Chapter 9
Advanced Heart Failure Management and Selection for Advanced Therapies

Alexander Papolos
Icahn School of Medicine at Mount Sinai, USA

Elrond Teo
Emory University Hospital, USA

Nishant A. Gandhi
Icahn School of Medicine at Mount Sinai, USA

Raymond Bietry
Icahn School of Medicine at Mount Sinai, USA

ABSTRACT

Advancements in the field of heart failure have significantly improved both mortality and the quality of life of millions. However, heart failure generally remains a chronic disease with an insidious progression to organ failure despite optimal medical treatment. Early consideration of advanced therapies such as mechanical circulatory support and cardiac transplantation in advanced heart failure is essential. The purpose of this chapter is to assist the reader in the identification of patients with advanced heart failure that have not yet developed irreversible end-organ dysfunction, as interventions in this narrow therapeutic window results in improved post-surgical outcomes.

INTRODUCTION

Heart failure is a multifaceted clinical syndrome of impaired cardiac function in which the heart fails to meet the metabolic demands of the body. Today an estimated 5 million Americans are living with heart failure, and current projections estimate this will increase 25% by 2030 (Go et al., 2013). In 2011, heart failure was the second most common reason for hospitalization among Americans aged 65-85 (Pfuntner, Wier, & Stockes, 2013). Not only is heart failure a menace to public health, but in 2013 the economic burden associated with its treatment was approximated to be $32 billion (Go et al., 2013).

Large randomized controlled trials have provided a robust armament of pharmacological and electro-physiological therapies to improve both mortality and quality of life. Unfortunately, events such as life threatening arrhythmias, clinical decompensation, and progressive end-organ damage remain common

among patients with heart failure. Thus, early consideration of mechanical circulatory support and cardiac transplant must be made in patients at increased risk of morbidity and mortality despite adequate medical therapy.

Objectives

1. Understand guideline directed therapy for heart failure.
2. Identify the patient refractory to medical therapy.
3. Understand the role of pre-surgical optimization prior to surgery for advanced therapies.

Heart Failure Pathogenesis

Heart failure is a progressive disease of deteriorating cardiac function. The inciting event that initiates progressive decline may be acute, such as with myocardial infarction, or insidious in nature as seen in structural, hypertensive, metabolic, infectious, genetic, toxic, and tachyarrhythmic induced cardiomyopathies. Regardless of etiology, suboptimal pump function stimulates compensatory homeostatic neurohormonal mechanisms that lead to myocardial damage, fibrosis, and negative remodeling that further beget disease progression.

Thus, when patients are found to have undifferentiated cardiomyopathy, it is paramount to determine the underlying etiology. There are a myriad of diseases associated with the development of cardiomyopathy as outlined in Table 1 (Table of common cardiomyopathies by etiology.), however specific attention should be made to those that are potentially reversible. The first step in delineating an etiology begins with obtaining a comprehensive history. Ischemic cardiomyopathy should be strongly considered in all patients, particularly those with risk factors or known coronary artery disease. History of cancer should prompt suspicion for infiltrative disease as seen with amyloidosis in multiple myeloma, as well as the effects of treatment with cardiotoxic therapies such as anthracyclines or chest radiation. Elements

Table 1. Etiologies of cardiomyopathy

Category	Example
Ischemic	Coronary artery disease, coronary embolus, coronary dissection
Infectious	HIV, Lyme, Coxsackie, Chagas, rheumatic
Hereditary	Arrhythmogenic right ventricle, ventricular non-compaction, hypertrophic, mitochondrial disorders, glycogen storage disorders, muscular dystrophy
Valvular	Mitral regurgitation, aortic regurgitation, aortic stenosis
Congenital	Ventricular septal defect, tetralogy of fallot, transposition
Autoimmune	Systemic lupus erythematosus, giant cell myocarditis, scleroderma, rheumatoid arthritis, hypersensitivity myocarditis, endocardial fibroelastosis
Toxin	Alcohol, cocaine, anthracyclines, amphetamines, antiretrovirals
Arrhythmias	Tachycardia induced
Infiltrative	Amyloidosis, hemochromatosis, sarcoidosis
Nurtritional	Thiamine deficiency
Misc	Takotsubo, peripartum, radiation, thyrotoxicosis, sleep apnea

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