

FOREWORD

An understanding of cardiac anatomy is fundamental to the practice of cardiology. Detailed and nuanced knowledge is required for effective diagnosis, interpretation of cardiac imaging, and treatment with interventional and surgical approaches. Since Andreas Versalius referred to the heart as the “center of life” in his 1543 atlas of anatomy, *De humani corporis fabrica libri septem*, anatomy was taught from drawings, descriptions, and dissection. Photographs and elegantly detailed drawings were important parts of the medical curriculum.

In 1975, Wallace McAlpine published a major contribution to the field, *Heart and Coronary Arteries: An Anatomic Atlas for Clinical Diagnosis, Radiological Investigation, and Surgical Treatment*, with beautifully detailed photographic images of cardiac anatomy made possible by “perfusion–fixation” of the heart, adapting a technique that he had observed applied to lung specimens. He developed a systematic approach to photographic examination of the explanted heart that included reference to anatomic position as well as views to clarify individual aspects of anatomy. We owe a debt of gratitude to Dr. Shivkumar and his colleagues for “rediscovering” these images more than three decades later and making the collection available through the UCLA Cardiac Arrhythmia Center. Inspired by Dr. McAlpine’s opus, Drs. Shivkumar and Mori have now gone further to provide new images obtained by applying Dr. McAlpine’s technique to extend and display detailed investigation of anatomic regions that have assumed even greater importance as cardiac imaging, intervention, and surgery have advanced.

The electrophysiology community, for example, focused on detailed electrical recordings and came to appreciate the importance of anatomic relationships through their efforts to define the locations and mechanisms of complex arrhythmias during catheter manipulation. This experience was coupled with efforts to explore the optimum location for pacing and defibrillator lead placement to restore electrical synchrony, improve cardiac function, and effectively terminate arrhythmias. No anatomic aspect of the heart has gone unexplored with electrode catheters, although admittedly, this exploration was frequently attempted with a limited understanding of the details of cardiac anatomy, morphology, and relationships. An awareness of surrounding anatomic structures came from manifestations of collateral injury observed after thermal energy ablation and was frequently not adequately anticipated based on an awareness of anatomic proximity. The need for an improved understanding of cardiac anatomy, morphology, and relationships became obvious in our field to optimize the success and minimize the risks of our interventional procedures. Similarly, interventional treatment of valvular heart disease, advances in surgical therapies, advances in complex imaging, and neurocardiology have brought to the fore the need for detailed knowledge of the heart’s anatomy.

The presentation of the cardiac anatomy in this new atlas uses a crucial attitudinal approach that includes the fluoroscopically familiar right anterior oblique and left anterior oblique views and sequentially peels back anatomic structures with progression of the figures to allow the reader to create visual images of anatomic structures that are merely reflected by silhouettes on fluoroscopy. It is like having the lights turned on in a dark, yet familiar room. Structures and important anatomic relationships, only imagined based on catheter manipulation under fluoroscopy, are displayed and appropriately labeled. All chambers are beautifully shown. Further facilitating this understanding are the images of strategically placed electrode catheters that aid in the understanding of obstacles to effective catheter placement, stability, and contact required for a successful procedure. The authors also take the additional important step of identifying the anatomically typical relationship of the precordial ECG leads. This effort is critical

to provide an understanding of how basic ECG P wave and QRS analysis can aid in the localization of arrhythmias within the heart's complex anatomic structures.

A few areas of special interest and emphasis in this atlas are also worth highlighting. Millions of people have benefited from coronary artery interventions to improve blood flow, but the coronary arteries and veins are also becoming important conduits for other interventional therapies. Effective implementation of optimal cardiac pacing and catheter-based ablation are facilitated by understanding of the anatomy of the coronary vasculature, which is beautifully delineated, along with the obstacles and challenges to its complete access. Options for management of the embolism risk by left atrial appendage occlusion techniques continue to evolve, based on recognition of the anatomic considerations and variability. This structure is highlighted in detail. For years, the pericardial space was largely the purview of cardiac surgeons. Percutaneous access to the pericardial space is now an important means of accessing parts of the heart for ablation and strategies using this access for other interventions are emerging. The detailed assessment of the pericardial space is another welcome addition.

Approaches to valvular heart disease are rapidly progressing and are also based on understanding of the anatomy and its relation to pathophysiology. Interventional cardiologists and surgeons will find a wealth of enlightening pictures clarifying the anatomy of the valves and their supporting apparatus, knowledge that forms the cornerstone of the evolving approaches to catheter-based interventional treatment. Finally, the cardiac nervous system is well recognized as playing a role in tachy- and bradyarrhythmias, electrical storms, and neurocardiogenic syncope. Approaches have emerged to therapeutically target the cardiac nervous system and a detailed delineation of the complexity on cardiac innervation is appreciated.

This atlas should be studied in detail and its images “burned into the brain” of everyone who performs interventional procedures, from trainees to the most experienced operators. The images should be referred to frequently and will create a valuable roadmap that must be followed. The appeal of the images will, of course, extend beyond the proceduralist to include all those with a serious interest in cardiac anatomy who want to take this clear and concise educational journey.

We congratulate Drs. Shivkumar and Mori on the wonderful achievement that is this atlas. It will help us better understand the anatomy crucial to diagnosing and treating our patients as well as advance cardiovascular science. We are excited that the first volume in the **Anatomical Basis of Cardiac Interventions** series, which details the anatomy of the normal adult heart, will be followed by future volumes that extend this important exploration.

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