Book Review

3D Echocardiography

What does 3-dimensional (3D) echocardiography offer that I cannot already obtain from standard echo techniques? How can I learn how to use it? How much will it cost to implement? Are there situations that will require 3D imaging to answer questions in more detail than current imaging permits? What does 3D echocardiography offer that magnetic resonance imaging cannot provide? These are the questions cardiologists want answered. Because the field is rapidly evolving, the timing of a book on the subject is challenging to the authors, publishers, and readers. A summary text would be welcome and needed but is also certain to lag behind the forefront of technological developments. This multiauthored book edited by Shiota strives to provide essential knowledge regarding the developments in 3D echocardiography illustrated with “impressive pictures.” As the first book on the subject, 3D Echocardiography suffers from several understandable timing gaps. Many aspects of this technology are still being developed and are in rapid evolution. Indeed, the introductory sections provide considerable detail describing technology that is no longer used in commercial systems. Second, any new technology requires time for clinical applications to be described and even longer for those applications to be accepted as additions to current practice. Thus, a first text has to strike a balance between reporting exciting developments before they become standard applications and waiting long enough for the field to establish itself as viable and valuable.

Three-dimensional echocardiography has been a long time in development and has traditionally been considered an interesting tool for the research laboratory. Image processing has been time consuming to learn and to apply and appears to still require a major commitment by the technologist and echocardiographer to master the techniques and interpretations. This text does not lead the reader through step-by-step procedures to enable a novice to become skilled merely by reading through the book. First, practitioners of 3D may be disappointed that this is not a “how-to” book. The book is more successful in describing what particular cardiac structures are best supported by published reports and are most promising for adding to the diagnostic capabilities of the echocardiography laboratory. Those eager to understand this new technology and decide whether it is time to invest the time and money into a rapidly evolving field will have their interest piqued but may not be convinced that the time is right.

To best answer the overall question of what 3D echo adds to existing imaging modalities, direct comparisons of 2D images and 3D images are needed. Even better would be comparisons with magnetic resonance imaging displays. The most successful portions of the text adhere to such displays, including those on the left atrium and mitral valve, although some of the images are reproduced in small size with limited labels. Three-dimensional transesophageal echocardiography may be the most promising development in the field but was not yet available during the time this text was being prepared. In addition, the entire book relies on still frames, and a companion CD of 3D motion examples and comparison images would be welcome. The technical descriptions in chapter 1 are somewhat disappointing, using manufacturer’s supplied images and broad descriptions of the technical basis for the development of instruments.

The organization of the text is not comprehensive and does not follow usual expectations. Several brief introductory chapters are dedicated to both ventricles and the left atrium but not the right atrium, although the last chapter on cardiac electrophysiology provides very detailed images of the right atrial anatomy. A full 4 chapters are dedicated to the mitral valve (including 1 each on mitral regurgitation and functional mitral regurgitation), as a result of the more extensive body of work published on the subject. However, only 1 chapter addresses the aortic valve, 1 chapter addresses the tricuspid valve, and no specific attention is given to the pulmonic valve or the aorta. These lapses are likely due to the lack of substantial data to warrant inclusion at this time, and these topics may reach the necessary level of reporting to be covered in future editions or other publications. Some sections dwell in too much detail on the traditional 2D and Doppler modalities without providing essential 3D images. Some editing gaps are apparent, as several image legends are reversed and chapters frequently overlap. The extent of reference citations varies considerably by chapter. Some are sparsely referenced and with older reports, whereas others are comprehensively supported. The presentation on strain echocardiography builds on an understandable explanation of current 2D applications with a taste of the potential of 3D.

After the mitral valve, congenital abnormalities may provide the best applications for 3D echo. The images of atrial septal defects, ventricular septal defects, and congenital mitral and aortic valve lesions are impressive displays of the value of the technique. Some images of Ebstein’s anomaly are less convincing and would benefit from additional labeling or comparative images. Unfortunately, more complex lesions are not approached. Fetal imaging may have potential, but only normal images were shown.

Overall, the text serves as a useful introduction to 3D echocardiography, but the field does not yet have a foundation of sufficient breadth and depth to permit the publication of a comprehensive in-depth survey of all applications of 3D echo. The reader is reminded that the quality of 3D images still depends on the quality of the 2D images. This text does provide an overview of the potential of the technique and will be of interest to many, but it cannot yet offer the “state-of-the-art” presentation that most would desire.

Disclosures

None.

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(Circulation. 2008;117:e156.)
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Circulation is available at http://circ.ahajournals.org

DOI: 10.1161/CIRCULATIONAHA.107.746321

e156
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Circulation. 2008;117:e156
doi: 10.1161/CIRCULATIONAHA.107.746321
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/117/6/e156

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