

Textbook of
**INTERVENTIONAL
CARDIOLOGY**

Textbook of INTERVENTIONAL CARDIOLOGY

Edited by

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Foreword

In the earliest days of angioplasty, Gruentzig said only half jokingly, "If I have an enemy, I will teach him angioplasty. This is punishment enough." Indeed, angioplasty was difficult and demanding. Fortunately, he taught many the "new concepts" in atherosclerotic vascular disease which have revolutionized cardiology. Gruentzig and those who followed him have taken the idea that arteries can be repaired from within and have produced a vast array of diagnostic and therapeutic procedures and devices needed for this work. In this book, Eric Topol brings together many of these developments described by some of those who have made significant contributions. Gruentzig indeed did give us many problems or "opportunities." With each problem, however, a new solution enabled further progress. Stiff unyielding guide catheters gave way to supple, torquable but steerable devices. Stiff and brittle guidewires gave way to flexible but superbly steerable ones, and balloons whose profiles were far from anorexic gave way to balloons which will literally pass through the eye of a needle. With every advance, excitement grows and operators become more adventurous.

Three significant problems, however, continue to modify that enthusiasm. They are undilatable lesions, mainly total occlusions, acute complications, and late restenosis. In the continuing pioneering spirit, many have tried to develop alternatives to balloon angioplasty in order to solve some of these problems.

Textbook of Interventional Cardiology begins with pharmacologic interventions by addressing the contributions of platelets, coagulation, spasm, and inflammation in the process of chronic and acute coronary disease and post-intervention healing. Methods of controlling these pathophysiologic processes are as diverse and multi-faceted as modern thrombolysis, multi-faceted fish oils, and future techniques of gene transfer are explored. The mechanism of healing of arteries following PTCA and the problem of over-exuberant cell proliferation leading to restenosis are now better understood. Some of the clinical attempts to deal with the problem are detailed and new experimental methods which show promise are previewed.

Balloon angioplasty, still the backbone of interventional procedures, appropriately encompasses seventeen chapters, the largest section, and aims to examine PTCA in various subsets from vein graft occlusion to acute myocardial infarction. In order to cope with the problem of balloon angioplasty, new technologies are being developed and tested. The third, fourth, and fifth sections of the book explore different methods of mechanical plaque removal: 1) three atherectomy techniques, 2) coronary stenting for abrupt closure after angioplasty and as an attempt to control restenosis, and 3) several laser approaches from direct photoablation to heat sealing.

New and innovative methods of evaluating the results of interventional techniques challenge the imagination and may ultimately give more precise guidance to our semi-blind procedures. Section six presents digital angiographic, angioscopic, and echo methods. Noninvasive catheter-based therapies for treating stenotic valvular lesions have been developed. The nature of the disease process has dictated that mitral and pulmonic valvuloplasty have become viable alternatives to surgery, while most calcific aortic disease limits interventions to palliation and poor operative candidates. The last section presents differing techniques and results from around the world.

Eric Topol, in preparing this book, has provided not only a review of current technologies, but also an excellent primer for what is yet to come. It should be of great interest to interventional cardiologists, cardiac surgeons, cardiology residents in training, as well as those practicing cardiologists wishing to become more familiar with a vast array of possibilities for their patients.

The concept of balloon angioplasty was not only brilliant, but simple. Advances in balloon technology have enabled angioplasty to be performed in almost half of the patients needing revascularization. The technique has matured to the point that randomized trials can now test the true value of angioplasty against bypass surgery in various subgroups. The results of these trials and more extensive case controlled studies will help define the limits of balloon angioplasty as currently practiced. As the new technologies emerge, we should keep in mind the question that Gruentzig must have asked himself about PTCA. Can a procedure which is shown to work in the controlled experimental setting be safe and simple enough to be applied widely in clinical practice? The new technologies described in this book have not passed that test as yet but with the application of innovative and sometimes tedious research, some of them will.

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Preface

More than a twelve-year period separates us from the dawn of the interventional cardiology era—the first coronary balloon angioplasty by Andreas R. Gruentzig in 1977. As a tribute to Dr. Gruentzig, his seminal work is cited by nearly every author in this book.

In this relatively brief time span, there is little doubt that no field of medicine has proliferated and developed as extensively as this one. Thus, in considering the idea for a textbook, a major concern for me was for the potential for obsolescence soon after its actual publication date. To counter this possibility, several factors were taken into account. First, the authors with specific expertise were solicited not only for their respective area of interest and renown, but particularly for their vision and insight. Each author was invited to speculate about how the field will likely change in the short term. Second, the objective of providing a comprehensive treatise encompassing all aspects of cardiovascular intervention was designed to provide a solid foundation for the future. In the interim of time between this and future editions, updates are planned for areas or chapters in which there have been significant advances. Third, much new, previously unpublished data are presented throughout the text to anticipate the imminent changing perspective of the field and step beyond an “up-to-date” status. A very accelerated publication schedule was adopted to make this possible which heavily relied on facsimile machines!

There have already been or soon will be several texts published that address various aspects of interventional cardiology, ranging from “how to” perform procedures to those incorporating electrophysiologic procedures. In developing the content of the book and its primary role to serve as a reference source, considerable emphasis was placed on providing material that would serve the interventional cardiologist. Typically this denotes a physician primarily dedicated to treating patients with coronary artery disease or valvular heart disease. To treat these diseases, both pharmacologic and mechanical interventions need to be properly integrated. Indeed much recent clinical investigation has been devoted to finding the right balance between these two vastly different but complementary forms of therapy.

In mentioning the concept of balance, the secondary purpose of this monograph has been to underscore the judicious use of interventional procedures. In an explosive field such as this one, there is a marked susceptibility for early undue enthusiasm and exuberance. This is especially true of all of the new techniques within invasive cardiology that have been inadequately evaluated in well-conducted prospective trials. The era of the “balloonic” appears to be on the decline. Mark Twain wrote “To a man with a hammer a lot of things look like nails that need pounding.” This statement provides valuable perspective in the context of the field. More than simply advocating the potential merits of the various interventions described in this book, the authors have attempted to highlight limitations and pitfalls of each therapy. This has been achieved whenever possible and *within* most of the chapters, but also through “crosstalk” between chapters of the competitive technologies (e.g., different stents, atherectomy catheters, or laser therapies), through presentation of different experiences (e.g., valvuloplasty in different parts of the world), and through individual chapters intended to focus on the negative