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CATHETER ABLATION OF CARDIAC ARRHYTHMIAS

BASIC BIOELECTRICAL EFFECTS AND CLINICAL INDICATIONS

EDITED BY MELVIN M. SCHEINMAN

University of California, San Francisco

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DEDICATION

The use of electrode catheter techniques for treatment of cardiac arrhythmias has opened a new and exciting approach for management of patients with drug-refractory cardiac arrhythmias. As with any new advance, investigators properly focus on the safety and efficacy of the technique but often forgotten is the courage and emotional fortitude of the patients (and their families) who agree to walk with us through uncharted and potentially dangerous paths. It is for this reason that I dedicate this book to Paul Christian Anderson who was the first patient to undergo catheter ablative procedure. Paul was a retired machinist living in northern California who suffered from crippling arthritis and severe chronic obstructive lung disease as well as cardiac disease. He was plagued with recurrent episodes of atrial fibrillation associated with rapid ventricular rates, which often resulted in frank pulmonary edema. He proved refractory or intolerant to trials of all available drugs, including amiodarone. His case was discussed with our surgical colleagues who felt that surgical interruption of the His bundle constituted an unacceptably high risk procedure for this patient. At about this time, my colleague, Dr. Rolando Gonzalez, and I had just completed our canine studies using a catheter ablative technique to interrupt AV conduction. With some trepidation, we had decided to offer this technique to the appropriate patient.

The task of obtaining truly informed consent was particularly delicate since there was no prior clinical guidelines to define efficacy or potentially dangerous consequences of this procedure. I felt that it would be inappropriate for

me to obtain consent because of possible favorable biases that I might have for the procedure I helped develop. The task of obtaining consent was assigned to Dr. David Hess, an outstanding and sensitive clinical cardiologist who was a full-time faculty member in the Division of Cardiology (Electrophysiology). Dave, as an arrhythmia specialist, was in an excellent position to evaluate both the gravity of the clinical problem and was fully conversant with our animal experience. He spent many hours discussing the new procedure and counseling Mr. Anderson and his wife. Once the decision was made to proceed with ablation, I think Mr. Anderson sensed the apprehension of his physicians and turned out to be a tower of strength for us. He fully realized that this procedure would not cure his severe arthritis or prevent the relentless progression of his cardiac and pulmonary diseases. It was clear that the decision was taken as much for a chance of personal benefit as it was for a sincere desire to help other patients with similar debilitating cardiac arrhythmias. The procedure was performed on April 9, 1981 and, to our great relief, was both successful and uneventful. Although AV conduction subsequently resumed, his arrhythmia was now easily controlled with verapamil.

Paul died of severe cardiac failure several years ago, but I know that he and his wife shared enormous pride of having pioneered this procedure. He is fondly remembered for his magnificent altruism, emotional strength, and courage.

PREFACE

The field of catheter ablation has grown in a rather helter-skelter fashion. Ablative techniques were applied in patients before basic bioelectric and cellular electrophysiologic effects were fully defined. Since the introduction of this technique into clinical medicine in 1982, happily, a wealth of basic information has become available, and it was thought prudent to summarize existing data in the form of a text. The purpose of this text is to provide for a concise summary of both the basic and clinical experiences to date. It was simply not possible to include chapters from many workers who have made outstanding contributions in this area. For this, I offer my profound apologies. I do wish, however, to acknowledge the outstanding work of Drs. Bharati and Lev who provided us with a sound understanding of the histologic effects of various energy delivery systems. Their seminal observations allowed us to bring this technique to clinical fruition.

The book is divided into sections that allow for the clinician, physicist, basic electrophysiologist, or pathologist to extract relevant information. The first two chapters are devoted to exploring the physics of high-energy direct current discharge as well as the important cellular electrophysiologic changes incident to these discharges. This is followed by a series of chapters which focus on the histologic effects of both high-energy electrical shocks and laser and radiofrequency energy on atrial, AV junctional, and ventricular myocardial tissue. The final chapters summarize the clinical usage of this technique for patients with either supraventricular or ventricular arrhythmias. I am

delighted with and extremely appreciative of the outstanding contributions to this book by its world renowned group of authors. Their skill and patience made editing of this book both instructive and pleasant.

Clearly, the presently available catheter techniques represent the first small steps. We await with a great sense of excitement and anticipation the continued technical breakthroughs in terms of perfecting energy sources as well as exploring catheters. These technical advances will no doubt extend the clinical usefulness of these techniques. I sincerely hope this text serves as a catalyst for bright young clinicians, physicists and catheter engineers to expeditiously provide us with the needed technical advances.

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