

Interventional Cardiology

Percutaneous Noncoronary Intervention

Edited by

Howard C. Herrmann, MD



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INTERVENTIONAL CARDIOLOGY

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FOREWORD

The development of catheterization of the right side of the heart was a milestone in the twentieth century. Following the bravado of Werner Forssman's self-catheterization and the subsequent systematic application of the technique by Cournand and Richards and then many others, by the early 1960s, catheterization had emerged as the premier cardiac diagnostic technique for congenital and valvular heart disease.

A number of seminal technical developments followed. These included percutaneous access to the venous and arterial vascular beds, a variety of approaches to catheterization of the left side of the heart, and of course the perfection of coronary arteriography. During the 1970s, therapeutic applications of cardiac catheterization were first introduced, including percutaneous transluminal coronary angioplasty by Gruntzig. Less well known was atrial septostomy for transposition of the great arteries by Rashkind. These were the "opening shots" of a revolution in cardiac therapy using catheter-based techniques which is still ongoing and gathering momentum. Simultaneously, echocardiography was developed and its role as an important diagnostic technique became established.

By the end of the twentieth century, the role of cardiac catheterization had changed drastically. Just as echocardiography and other non-invasive imaging techniques displaced catheterization as the premier cardiac diagnostic method, so were catheter-based approaches displacing surgery as the principal method for repairing anatomic cardiac and vascular abnormalities. Of course, percutaneous coronary interventions have been the mainstay of interventional cardiology. However, beginning with atrial septostomy and then percutaneous mitral balloon valvuloplasty, progress in noncoronary intervention has been accelerating rapidly and on many fronts. Most visible have been the procedures to improve valve function, including percutaneous valve replacement. However, advances in closure of patent foramina ovale as well as atrial and ventricular septal defects are quite impressive. A variety of adjunctive coronary interventions including alcohol septal ablation are gaining a foothold. Disorders of the aorta, carotid, and peripheral arteries, long the domain of the vascular surgeon, are now increasingly managed through catheterization techniques.

Dr. Herrmann, a pioneer in interventional cardiology, has made a major contribution by editing this fine book, *Interventional Cardiology: Percutaneous Noncoronary Intervention*. He has brought together world leaders who have contributed their enormous expertise to this field which is growing rapidly in importance. Although this volume is as current as last month's meetings, it is nonetheless carefully edited, finely illustrated, and well referenced.

Dr. Herrmann and his talented coauthors deserve the thanks of the growing number of interventional cardiologists who are looking beyond the coronary vascular bed and to the growing number of patients who can benefit from percutaneous noncoronary interventions.

Eugene Braunwald, MD
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PREFACE

From its beginnings, the field of interventional cardiology has been defined by coronary interventions. Today, percutaneous coronary intervention with balloon angioplasty, bare metal, and drug-eluting stents has become the predominant form of coronary revascularization and the most frequent therapeutic intervention in the modern cardiac catheterization laboratory. However, as this field has matured, cardiologists have found novel ways to apply their expertise with wires, guide catheters, balloons, and stents to a number of other vascular beds and structural cardiac diseases.

Specifically, in the area of valvular heart disease, percutaneous noncoronary intervention began with the pioneering work of Jean Kan and Kanji Inoue, who demonstrated the usefulness of balloon valvuloplasty for stenotic valvular heart disease. Part I of *Interventional Cardiology: Percutaneous Noncoronary Intervention* focuses on valvular heart disease and is introduced by reviews of balloon valvuloplasty for mitral stenosis (Chapter 1) and for aortic and pulmonary valve stenosis (Chapter 2). In this regard, one of the most exciting current areas of clinical investigation in valvular heart disease involves a new treatment for aortic stenosis with a stented percutaneously inserted aortic valve as described in Chapter 6. Advancements are also being made in the treatment of regurgitant valvular disease, particularly mitral regurgitation. Chapters 3–5 describe the pathophysiology of mitral regurgitation, and percutaneous approaches either through the coronary sinus or by direct leaflet modification.

Part II describes new interventions for structural heart disease focusing on septal defects at both the atrial and ventricular level. These chapters include descriptions by experts in the field on the use of closure devices for atrial and ventricular septal defects. Although no one would dispute the value of closing a large, hemodynamically significant atrial or ventricular septal defect, the use of devices for closure of patent foramen ovale and to exclude the left atrial appendage in order to reduce the risk of stroke is more controversial. In this regard, Chapter 7 describes the neurologic considerations in PFO closure prior to a discussion of closure devices in Chapters 8, 9, and 12.

Although one goal of this book was to avoid discussion of conventional coronary revascularization, many new and novel devices are being developed as adjunctive therapies during coronary interventions. Nowhere is this more apparent than in the area of myocardial infarction (Chapter 13) and for cardiogenic shock where new percutaneous mechanical assist devices are being utilized (Chapter 14). The use of alcohol septal ablation to modify hypertrophic obstructive cardiomyopathy is another example of a coronary intervention that falls outside of the usual revascularization procedure (Chapter 15). Finally, the last chapter in this section describes myocardial regeneration and therapeutic angiogenesis via both coronary and myocardial approaches.

Probably the most frequent and successful of the noncoronary interventions to date involves the use of angioplasty techniques to treat extracardiac vascular disease. Chapters 17 and 18 describe peripheral intervention in the renal, iliac, and carotid territories. Aortic stent grafting is currently a mostly surgical field as described in Chapter 19, but it is likely that technologic advancements in the future will allow diseases of the aorta to be treated percutaneously in the cardiac catheterization laboratory.

The last section of the book deals with the important adjunctive imaging modalities utilized in these new percutaneous noncoronary interventions. Echocardiography, whether transthoracic, transesophageal, or intracardiac, is more and more frequently being utilized during interventional procedures and is well described in Chapter 20. Improvements in angiography such as 3-dimensional reconstruction, as well as the use of magnetic resonance, round out this section on associated imaging modalities.

Percutaneous coronary intervention will remain the mainstay of most cardiac catheterization laboratories for the foreseeable future. However, percutaneous noncoronary intervention is occupying an ever-increasing niche in many laboratories and for many interventionalists. I am hopeful that *Interventional Cardiology: Percutaneous Noncoronary Intervention* will help to expand this field and provide a forum for future advances and discussion of these modalities. I am grateful to all of the contributors for their expertise and effort in making their knowledge available on a widespread basis. I would also like to thank my wife Deborah and our children Stephanie, Jessica, and Jason for their support and understanding as I completed the editorial process.

Howard C. Herrmann, MD

CONTENTS

Foreword	v
Preface	vii
Color Plate	xiii
Contributors	xv
Companion CD-ROM	xix

Part I. Valvular Disease

1 Percutaneous Mitral Balloon Valvuloplasty for Patients with Rheumatic Mitral Stenosis: <i>Immediate and Long-Term Follow-up Results</i>	3
<i>Igor F. Palacios</i>	
2 Balloon Aortic and Pulmonic Valvuloplasty	29
<i>Ted E. Feldman, Timothy A. Sanborn, and William W. O'Neill</i>	
3 Pathophysiology and Percutaneous Coronary Sinus Repair of Mitral Regurgitation	49
<i>Nicholas Valettas, Joseph H. Gorman III, and Robert C. Gorman</i>	
4 Percutaneous Coronary Sinus Approach to the Treatment of Mitral Regurgitation	69
<i>Fumiaki Ikeno, Yasuhiro Honda, Heidi N. Bonneau, Ali H. M. Hassan, and Peter J. Fitzgerald</i>	
5 Percutaneous Mitral Valve Repair with the Edge-to-Edge Technique	87
<i>Frederick G. St. Goar, James I. Fann, Ted E. Feldman, Peter C. Block, and Howard C. Herrmann</i>	
6 Percutaneous Valve Insertion for the Treatment of Calcific Aortic Valve Stenosis	97
<i>Alain Cribier, Helene Eltchaninoff, Christophe Tron, Fabrice Bauer, and Martin B. Leon</i>	

Part II. Septal Defects

7 Patent Foramen Ovale: <i>Neurological Considerations</i>	115
<i>Steven R. Messé, Scott E. Kasner, and Anthony Furlan</i>	

8	CardioSEAL®, CardioSEAL–STARFlex®, and PFO-Star® Closure of PFO	131
	<i>Michael J. Landzberg</i>	
9	Percutaneous Closure of Patent Foramen Ovale with the Amplatzer PFO Occluder: <i>European Experience</i>	143
	<i>Andreas Wahl, Stephan Windecker, and Bernhard Meier</i>	
10	Transcatheter Closure of Atrial–Septal Defects Using the Amplatzer Devices	161
	<i>Hitendra Patel, Ralf Holzer, Qi-Ling Cao, and Ziyad M. Hijazi</i>	
11	An Overview of Device Closure of Ventricular Septal Defects Using the Amplatzer Devices	179
	<i>Ralf Holzer, Qi-Ling Cao, and Ziyad M. Hijazi</i>	
12	Left Atrial Appendage Occlusion	197
	<i>Mark Reisman</i>	

Part III. Adjunctive Coronary Interventions

13	Devices for Myocardial Preservation	211
	<i>Simon R. Dixon and William W. O'Neill</i>	
14	Percutaneous Mechanical Assist Devices	233
	<i>Suresh R. Mulukutla and Howard A. Cohen</i>	
15	Alcohol Septal Ablation for Hypertrophic Obstructive Cardiomyopathy	259
	<i>Haran Burri and Ulrich Sigwart</i>	
16	Therapeutic Angiogenesis and Myocardial Regeneration	271
	<i>G. Chad Hughes and Brian H. Annex</i>	

Part IV. Peripheral Interventions

17	Renal and Iliac Intervention	295
	<i>Michael T. Caulfield, Dharsh Fernando, and Kenneth Rosenfield</i>	
18	Percutaneous Carotid Artery Stenting	321
	<i>Cameron Haery and Jay S. Yadav</i>	
19	Aortic Stent Grafting: <i>Percutaneous and Surgical Approaches</i>	343
	<i>Omaida C. Velazquez, Edward Woo, and Ronald M. Fairman</i>	

Part V. Associated Imaging Modalities

20	Interventional Echocardiography	371
	<i>Frank E. Silvestry</i>	
21	3D Angiography	391
	<i>Nathan E. Green, S.-Y. James Chen, John C. Messenger,</i> <i>and John D. Carroll</i>	
22	Interventional Cardiovascular MRI: <i>Current Status and Future Directions</i>	405
	<i>Milind Y. Desai, Albert C. Lardo, and Joao A. C. Lima</i>	
Index	425

COLOR PLATE

These illustrations are printed in color in the insert that follows page 236:

Chapter 3

Figure 2, p. 51: Image of a human mitral valve annulus and leaflets created with real-time three dimensional echocardiology.

Figure 10, p. 60: Echocardiographic images.

Chapter 8

Figure 5, p. 136: Internal autoadjusting spring mechanism of the CardioSEAL-STAR-Flex system.

Chapter 10

Figure 2C, E, and L, pp. 168–169: Intracardiac echocardiographic images.

Chapter 14

Figure 7, p. 246: Transesophageal imaging of flow across the transseptal cannula in the TandemHeart.

Chapter 19

Figure 4, p. 352: Significant migration of a Talent endograft at 4 yr follow-up.

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