
The Practice of Cardiology

*The Medical and Surgical Cardiac Units
at the Massachusetts General Hospital*

SECOND EDITION

EDITED BY

Kim A. Eagle, M.D.

Edgar Haber, M.D.

Roman W. DeSanctis, M.D.

W. Gerald Austen, M.D.



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I

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Preface

As with the first edition, the origin, emphasis, and intent of the second edition of *The Practice of Cardiology* differ from most other current textbooks of cardiology. When the specialty of cardiology was in its infancy, it was possible for one talented author to encompass the entire spectrum of cardiology in a single-author textbook. In some instances, the careful analysis of a single clinical practice became the foundation for the creation of a textbook such as with Paul Wood's classic work, *Diseases of the Heart and Circulation*, or Paul Dudley White's *Heart Disease*. However, with the virtual explosion of knowledge in the pathophysiology and treatment of cardiovascular disease, it is no longer possible for a single author to authoritatively cover all aspects of cardiology. As a consequence, most present day texts represent multiauthor and multi-institutional efforts to deliver up-to-date information about cardiovascular diseases and the tests, drugs, and procedures used in their treatment. While these texts certainly are invaluable for references and for an encyclopedic view of a particular disease or test, they sometimes lack the uniformity of purpose and practice style that so endears one to the older single-author books. Furthermore, because they are often multi-institutional in origin, they may contain considerable contradiction and redundancy. Given their tendency to compile comprehensive information about diseases and techniques, they frequently slight an area of vital interest to practicing physicians, that of clinical decision-making.

The purpose of this book is to survey the status of modern clinical cardiology from the clinician's perspective, emphasizing the decision-making aspects of the practice of cardiology. The book comprises a series of essays arranged and edited so that all aspects of cardiology as practiced at our hospital are covered, with as little redundancy as possible. The authors are individualists with varying styles. *Their chapters in many instances capture the flavor of single-author texts of yesteryear.* We believe that gathering authors who are predominantly from a single institution provides a more unified description of cardiology practice than is possible in most multi-institutional efforts. We have not attempted to remove all semblance of conflicting opinion, however. The reader will note

some differences in the approach to management of coronary artery disease by the authors of Chapters 11 and 14, for instance. Another example is that not all of our authors agree with the indications for chemoprophylaxis for endocarditis as outlined in Chapter 24. The authors have been encouraged to identify areas of uncertainty in clinical practice but also to present what they actually do in such instances and why.

A number of features of the Massachusetts General Hospital contributed to the decision to produce the first, and now the second, edition of this book and also to its character. First, the institution is large and has a long tradition of commitment to patient care and to clinical excellence. Its medical and surgical cardiac units are somewhat unusual among academic cardiac units in the United States in that a significant number of the staff are full-time clinicians. In addition, many of the clinical investigators in the two units continue to actively participate in both inpatient and outpatient care. Thus, while the commitment to research and teaching is unquestioned, the first priority through the years has been patient care, an emphasis which we hope shows through in this book. Second, a particularly cooperative attitude exists in our hospital between cardiologists, cardiac surgeons, and cardiac anesthesiologists. Many of our clinical research accomplishments, such as the development of the intra-aortic balloon pump, among others, have represented joint efforts of cardiologists and cardiac surgeons. Thus, you will find that a sizable portion of the chapters are coauthored by individuals from cardiology, cardiac surgery, and/or anesthesiology. We believe this spirit of cooperation makes for better patient care and, as it relates to the textbook, a more comprehensive approach to medical decision-making. Third, when Dr. Paul Dudley White was alive, he encouraged the cardiac units at the Massachusetts General Hospital to adopt an international outlook. Perhaps for this reason we hope that the second edition will have the same international appeal seen with the first edition. The large sections of the text devoted to acute rheumatic fever, endomyocardial fibrosis, Chagas' disease and others reflect our ongoing commitment to this goal.

Much has happened to cardiology practice in the

past nine years and these changes are reflected in the second edition of this textbook. Whereas coronary angioplasty was just an appendix in the first edition, it has now become a major chapter, consistent with its importance in everyday practice. The reader will also find a number of other changes, including new chapters dealing with percutaneous balloon valvotomy, the approach to the patient with syncope, and cardiac transplantation. Chapters dealing with echocardiography, electrophysiology, coronary risk factors, and radionuclide and magnetic resonance imaging have undergone considerable expansion, again reflecting their increasing importance in cardiology practice.

We intend that the book be read by clinicians

who are interested in cardiovascular disease—in particular, internists, cardiologists, cardiac surgeons, cardiac anesthetists, and trainees in these fields. This book is about cardiologic and cardiac surgical practice. We have not considered in detail several areas of introductory cardiology, such as general electrocardiography, general cardiovascular physiology, the generation of heart sounds, and so forth. These areas are well covered in existing textbooks of general cardiology or in books devoted specifically to them.

K.A.E.

E.H.

R.W.D.

W.G.A.

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We are indebted to many people. First, thanks to the staff of the Cardiac Unit's editorial office, Tom McVarish, Bob Guerra, and Deborah Brown; without their care and commitment, the second edition would not have happened. Second, we extend a very special thanks to the authors, many of whom sacrificed weekends and vacations for the writing of their chapters. We are grateful to their spouses and families, as well, for tolerating this project. Edith Tagrin and her staff did most of the illustrations for the book; their interest often cost them extra hours and effort. Stan Bennett and his staff did most of the photography. We are proud of the illustrations and photographs; thanks to both of these groups. John Newell and his staff in the Cardiac Unit's computer center provided frequent input and technical assistance and we thank them. Lynne Herndon, Jack Bruggeman, Laurie Anello,

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I/Problems Common to the Evaluation and Management of Several Forms of Cardiac Disease

1/Problems in the Evaluation of the Normal Heart

PETER M. YURCHAK

The history

Auscultatory findings

Skeletal deformities and suspected heart disease

Athletic heart syndrome

Hyperkinetic heart syndrome

Electrocardiographic changes suggesting heart disease

The purpose of this chapter is to consider the common and often perplexing question "Disease or nondisease?" that is, to consider the individual whose symptoms, findings, or both are due to noncardiac causes and who might be confused with a patient with heart disease [10, 119]. Such symptoms or findings might reflect either a disease state of noncardiac origin or a well-established normal variant. Indeed, they might go completely unexplained in the absence of demonstrable pathology. Awareness of the importance of recognizing a normal heart as such and identifying phenomena mimicking cardiac disease is as old as the discipline of cardiology itself. In 1924, two distinguished English cardiologists independently called attention to this. Parkinson, in an address to the Canadian Medical Association, emphasized misleading symptoms and signs and sources of difficulty in deciding on the presence or absence of heart disease [132]. Coombs, in a similar vein, noted the possibility of arrhythmias and innocent murmurs being mistaken for evidence of heart disease. In his words: "Over the man who has been told that his heart is unsound a dark shadow hangs, a shadow that it is much easier to invoke than to dispel. Clearly, then, a diagnosis of cardiac disease is not made lightly or unadvisedly" [34]. The late Paul Dudley White addressed this matter in the third edition of his textbook on heart disease in 1944:

The range of the normal heart remains today in cardiovascular physiology one of the most difficult problems accurately to assess, and in the diagnosis of cardiovascular disease one of the most important and yet neglected subjects. It is astonishing to find relatively so little written about it in works on medicine by either ancient or modern authors. . . . In the chapters that follow I shall discuss in full detail the symptoms and signs of heart disease, but it is of the greatest importance to recognize that some symptoms and even signs may exist

within the range of the normal heart as we examine it in the clinic; the width of this range is a frequent source of error and confusion. There may be symptoms from a sound heart. Excitement, effort, coffee, tobacco, a full meal, and especially any of these factors in combination may cause a disagreeable palpitation, a forceful thumping of the heart which may or may not be more rapid than usual [176].

In the 44 years since this was written, scant progress has been made in clarifying the borderline between a normal variant and an early disease state [90, 153, 158]. In an individual patient, only the passage of time may answer the question. The question of a normal variant versus early heart disease most commonly arises in four settings. First, symptoms (chest pain, dyspnea, palpitations) raise the question of heart disease in themselves. One may or may not find evidence on physical examination to strengthen this suspicion. Second, a heart murmur is heard on casual examination. Third, an ECG, done routinely or as part of the evaluation of either of the foregoing, shows some departure from normal. This may be an abnormality in the QRS-T pattern or the presence of an arrhythmia or conduction disturbance. Fourth, a chest radiograph, done for the same two considerations, shows an unusual finding.

The History

The three symptoms most commonly invoking the possibility of cardiac disease are chest pain, dyspnea, and palpitations. Typical angina pectoris, as described by Heberden, is discussed in Chapter 11. Noncardiac *chest pain* may assume many atypical patterns, and pain that is clearly due to myocardial ischemia may have some atypical features (see Chapter 11).

Dyspnea, if of cardiac cause, is due to left atrial hypertension. It is to be distinguished from the dyspnea caused by pulmonary disease and from the heightened awareness of breathing that occurs in cardiac neurosis. Some subjects describe the substernal distress of angina pectoris as "trouble breathing," but close questioning reveals that what is really experienced is a sensation of oppression or smothering. Asking the patient if he or she au-

dibly gasps for air will help define true dyspnea. Both cardiac and pulmonary dyspnea are aggravated by effort. Unlike pulmonary dyspnea, the dyspnea of cardiac disease is also aggravated by recumbency (orthopnea). This is explained by pooling of blood in dependent portions of the lungs, lowering the vital capacity by nearly 300 ml. The subjective difficulty in breathing described by a patient with cardiac neurosis is always out of proportion to the amount of physical effort inducing it. The physician can easily evaluate seemingly disproportionate dyspnea by walking with the patient up a flight of stairs. Pulmonary function tests are normal in patients with cardiac neurosis [26].

Individuals subject to acute or chronic hyper-ventilation may also complain of dyspnea, which is associated with light-headedness, blurred vision, and tingling of the extremities [172]. Such subjects may be observed to breathe rapidly and shallowly as one takes the history. Reproducing the patient's symptoms by having him or her voluntarily overbreathe clinches the diagnosis.

Paul Dudley White had this to say about dyspnea:

Abnormality of breathing of all kinds, rapid, slow, difficult, or irregular (as in Cheyne-Stokes breathing), may occur in the presence of a normal heart. In fact, dyspnea is in the minority of cases due to heart disease. Sighing respiration in particular suggests a normal heart, since it is most common in nervous young persons without heart disease, and is particularly characteristic of neurocirculatory asthenia. An important word of advice: if the heart is well within normal limits of size by careful study, dyspnea is not to be ascribed to heart disease [176].

The patient with cardiac neurosis has both dyspnea and chest pain as prominent features of the constellation of symptoms. Characteristically the symptoms appear with the most minimal of activity, and sighing (as mentioned earlier) is a prominent objective finding. The pain is typically precordial rather than substernal, sharp, and often aggravated by breathing and by movement of the trunk [26]. A particularly common form of non-cardiac chest pain is a sharp, stabbing pain, usually occurring in the left side of the chest, often in young people, which is made worse by breathing. It can be momentarily quite severe, but then goes away. Often it is associated with point tenderness on the chest wall.

Effort-induced asthma bears mention as a phenomenon that may occasionally be confused with

cardiac dyspnea. This is usually seen in subjects with a history of asthma (remote or current) or an allergic diathesis [118].

Yet another manifestation that may be mistaken for dyspnea or orthopnea is Cheyne-Stokes respirations. This periodic waxing and waning in amplitude of breathing may occur only at night, while the patient is asleep. Close questioning of the patient's spouse brings out the fact that his or her "shortness of breath" takes cyclic form, with periods of apnea. Indeed, the account of shortness of breath may come more from the onlooker than from the patient. Cheyne-Stokes respiration usually reflects cerebrovascular disease, although some subjects with a low cardiac output may exhibit it (see Chapter 4).

Palpitation represents the third of the "cardiac triad" to be considered. Stedman defines palpitations as "forcible pulsation of the heart, perceptible to the patient, usually with an increase in frequency, with or without irregularity in rhythm" [157]. Is the beat regular or irregular? Rapid, normal, or slow in rate? A regular forceful beat at normal or slightly accelerated rates usually reflects heightened awareness of normal heart action, often perceived when the subject is sitting or lying quietly. It may also reflect anxiety and can be related to a stressful life situation by close questioning. Having the patient count the radial pulse at the time of the symptom may be revealing. An irregular rhythm, subjectively perceived and confirmed by palpation of the pulse, suggests premature beats or short salvos of arrhythmia as the basis. Marked bradycardia (less than 50 bpm) may reflect intermittent high-grade atrioventricular block or sinus node dysfunction. The physician should recall that ventricular bigeminy can produce peripheral bradycardia. The premature beats fail to open the semilunar valves because of inadequate ventricular filling. The patient may not perceive the early beat, and thus the basis of the peripheral bradycardia is obscured.

If palpitation customarily lasts long enough for the patient to reach a medical facility, an ECG during a spell may document the mechanism. If short-lived but frequent palpitation occurs, ambulatory ECG monitoring is the best course [105]. On the other hand, short-lived and infrequent palpitations are best documented by transtelephonic transmission of cardiac rhythm [150]. It is surprising how often patients with arrhythmias, documented by ambulatory ECG monitoring, are quite oblivious to their presence. Conversely, many patients with palpitations prove on ambulatory ECG monitoring