However, it also includes such diverse causes as genetic familial cardiomyopathies, peripartum cardiomyopathy, coxsackie viral cardiomyopathy, and exposure-related cardiomyopathies including

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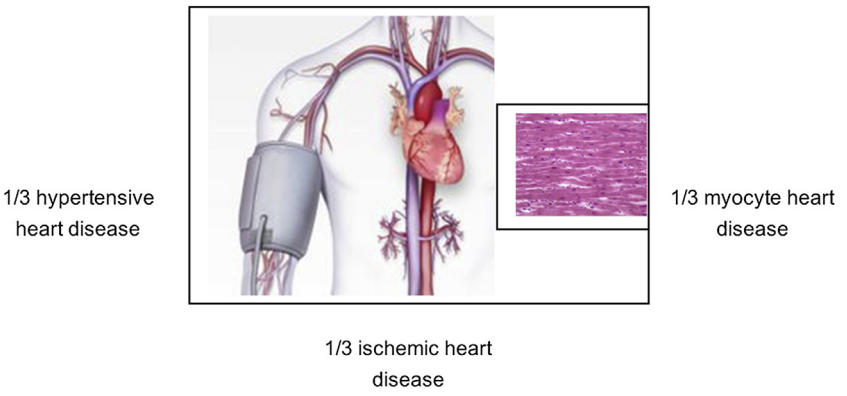

Fig. 1. Cardiomyopathy-related heart failure. The 3 principal etiologies are shown. Hypertensive heart disease is illustrated by the blood pressure cuff. Ischemic heart disease is shown by the heart's coronary arteries. Myocyte heart disease is indicated with the close-up histologic section of cardiac muscle. (Source: American Heart Association.)

those due to alcohol, cocaine, or chemotherapeutic agents.

ADHF is generally precipitated by a new disturbance that places hemodynamic load on an already failing ventricle. Such precipitants can include tachyarrhythmias, acute anemia, or systemic infection. The most common cause, however, of reversible cardiac decompensation is noncompliance: either with diet, salt restriction, medications, or a combination. Even a small increase in dietary sodium, a change in fluid intake, or intermittent failure to take a medication can trigger a heart failure exacerbation in this population. Use of drugs such as nonsteroidal anti-inflammatory agents may blunt diuresis and the vasodilatory effects of the renin-angiotension-aldosterone antagonists, thus resulting in ADHF.[3] For treatment, coronary revascularization can be an effective approach if active angina accompanies the heart failure. The benefit of revascularization is most pronounced when large amounts of viable myocardium are suitable for revascularization. Indeed, the most common contributing comorbidities are active myocardial ischemia, poorly controlled hypertension, or initiation of atrial fibrillation. Any of these can contribute to ADHF. In addition, patients are now being treated more commonly for diuretic resistance and the cardiorenal syndrome. Kidney dysfunction is now recognized as a late-stage exacerbating factor that plays a larger role as patients become more refractory to medication therapy. This has led to an increasing use of ultrafiltration for diuretic-resistant patients[4] and hemodialysis for patients with progressive kidney disease. Each of these strategies can play a role in re-establishing a new set point for the heart failure patient's fluid balance and hemodynamic stability.

MANAGEMENT GOALS

Patients with ADHF generally present with some combination of dyspnea, fatigue, volume overload, hypotension, and end-organ dysfunction. The first goal is to relieve symptoms, especially in patients who have signs of congestion. The goals of medical treatment are to bring the ventricular filling pressures down to the normal range and optimize end-organ perfusion. While hospitalized, there is the ability to assess the patient's often complex medication regimen and the patient's ability to comply. Similarly, hospitalization allows for a period of patient education focused on salt and fluid restriction and on daily monitoring of body weight as a surrogate for fluid retention.

Finally, the time in hospital allows the physician to readdress advanced treatment options. These may include antiarrhythmic therapy or cardioversion for atrial tachyarrhythmias, coronary revascularization for patients with treatable ischemic heart disease, or cardiac resynchronization therapy for patients with significant dyssynchrony as evidenced by QRS duration on electrocardiogram (ECG) greater than 120 to 130 milliseconds. Still more aggressive treatments, including support with ventricular assist device or pursuing cardiac transplantation, can be entertained.

PHARMACOLOGIC STRATEGIES

Intravenous diuretics, especially furosemide and bumetanide, have remained the primary first-line treatment for ADHF for many decades. The optimal dosing of diuretic therapy remains controversial. A randomized study published in 2011 studied high-dose and low-dose strategies and