Surgical Management
of Congestive Heart Failure
CONTEMPORARY CARDIOLOGY

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FOREWORD

There are 4 to 5 million people with heart failure in the United States alone. Included in this diagnosis are patients who have decreased left ventricular contractility and ejection fraction but no symptoms, and patients who have “preserved” ejection fraction, even supernormal in hypertrophic cardiomyopathy, in whom an impairment of ventricular filling leads to exercise intolerance and elevated venous pressures. However, the majority of patients currently diagnosed have left ventricular ejection fraction 20–40% and mild to moderate symptoms of heart failure.

Medical Therapy for Heart Failure

For these patients, there have been major advances in pharmacologic therapy since the late 1980s, since the demonstration that vasodilator therapy improves outcome in heart failure. Subsequent trials showed that inhibition of the renin-angiotensin system enzyme bestows additional benefit, decreasing recurrent ischemic events and improving outcomes for patients with diabetes, as well as decreasing the left ventricular dilation, or “remodeling” that characterizes heart failure progression. Even more striking for survival benefit has been the addition of β-adrenergic blocking agents. The complexity of initiation and uptitration of β-blocking agents has highlighted the chasm between the recommended therapeutic regimen and the limited experience and resources available to establish and maintain that regimen in the community. The true impact of the therapies proven in clinical trials has not yet been realized, but may be less than anticipated when those therapies are provided without clinical trial-level surveillance to populations on average 10 years older and with more co-morbidities.

Although inhibition of the renin-angiotensin system and β-receptors of the sympathetic nervous system have provided the cornerstones of our pharmacologic therapy, it is not clear whether more benefit can be derived from further neurohormonal modulation. Trials of central sympatholysis, angiotensin receptor blockers, cytokine inhibitors, and endothelin antagonists may even be deleterious on top of the known therapies. Furthermore, as heart failure progresses, an increasing proportion of patients are unable to tolerate reflex inhibition, first showing intolerance to β-blockers, then to angiotensin-converting enzyme (ACE) inhibitors. Symptoms of con-
gestion can be relieved at most stages of heart failure until close to the end stage, when the cardiorenal syndrome often becomes limiting before there is other evidence of refractory low output states. Oral inotropic therapy to improve cardiac output was abandoned owing to a small but significant increase in mortality. Paradoxically, intravenous inotropic therapy is increasingly used to provide palliation at the end stage of heart failure. Expected survival is less than 50% at 6 months for patients who are dependent on chronic inotropic therapy.

Surgery for Heart Failure: Repair, Remodeling, and Replacement

Since medical therapy for heart failure has delayed but not prevented disease progression, there is increasing interest in more definitive therapy. Many previous surgical approaches were tried and subsequently abandoned, whereas transplantation became an accepted therapy without any controlled experiment. More recently, the template of the double-blind randomized clinical trial that has validated drug therapies has been superimposed with some awkwardness on investigation of procedures and devices. After initial feasibility has been shown, systematic performance and documentation of outcomes with a new therapy without randomization can provide conclusive evidence of lack of sufficient efficacy to merit a controlled trial, as with the commendable experience of the Cleveland Clinic with the left ventriculectomy procedure. For cardiomyo-plasty, the limited functional improvement observed was not sufficient to maintain enthusiasm for the courageously planned randomized trial, subsequently plagued with slow enrollment. For benefit, it remains possible that early experience carefully recorded with a new procedure could be sufficiently positive to constitute a “breakthrough” development, after which equipoise could not then be established for a randomized trial. More often, there are encouraging results that warrant further investigation with a prospective control arm. It should be recognized, however, that inability to provide an ethical double blind limits both patient enrollment and the interpretation of results for such trials. These limitations and the inherently greater cost and risk of surgical procedures mandate a higher bar of obvious benefit before acceptance of a new surgical procedure for heart failure.

Inherent in consideration of surgery for heart failure is the recognition that some patients are more likely to benefit than others. In this respect, the surgical approaches are already advanced beyond the medical approaches, which have been hindered by the assumption of homogeneity of the heart failure populations. In Surgical Management of
Congestive Heart Failure, multiple different procedures for heart failure are presented, together with careful description of the candidate populations for each. For procedures such as revascularization and valve repair or replacement, the benefit has been well established for some populations. The challenge here is to push the envelope to identify when such procedures may offer meaningful benefit for patients once considered to be “too late” in the stage of their disease. Other procedures under active investigation for advanced stages of disease, such as ventricular reconstruction or external constraint devices, may eventually be introduced earlier in the course of disease to limit disease progression. At the end of the road, the goal of effective cardiac replacement looms large. Cardiac transplantation at this time remains the greatest success story for truly end-stage disease, with more than 50,000 patients now transplanted worldwide. The breadth of its impact far exceeds the actual recipients, however, because the lure of cardiac transplantation called attention to the newly defined population of advanced heart failure, whereas the restricted donor supply inspired the development of better heart failure management and of new strategies for replacement, such as mechanical cardiac devices and xenotransplantation.

The Right Therapy for Each Patient

Heart failure has legitimately moved into a field of its own. After a barren period in the mid-1990s when medical therapy was ACE inhibitors and surgical therapy was transplantation, better understanding of the physiology of heart failure has yielded a cornucopia of potential options. At the same time, survival alone is no longer the only count of success. The implanted defibrillators have decreased the cloud of sudden death, and biventricular pacing has shown larger improvement in symptoms than seen with neurohormonal therapy, but issues of functional capacity and quality of life are increasingly relevant. Heart failure is not one disease, and the heart failure patient is not a composite of averages. The individual patient has developed heart failure uniquely through injury and adaptation, suffers the limitations of heart failure uniquely, and seeks therapy with unique expectations regarding length and quality of survival, tempered by risk-taking preferences that can be honored but not predicted. This book seeks to encompass both the large studies and the vital experiences. Improved outcome in heart failure must be calibrated and tracked for populations, but will ultimately be provided by individual physicians for individual patients.

Lynne W. Stevenson, MD
Congestive heart failure (CHF) is one of the leading causes of hospitalization in the United States and is associated with significant morbidity and mortality. Pharmacologic therapies have had a significant impact on the disease, but have been primarily limited to angiotensin-converting enzyme inhibitors and β-blockers. Inotropic agents and other vasodilators are available and effective for the acute management of heart failure, but are associated with poor long-term outcomes. Until recently, few surgical therapies were available for severe end-stage CHF short of cardiac transplantation. With the advent of better surgical techniques and improved pre- and postoperative medical management, traditional surgeries for severe left ventricular dysfunction can now be performed with reasonable success. Furthermore, the advances in mechanical circulatory support devices have made the concept of bridging to transplant and bridging to recovery a reality. Even permanent mechanical circulatory support is now available. Finally, other novel approaches using various devices are constantly being investigated.

The surgical options for the end-stage heart failure patient are now numerous and effective. The aim of Surgical Management of Congestive Heart Failure is to bring together the latest clinical, scientific, and investigational surgical approaches to improve the lives of this challenging group of patients. The book is written by leading authorities in both cardiovascular surgery and cardiology as the management of these patients has necessitated an increasingly multidisciplinary approach. We hope that the readers will get a broad yet in-depth understanding of the options that can be offered to their patients and what the future holds for the surgical and device-oriented treatment of heart failure.

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CONTENTS

Foreword ...................................................................................................................... v
Preface ......................................................................................................................... ix
Contributors ................................................................................................................ xiii

1 Recent Advances in Cardiac Allotransplantation .......... 1
  John Adams Jarcho and James C. Fang

2 Surgical Revascularization in the Management of Heart Failure and Ischemic Left Ventricular Dysfunction ........................................................... 39
  Jeffrey J. Teuteberg and James C. Fang

3 Aortic Valve Surgery With Severe Left Ventricular Dysfunction ........................................................... 67
  Blasé A. Carabello

4 Mitral Valve Surgery With Severe Left Ventricular Dysfunction ........................................................... 79
  Vinay Badhwar and Steven F. Bolling

5 Tricuspid Valve Surgery in Right Heart Failure ........... 97
  James P. Greelish, Bradley J. Phillips, James C. Fang, and John G. Byrne

6 Pacing in Heart Failure ................................................................. 123
  Uday N. Kumar, Teresa De Marco, and Leslie A. Saxon

7 Left Ventricular Assist Devices ........................................... 155
  Paul L. DiGiorgi, Yoshifumi Naka, and Mehmet C. Oz

8 Left Ventricular Volume Reduction Surgery for Idiopathic Dilated Cardiomyopathy .......... 191
  Richard Lee, Mohammed A. Quader, Katherine J. Hoercher, and Patrick M. McCarthy
9 Surgical Management of Hypertrophic Cardiomyopathy ................................................. 203

10 Dynamic Cardiomyoplasty and New Prosthetic LV Girdling Devices ........................................ 225
Michael A. Acker

11 Xenotransplantation ................................................................. 239
Joren C. Madsen and Ruediger Hoerbelt

12 Left Ventricular Reconstruction for Ischemic Heart Failure ................................................. 279
Vincent Dor

13 The Total Artificial Heart in the Surgical Management of Congestive Heart Failure ....... 301
Jack G. Copeland, Francisco A. Arabia, and Richard G. Smith

Index ................................................................................................. 317
CONTRIBUTORS

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