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Preface: Heart Failure: A Common and Complex Clinical Syndrome xi
Prakash C. Deedwania

The Epidemiology and Pathophysiology of Heart Failure 881
Shradha Rathi and Prakash C. Deedwania

Heart failure (HF) remains a major growing public health problem in the United States. Despite extensive understanding of the mechanism at the molecular level and innovations in therapy, HF carries high morbidity and mortality rates, with frequent hospital admissions. In the Medicare population, HF is the leading cause for hospitalization, accounting for more than 1 million admissions per year. The authors provide a review of the epidemiology and pathophysiology of HF.

Pathophysiology of Systolic and Diastolic Heart Failure 891
Kanu Chatterjee

Systolic and diastolic heart failure are the 2 most common clinical subsets of chronic heart failure. Left ventricular “Starling” function is depressed in patients with systolic heart failure. In systolic heart failure, left ventricular mass is increased, which can be measured by transthoracic echocardiography. Cardiac magnetic resonance imaging is a more precise technique to measure left ventricular mass. Neurohormonal activation is a major pathophysiologic mechanism for ventricular remodeling and progression of heart failure in systolic heart failure.

The Appropriate Use of Biomarkers in Heart Failure 901
Punam Chowdhury, Rajiv Choudhary, and Alan Maisel

The activation of compensatory pathways and ongoing hemodynamic changes result in the release of biomarkers that can be monitored to chart disease progression and possibly target for therapy. We will review the biomarkers of heart failure that have been the focus of much discussion and research, including neurohormonal markers, particularly natriuretic peptides, cardiac injury markers, specifically troponins, inflammatory marker sST2, and matrix remodeling marker Galectin-3. In addition, we will discuss cardiorenal markers that have shown promise in improving risk stratification of patients with HF with worsening renal function, such as cystatin C, neutrophil gelatinase-associated lipocalin (NGAL), and kidney injury molecule-1 (KIM-1).

Evidence-Based Therapy for Heart Failure 915
Prakash Deedwania and Enrique Carbajal

Heart failure (HF) is a major public health problem associated with increased morbidity and mortality. As the US life expectancy increases and the population ages, the overall prevalence of HF will continue to
escalate. The increasing use of effective selective therapies such as neurohormonal blockade in the treatment of patients with HF has led to considerable improvement in the prognosis. During the past several decades, some studies have demonstrated the benefits of treatment; based on the evidence available from these studies, various national and international guidelines have specific recommendations for the evidence-based therapy with these drugs in patients with HF.

Diuretics in Heart Failure: Practical Considerations
Jagroop Basraon and Prakash C. Deedwania

This review discusses the role of diuretics in heart failure by focusing on different classifications and mechanisms of action. Pharmacodynamic and pharmacokinetic properties of diuretics are elucidated. The predominant discussion highlights the use of loop diuretics, which are the most commonly used drugs in heart failure. Different methods of using this therapy in different settings along with a comprehensive review of the side-effect profile are highlighted. Special situations necessitating adjustment and the phenomenon of diuretic resistance are explained.

Inotropic Therapy: An Important Role in the Treatment of Advanced Symptomatic Heart Failure
Patrick McCann and Paul J. Hauptman

Inotropic therapy remains an option in the management of patients with advanced heart failure symptoms from systolic dysfunction who do not respond to conventional therapies. The decision to use this class is largely predicated on an accurate evaluation of the patient’s fluid and perfusion status. Selection of the appropriate agent and dosing regimens requires an understanding of the underlying pathophysiology of heart failure and concomitant therapy. Most important, the goals of care should be stated clearly, given inherent risks associated with this class of drug.

Renal Dysfunction in Heart Failure
Robert T. Cole, Amirali Masoumi, Filippos Triposkiadis, Gregory Giamouzis, Vasiliki Georgiopoulou, Andreas Kalogeropoulos, and Javed Butler

Renal dysfunction is a common, important comorbidity in patients with both chronic and acute heart failure (HF). Chronic kidney disease and worsening renal function (WRF) are associated with worse outcomes, but our understanding of the complex bidirectional interactions between the heart and kidney remains poor. When addressing these interactions, one must consider the impact of intrinsic renal disease resulting from medical comorbidities on HF outcomes. WRF may result from any number of important processes. Understanding the role of each of these factors and their interplay are essential in understanding how to improve outcomes in patients with renal dysfunction and HF.

Management of Comorbid Conditions in Heart Failure: A Review
Vijaiganesh Nagarajan and W.H. Wilson Tang

Multiple comorbidities are common in patients in heart failure. Some of them could contribute to the development of heart failure, whereas others
may lead to disease progression and may be associated with poor prognosis. It is not only important to diagnose those comorbid conditions early, but also vital to treat those conditions appropriately, which may have a huge impact on the primary disease itself. The common conditions are discussed in this review, but there are multiple other comorbidities beyond the scope of this article. The physician should try treating “patients as a whole” instead of treating the specific disease, and this approach may require multidisciplinary care.

Atrial Fibrillation in Heart Failure
Joel A. Lardizabal and Prakash C. Deedwania

Heart failure (HF) and atrial fibrillation (AF) are highly prevalent debilitating conditions that often coexist and are frequently encountered in clinical practice. The presence of chronic AF is a marker of worse prognosis in patients with HF, and the onset of new AF in those with chronic HF is associated with increased morbidity and mortality. Advances in the development of novel drugs, nonpharmacologic modalities, and therapeutic strategies, as well the increased understanding of the pathobiology of HF and AF, are key to mitigating the tremendous public health burden that is associated with these conditions.

Breast Cancer Therapies and Cardiomyopathy
John Groarke, Amanda Tong, Jay Kambhati, Susan Cheng, and Javid Moslehi

The prevalence of chemotherapy-related cardiac disease is increasing because of patient survivorship and the development of novel chemotherapies that may be cardiotoxic. Management requires a multidisciplinary approach from cardiologists and oncologists. Pretreatment identification of predisposing risk factors and assessment of cardiac function before and at intervals during and after therapy with cardiotoxic agents are necessary. In clinical practice, surveillance is largely performed using transthoracic echocardiography or multi-gated radionuclide angiography. Imaging strategies that detect cardiac injury before overt left ventricular systolic dysfunction provide an opportunity for early intervention and improved cardiac outcomes.

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