An Atlas of Mitral Valve Imaging

Milind Desai • Christine Jellis
Teerapat Yingchoncharoen
Editors

An Atlas of Mitral Valve Imaging

Springer

Editors
Milind Desai
Department of Cardiovascular Medicine
Cleveland Clinic
Cleveland, OH
USA

Christine Jellis
Cleveland Clinic
Cleveland, OH
USA

Teerapat Yingchoncharoen
Cleveland Clinic
Cleveland, OH
USA

Additional material to this book can be downloaded from http://extras.springer.com

ISBN 978-1-4471-6671-9 ISBN 978-1-4471-6672-6 (eBook)
DOI 10.1007/978-1-4471-6672-6

Library of Congress Control Number: 2015940567

Springer London Heidelberg New York Dordrecht
© Springer-Verlag London 2015
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer-Verlag London Ltd. is part of Springer Science+Business Media (www.springer.com)

I would like to acknowledge my wife, Rajul, and my kids, Ria and Rohan, for their tremendous support in life.

MD

To my husband and son, Dan and Hamish Waters, for their unwavering love and support. Their ongoing encouragement, understanding, and sacrifice allow me to pursue my academic dreams.

CJ

To the memory of my respected father, Adisak Yingchoncharoen; my beloved mother, Sumalee Phiphitwattanaphan, for her unconditional love, encouragement, and unfailing optimism; to Professor Suradej Hongeng who always believes in me and has been more than an inspiration and tireless supporter through these many years; to all my teachers and lastly all my patients who have taught me a lot about cardiology and echocardiography.

TY

Preface

Imaging and assessment of the mitral valve provides ongoing challenges due to its complicated structure and physiology. For decades, echocardiologists have been seeking new methods to evaluate the mitral valve and quantitate valve dysfunction. From the era of M-mode through development of two-dimensional Doppler and now three-dimensional techniques, echocardiography has remained the imaging modality of choice. The fact that there are still so many measures employed to assess the mitral valve illustrates that it remains a complicated process, which is not well performed with any single parameter.

The purpose of this Atlas is to provide readers with a case-based overview of mitral valve structure and echocardiographic evaluation. The clinical scenarios illustrate how the various echocardiographic parameters provide incremental value in the accurate assessment of mitral valve dysfunction. Detailed, noninvasive assessment of the mitral valve remains integral for planning and performance of mitral valve surgery. Increasingly, echocardiographic assessment and real-time guidance are also required to facilitate percutaneous treatment options. We highlight important imaging aspects of these cases, along with salient teaching points and further recommended reading.

We have aimed to make this contemporary style of Atlas interactive and useful for individual learning as well as group teaching purposes, with the inclusion of numerous video files. Real-world examples of both common and rarer conditions are included to illustrate the breadth of mitral valve pathology and the challenges faced in acquiring optimal images. We hope that readers will enjoy exploring the mitral valve with us in this format.

Cleveland, OH, USA

Milind Desai
Christine Jellis
Teerapat Yingchoncharoen

Acknowledgments

We would like to acknowledge the sonographers, cardiologists, and imaging fellows who comprise the team behind the Cleveland Clinic Cardiovascular Imaging Center. Their tireless efforts, experience, enthusiasm, and expertise on a daily basis are proudly represented by the images comprised within this Atlas. We also acknowledge the advice and assistance provided by Lee Klein and the editorial team at Springer Publishers.

Contents

List of Videos

Video 12.10 Apical four-chamber view with color Doppler demonstrating severe (4+) mitral regurgitation in the early recovery phase even though the heart rate had nearly returned to the baseline of 68 bpm.

Video 12.11 Parasternal long-axis view at rest, with color Doppler imaging demonstrating a repaired mitral valve with an annuloplasty ring and trivial valvular mitral regurgitation.

Video 12.12 (**a**) Parasternal long-axis view before exercise

Video 12.12 (**b**) The same view after exercise, demonstrating a decrease in left ventricular size with stress, indicative of preserved contractile reserve. No regional wall motion abnormalities are seen that would suggest underlying myocardial ischemia, although this exercise was at a submaximal predicted heart rate

Video 12.13 (**a**) Apical four-chamber view before exercise

Video 12.13 (**b**) The same view after exercise, demonstrating a decrease in left ventricular size with stress, indicative of preserved contractile reserve. No regional wall motion abnormalities are seen that suggest underlying myocardial ischemia, although this exercise was at a submaximal predicted heart rate

Video 12.14 (**a**) Color Doppler imaging of the tricuspid valve at rest demonstrates mild to moderate (1–2+) tricuspid regurgitation

Video 12.14 (**b**) This regurgitation increases to moderately severe (3+) after exercise stress

Video 13.1 Transthoracic echocardiography (TTE) parasternal long-axis view showed a 3.7 × 3.6-cm, highly mobile echodensity with frond-like projections in the left ventricle, attached to the posterior mitral valve leaflet and subvalvular apparatus.

Video 13.2 TTE apical four-chamber view showed the mass (*arrows*) of the mitral valve.

Video 13.3 TTE parasternal long-axis view showed a thin-walled, well-circumscribed mass with an echolucent core in the posteroinferior wall area.

Video 13.4 TTE parasternal long-axis view zoomed at the mass (*arrow*) confirmed the same findings.

Video 13.5 TTE short-axis view zoomed at the mass attached to the anterolateral papillary muscle.

Video 13.6 TTE apical four-chamber view confirmed the thin-walled, well-circumscribed mass with an echolucent core attached to the anterolateral papillary muscle, findings consistent with a blood cyst.

Video 13.7 A TTE apical four-chamber view with color Doppler flow imaging showed typical systolic mitral regurgitation but also a short regurgitation jet from the left ventricle to the left atrium during diastole, consistent with diastolic mitral regurgitation.

Video 13.8 A TTE apical four-chamber view with color Doppler flow imaging showed typical systolic tricuspid regurgitation but also a short regurgitation jet from the right ventricle to the right atrium during diastole, consistent with diastolic tricuspid regurgitation.