mechanical heart valve mri

mechanical heart valve mri is a critical topic in the intersection of cardiovascular medicine and diagnostic imaging. Patients with mechanical heart valves often require detailed cardiac evaluations, and magnetic resonance imaging (MRI) is a valuable tool for non-invasive assessment. However, the presence of a mechanical heart valve presents unique challenges and considerations for MRI procedures. This article explores the compatibility, safety, imaging techniques, and clinical implications of performing MRI on patients with mechanical heart valves. Understanding these aspects is essential for healthcare providers to optimize patient care while minimizing risks. The following sections will delve into the technical and clinical facets of mechanical heart valve MRI, providing a comprehensive overview for medical professionals and researchers.

Understanding Mechanical Heart Valves

Mechanical heart valves are artificial devices implanted to replace damaged or diseased natural heart valves. They are designed to regulate blood flow through the heart’s chambers, mimicking the function of native valves. These prosthetic valves are typically made from durable materials such as titanium, pyrolytic carbon, and other biocompatible metals and polymers. Mechanical heart valves are chosen for their longevity, often lasting several decades without the need for replacement, but they require lifelong anticoagulation therapy to prevent thrombosis.

Types of Mechanical Heart Valves

There are several types of mechanical heart valves in clinical use, each with unique structural characteristics that influence their interaction with MRI machines. The most common types include:

- **Tilting Disc Valves:** Featuring a single leaflet that tilts to open and close, allowing blood flow.
- **Bileaflet Valves:** Comprising two semicircular leaflets that pivot to regulate blood passage.
- **Ball-and-Cage Valves:** An older design with a ball inside a metal cage that moves to control

flow.

Each valve type’s material composition and design affect its MRI compatibility and artifact production during imaging.

MRI Technology and Principles

Magnetic resonance imaging (MRI) utilizes strong magnetic fields and radiofrequency pulses to generate detailed images of internal body structures. MRI is widely used for cardiac imaging due to its ability to visualize soft tissues, blood flow, and myocardial function without ionizing radiation. The magnetic fields produced by MRI machines typically range from 0.5 to 3.0 Tesla, with higher Tesla values offering greater image resolution but increased safety considerations for implanted devices.

How MRI Interacts with Implanted Devices

Implanted devices like mechanical heart valves can interact with the MRI environment in several ways:

- **Magnetic Field Interactions:** Ferromagnetic components may experience forces and torque, potentially causing device displacement or malfunction.
- **Radiofrequency-Induced Heating:** Metallic implants can absorb RF energy, leading to localized heating that might damage surrounding tissues.
- **Image Artifacts:** Metal components cause distortions in the magnetic field, resulting in signal voids or distortions on MRI images.

Understanding these interactions is crucial for assessing the safety and diagnostic utility of MRI in patients with mechanical heart valves.

Safety Concerns with Mechanical Heart Valve MRI

The primary safety concerns regarding MRI in patients with mechanical heart valves include potential device displacement, heating, and image distortion. Historically, mechanical valves were considered contraindications for MRI, but advances in both MRI technology and prosthetic valve design have changed clinical practice.

Magnetic Compatibility

Most modern mechanical heart valves are manufactured from non-ferromagnetic materials, which significantly reduce the risk of magnetic attraction or movement during MRI scans. The American Society for Testing and Materials (ASTM) classifies devices based on their MRI compatibility as:

- **MRI Safe:** Devices pose no known hazards in any MRI environment.
- **MRI Conditional:** Devices are safe under specific MRI conditions (e.g., field strength, scan duration).
- **MRI Unsafe:** Devices pose unacceptable risks and should not be exposed to MRI.

Most mechanical heart valves fall under the MRI conditional category, requiring adherence to manufacturer guidelines to ensure patient safety.

Heating and Mechanical Function

Radiofrequency energy during MRI can cause heating of metallic components. Clinical studies have shown that heating in mechanical valves is generally minimal and within safe limits when scanning is performed according to safety protocols. Moreover, the mechanical function of the valve is not typically impaired by MRI exposure, as the devices are designed to withstand biomechanical stresses.

Imaging Techniques and Protocols

Optimizing MRI protocols for patients with mechanical heart valves involves balancing image quality against artifact reduction and safety. Specialized imaging sequences and settings can help achieve diagnostic images while minimizing interference from prosthetic materials.

Artifact Reduction Strategies

Metallic components of mechanical valves cause susceptibility artifacts that degrade image quality. Strategies to reduce these artifacts include:

- Using spin-echo sequences instead of gradient-echo sequences, as spin-echo is less sensitive to magnetic field inhomogeneities.
- Applying higher bandwidth to reduce distortion.
- Employing shorter echo times (TE) to minimize phase dispersion.
- Orienting imaging planes to avoid direct intersection with the metallic valve components.

Recommended MRI Protocols

Cardiac MRI protocols for mechanical heart valve patients typically include:

- Localizer scans to identify valve position and orientation.

- Cine MRI sequences to evaluate valve function and ventricular performance.
- Phase-contrast imaging for quantification of blood flow and velocity across the valve.
- Tissue characterization sequences to assess myocardial viability and fibrosis.

Adhering to institution-specific safety guidelines and manufacturer recommendations ensures optimal imaging outcomes.

Clinical Applications of Mechanical Heart Valve MRI

MRI plays a vital role in the comprehensive assessment of patients with mechanical heart valves, complementing other imaging modalities such as echocardiography and computed tomography (CT). Its applications range from functional evaluation to complication detection.

Valve Function Assessment

MRI provides dynamic, high-resolution images to assess the mechanical valve’s opening and closing motion. Cine MRI sequences allow visualization of leaflet mobility and detection of abnormal valve function such as stenosis or regurgitation.

Evaluation of Cardiac Chambers

Patients with mechanical valves often require periodic assessment of ventricular size and function. MRI offers precise quantification of left and right ventricular volumes, ejection fraction, and wall motion abnormalities.

Detection of Complications

Mechanical heart valves can be associated with complications such as thrombosis, pannus formation, or endocarditis. MRI can aid in identifying these issues by demonstrating abnormal flow patterns, mass lesions, or myocardial inflammation.

Future Directions and Innovations

Continued advancements in both mechanical heart valve design and MRI technology are expanding the scope and safety of imaging in this patient population. Innovations include the development of MRI-compatible valve materials and improved artifact reduction techniques.

Emerging Technologies

Research into novel biomaterials aims to create mechanical valves with minimal magnetic

susceptibility, enabling safer and higher-quality MRI imaging. Additionally, new MRI sequences and artificial intelligence-based image reconstruction methods promise enhanced visualization despite metallic artifacts.

Integration with Other Modalities

Hybrid imaging approaches combining MRI with modalities such as positron emission tomography (PET) or CT are under investigation to provide comprehensive assessments of mechanical valve function and associated complications.

Frequently Asked Questions

Is it safe to undergo an MRI scan with a mechanical heart valve?

Most modern mechanical heart valves are considered MRI conditional, meaning they are generally safe to undergo MRI scans under specific conditions. However, it is crucial to consult with your cardiologist and the imaging facility to ensure the device's compatibility and follow safety protocols.

What are the risks of MRI for patients with mechanical heart valves?

The primary risks include potential heating of the valve or surrounding tissues, movement or displacement of the valve, and interference with MRI image quality. However, these risks are minimal with newer valve models and proper MRI settings.

Can MRI images be affected by the presence of a mechanical heart valve?

Yes, mechanical heart valves can cause artifacts or distortions in MRI images near the chest area, potentially affecting the quality of the cardiac images. Radiologists may use specialized techniques to minimize these artifacts.

Are there specific MRI settings recommended for patients with mechanical heart valves?

Yes, MRI protocols for patients with mechanical heart valves often involve using lower magnetic field strengths (usually 1.5 Tesla), specific radiofrequency settings, and monitoring to reduce heating and artifacts. Always follow the device manufacturer's guidelines and hospital protocols.

Do all types of mechanical heart valves have the same MRI

compatibility?

No, MRI compatibility varies depending on the valve's make, model, and materials. Some older mechanical valves may not be MRI safe, whereas most newer models are MRI conditional. Always check the implant identification card and consult with healthcare providers.

What should a patient inform their radiologist before undergoing MRI with a mechanical heart valve?

Patients should inform the radiologist and MRI technician about their mechanical heart valve, including the valve type, model, implantation date, and any implant identification card details. This information helps assess MRI safety and plan the appropriate imaging protocol.

Are there alternative imaging methods if MRI is not suitable for patients with mechanical heart valves?

Yes, alternative imaging modalities include CT scans, echocardiography (ultrasound), and nuclear imaging, which do not pose the same risks as MRI for patients with mechanical heart valves. The choice depends on the clinical indication and the specific diagnostic needs.

Additional Resources

1. *Magnetic Resonance Imaging in Patients with Mechanical Heart Valves*
This book provides a comprehensive overview of MRI safety, imaging techniques, and artifact management in patients with mechanical heart valves. It discusses the physics of MRI interactions with prosthetic materials and offers clinical guidelines to optimize image quality. The text is essential for radiologists and cardiologists managing patients requiring MRI scans.

2. *Advanced Cardiac MRI: Imaging Mechanical Heart Valves and Prostheses*
Focusing on advanced cardiac MRI protocols, this book explores the challenges of imaging mechanical heart valves, including artifact reduction and signal optimization. It includes detailed case studies and practical tips for differentiating valve function and complications. The content is tailored for clinicians and imaging technicians specializing in cardiac care.

3. *Cardiac Prosthesis and MRI: Safety and Diagnostic Considerations*
This title examines the safety concerns and diagnostic potential of MRI in patients with mechanical cardiac prostheses. It reviews current literature on device compatibility, heating effects, and magnetic field interactions. The book also provides recommendations for patient screening and MRI procedure planning.

4. *Imaging Artifacts in Mechanical Heart Valve MRI: Identification and Solutions*
Dedicated to the technical aspects of MRI imaging, this book addresses common artifacts caused by mechanical heart valves and strategies to minimize them. It includes visual examples and troubleshooting guidelines to enhance diagnostic accuracy. The book is a practical resource for imaging specialists encountering prosthetic valve artifacts.

5. *Clinical Applications of MRI in Mechanical Heart Valve Assessment*
This work outlines the clinical utility of MRI in evaluating mechanical heart valve function,

thrombosis, and structural integrity. It covers comparative imaging modalities and highlights MRI's unique advantages in non-invasive assessment. The text is useful for cardiologists and radiologists in clinical decision-making.

6. *Mechanical Heart Valves: Imaging and Interventional Perspectives*
Combining imaging insights with interventional cardiology, this book discusses the role of MRI in pre- and post-procedural evaluation of mechanical heart valves. It integrates imaging findings with patient management strategies and surgical outcomes. The interdisciplinary approach benefits both imaging and cardiac intervention professionals.

7. *Prosthetic Heart Valves and MRI: Physics, Safety, and Clinical Protocols*
This title delves into the physics behind MRI interactions with prosthetic heart valves, emphasizing safety protocols and device testing. It serves as a guide for developing institutional MRI protocols to ensure patient safety and image quality. The book is ideal for medical physicists, radiologists, and MRI technologists.

8. *Cardiac MRI Techniques for Mechanical Valve Evaluation*
This book presents detailed MRI techniques tailored for assessing mechanical heart valves, including flow quantification and tissue characterization. It discusses pulse sequence optimization and post-processing methods to improve visualization. The content supports imaging specialists aiming to enhance diagnostic precision.

9. *Heart Valve Prostheses: MRI Challenges and Innovations*
Focusing on recent technological advancements, this book explores innovative MRI solutions to overcome challenges posed by mechanical heart valves. It highlights emerging imaging sequences, hardware improvements, and software algorithms designed to reduce artifacts. The book offers a forward-looking perspective for researchers and clinicians alike.

Mechanical Heart Valve Mri

mechanical heart valve mri: Cardiovascular Magnetic Resonance Imaging Raymond Y. Kwong, Michael Jerosch-Herold, Bobak Heydari, 2019-01-31 The significantly updated second edition of this important work provides an up-to-date and comprehensive overview of cardiovascular magnetic resonance imaging (CMR), a rapidly evolving tool for diagnosis and intervention of cardiovascular disease. New and updated chapters focus on recent applications of CMR such as electrophysiological ablative treatment of arrhythmias, targeted molecular MRI, and T1 mapping methods. The book presents a state-of-the-art compilation of expert contributions to the field, each examining normal and pathologic anatomy of the cardiovascular system as assessed by magnetic resonance imaging. Functional techniques such as myocardial perfusion imaging and assessment of flow velocity are emphasized, along with the exciting areas of artherosclerosis plaque imaging and targeted MRI. This cutting-edge volume represents a multi-disciplinary approach to the field, with contributions from experts in cardiology, radiology, physics, engineering, physiology and biochemistry, and offers new

directions in noninvasive imaging. The Second Edition of Cardiovascular Magnetic Resonance Imaging is an essential resource for cardiologists and radiologists striving to lead the way into the future of this important field.

mechanical heart valve mri: Advances in Heart Valve Biomechanics Michael S. Sacks, Jun Liao, 2019-04-08 This book covers the latest research development in heart valve biomechanics and bioengineering, with an emphasis on novel experimentation, computational simulation, and applications in heart valve bioengineering. The most current research accomplishments are covered in detail, including novel concepts in valvular viscoelasticity, fibril/molecular mechanisms of tissue behavior, fibril kinematics-based constitutive models, mechano-interaction of valvular interstitial and endothelial cells, biomechanical behavior of acellular valves and tissue engineered valves, novel bioreactor designs, biomechanics of transcatheter valves, and 3D heart valve printing. This is an ideal book for biomedical engineers, biomechanics, surgeons, clinicians, business managers in the biomedical industry, graduate and undergraduate students studying biomedical engineering, and medical students.

mechanical heart valve mri: Cardiovascular Magnetic Resonance Warren J. Manning, MD, Dudley J. Pennell, MD, FRCP, FACC, 2010-04-05 Cardiovascular Magnetic Resonance provides you with up-to-date clinical applications of cardiovascular MRI for the broad spectrum of cardiovascular diseases, including ischemic, myopathic, valvular, and congenital heart diseases, as well as great vessel and peripheral vascular disease. Editors Warren J. Manning and Dudley J. Pennell and their team of international contributors cover everything from basic MR physics to sequence design, flow quantification and spectroscopy to structural anatomy and pathology. Learn the appropriate role for CMR in a variety of clinical settings with reference to other modalities, practical limitations, and costs. With the latest information on contrast agents, MR angiography, MR spectroscopy, imaging protocols, and more, this book is essential for both the beginner and expert CMR practitioner. Covers both the technical and clinical aspects of CMR to serve as a comprehensive reference. Demonstrates the full spectrum of the application of cardiac MR from ischemic heart disease to valvular, myopathic, pericardial, aortic, and congenital heart disease. Includes coverage of normal anatomy, orientation, and function to provide you with baseline values. Discusses advanced techniques, such as interventional MR, to include essential information relevant to the specialist. Features appendices with acronyms and CMR terminology used by equipment vendors that serve as an introduction to the field. Uses consistent terminology and abbreviations throughout the text for clarity and easy reference. Covers both the technical and clinical aspects of CMR to serve as a comprehensive reference. Demonstrates the full spectrum of the application of cardiac MR from ischemic heart disease to valvular, myopathic, pericardial, aortic, and congenital heart disease. Includes coverage of normal anatomy, orientation, and function to provide you with baseline values. Discusses advanced techniques, such as interventional MR, to include essential information relevant to the specialist. Features appendices with acronyms and CMR terminology used by equipment vendors that serve as an introduction to the field. Uses consistent terminology and abbreviations throughout the text for clarity and easy reference.

mechanical heart valve mri: An Atlas of Mitral Valve Imaging Milind Desai, Christine Jellis, Teerapat Yingchoncharoen, 2015-06-09 Valvular heart medicine revolves around the need to accurately identify locations of pathological structures and/or the interventional tools needed to manage that pathology. The imaging of the valves is developing at an enormous pace and the clinician must be aware of the advantages of each modality and how it compares to the others available. There is a need for a practical, clinical atlas designed to work the reader through cases and assessing the gold standard choices available to physicians. This atlas will represent the full multimodality imaging decisions needed when assessing mitral valvular disorders. Within this atlas the authors will be presenting a comprehensive pictorial overview of the highly complex pathology/treatment techniques and management in this diverse group of patients with varied mitral valvular pathologies. Imaging modalities move fast representing challenge to practitioners. This atlas will enable them to learn the choices available and be well versed in techniques. It will

therefore be essential reading for all cardiac imagers, surgeons, interventionalists, anesthetists and trainees in these disciplines.

mechanical heart valve mri: *Magnetic Resonance Procedures* Frank G. Shellock, 2000-12-21 Magnetic Resonance Procedures: Health Effects and Safety is the first authoritative text on MR procedures and its associated health and safety concerns written by noted radiologists, physicists, and scientists with expertise in the field. It contains both theoretical and practical information. This timely text discusses emergent issues rela

mechanical heart valve mri: Cardiovascular Magnetic Resonance Warren J. Manning, Dudley J. Pennell, 2018-04-26 - Provides state-of-the-art coverage of CMR technologies and guidelines, including basic principles, imaging techniques, ischemic heart disease, right ventricular and congenital heart disease, vascular and pericardium conditions, and functional cardiovascular disease. - Includes new chapters on non-cardiac pathology, pacemaker safety, economics of CMR, and guidelines as well as new coverage of myocarditis and its diagnosis and assessment of prognosis by cardiovascular magnetic resonance, and the use of PET/CMR imaging of the heart, especially in sarcoidosis. - Features more than 1,100 high-quality images representing today's CMR imaging. - Covers T1, T2 and ECV mapping, as well as T2* imaging in iron overload, which has been shown to save lives in patients with thalassaemia major - Discusses the cost-effectiveness of CMR. - Provides state-of-the-art coverage of CMR technologies and guidelines, including basic principles, imaging techniques, ischemic heart disease, right ventricular and congenital heart disease, vascular and pericardium conditions, and functional cardiovascular disease. - Includes new chapters on non-cardiac pathology, pacemaker safety, economics of CMR, and guidelines as well as new coverage of myocarditis and its diagnosis and assessment of prognosis by cardiovascular magnetic resonance, and the use of PET/CMR imaging of the heart, especially in sarcoidosis. - Features more than 1,100 high-quality images representing today's CMR imaging. - Covers T1, T2 and ECV mapping, as well as T2* imaging in iron overload, which has been shown to save lives in patients with thalassaemia major. - Discusses the cost-effectiveness of CMR. - Expert ConsultTM eBook version included with purchase. This enhanced eBook experience allows you to search all of the text, figures, and references from the book on a variety of devices.

mechanical heart valve mri: MRI and CT of the Cardiovascular System Charles B. Higgins, Albert de Roos, 2006 Written by internationally eminent experts in cardiovascular imaging, this volume provides state-of-the-art information on the use of MRI and CT in the assessment of cardiac and vascular diseases. This Second Edition reflects recent significant advances in cardiovascular MRI technology and the emergence of multi-detector CT as an important diagnostic modality, particularly for ischemic heart disease. New chapters in this edition cover coronary CTA and plaque characterization. A brand-new interventional MR section covers catheter tracking and devices, endovascular interventions, MR-guided cardiac catheterization, and endovascular delivery of gene and stem cell therapy. More than 900 illustrations present diagnostic information in unprecedented detail.

mechanical heart valve mri: *Cardiovascular Magnetic Resonance E-Book* Warren J. Manning, Dudley J. Pennell, 2010-04-05 Cardiovascular Magnetic Resonance provides you with up-to-date clinical applications of cardiovascular MRI for the broad spectrum of cardiovascular diseases, including ischemic, myopathic, valvular, and congenital heart diseases, as well as great vessel and peripheral vascular disease. Editors Warren J. Manning and Dudley J. Pennell and their team of international contributors cover everything from basic MR physics to sequence design, flow quantification and spectroscopy to structural anatomy and pathology. Learn the appropriate role for CMR in a variety of clinical settings with reference to other modalities, practical limitations, and costs. With the latest information on contrast agents, MR angiography, MR spectroscopy, imaging protocols, and more, this book is essential for both the beginner and expert CMR practitioner. Covers both the technical and clinical aspects of CMR to serve as a comprehensive reference. Demonstrates the full spectrum of the application of cardiac MR from ischemic heart disease to valvular, myopathic, pericardial, aortic, and congenital heart disease. Includes coverage of normal

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mechanical heart valve mri: The EACVI Textbook of Cardiovascular Magnetic Resonance Victor Ferrari, 2018-09-20 This highly comprehensive and informed textbook has been prepared by the Cardiovascular Magnetic Resonance section of the European Society of Cardiology association on imaging, the EACVI. The EACVI Textbook of Cardiovascular Magnetic Resonance is the authority on the subject. The textbook is aligned with ESC Core Curriculum and EACVI Core Syllabus for CMR. It is a practical resource and provides a disease orientated outlook on the subject. Structured with thirteen clear and detailed sections, ranging from Physics to Methodology, and featuring specific sections on ischemic heart disease, myocardial disease, pericardial disease, and congenital heart disease and adult congenital heart disease, The EACVI Textbook of Cardiovascular Magnetic Resonance provides extensive knowledge across the entire subject area in CMR. Beautifully illustrated and physical principles enriched with schematic animations, the textbook is advanced further with key video content based on clinical cases. Written by leading experts in the field from across the world, the textbook aims to summarise the existing research and clinical evidence for the various CMR indications and provide an invaluable resource for cardiologists and radiologists across the board. The textbook is ideal for cardiologists and radiologists new to the field of Cardiovascular Magnetic Resonance, those preparing for ESC certification in CMR, and those established in the field wishing to gain a deep understanding of CMR. Online access to the digital version is included with purchase of the print book, with accompanying videos referenced within the text available on Oxford Medicine Online.

mechanical heart valve mri: Basic Principles of Cardiovascular MRI Mushabbar A. Syed, Subha V. Raman, Orlando P. Simonetti, 2015-10-29 This book is a comprehensive and authoritative text on the expanding scope of CMR, dedicated to covering basic principles in detail focusing on the needs of cardiovascular imagers. The target audience for this book includes CMR specialists, trainees in CMR and cardiovascular medicine, cardiovascular physicists or clinical cardiovascular imagers. This book includes figures and CMR examples in the form of high-resolution still images and is divided in two sections: basic MRI physics, i.e. the nuts and bolts of MR imaging; and imaging techniques (pulse sequences) used in cardiovascular MR imaging. Each imaging technique is discussed in a separate chapter that includes the physics and clinical applications (with cardiovascular examples) of a particular technique. Evolving techniques or research based techniques are discussed as well. This section covers both cardiac and vascular imaging. Cardiovascular magnetic resonance (CMR) imaging is now considered a clinically important imaging modality for patients with a wide variety of cardiovascular diseases. Recent developments in scanner hardware, imaging sequences, and analysis software have led to 3-dimensional, high-resolution imaging of the cardiovascular system. These developments have also influenced a wide variety of cardiovascular imaging applications and it is now routinely used in clinical practice in CMR laboratories around the world. The non-invasiveness and lack of ionizing radiation exposure make CMR uniquely important for patients whose clinical condition requires serial imaging follow-up. This is particularly true for patients with congenital heart disease (CHD) with or without surgical corrections who require lifelong clinical and imaging follow-up.

mechanical heart valve mri: Clinical Cardiac MRI Jan Bogaert, Steven Dymarkowski, Andrew M. Taylor, Vivek Muthurangu, 2012-02-27 This fully updated edition of the most comprehensive and best-illustrated volume on cardiac MRI emphasizes its use in everyday clinical practice and includes in its online edition dozens more real-life cases that significantly enhance the utility of the book.

mechanical heart valve mri: *Multimodality Imaging for Cardiac Valvular Interventions, Volume 1 Aortic Valve* Francesco Maisano, Philipp Kaufmann, Hatem Alkadhi, Michel Zuber, Alberto Pozzoli, Edwin Ho, 2020-02-10 This book provides a practically applicable guide to the use of multimodality imaging for managing aortic valve disorders. Details of how to successfully diagnose a range of aortic valve diseases is presented, with detailed information covered on the techniques and relevant criteria for pre-operative screening, surgical and transcatheter planning, intraprocedural imaging and related postoperative follow-up. Multimodality Imaging for Cardiac Valvular Interventions, Volume 1 Aortic Valve: From Diagnosis to Decision-Making enables the reader to develop a thorough understanding and confidence of how to make appropriate clinical decisions when confronted by a range of aortic valve diseases. It is therefore a key resource for practicing cardiac imagers, cardiologists and interventional cardiologists who encounter these patients in their day-to-day clinical practice and trainees in cardiology seeking insight on the appropriate management of these patients.

mechanical heart valve mri: *Problem Solving in Radiology: Cardiovascular Imaging E-Book* Suhny Abbara, Sanjeeva P Kalva, 2012-11-01 Optimize diagnostic accuracy with Cardiovascular Imaging, a title in the popular Problem Solving in Radiology series. Drs. Suhny Abbara and Sanjeeva Kalva use a problem-based approach to help you make optimal use of the latest cardiovascular imaging techniques and achieve confident diagnoses. Consult this title on your favorite e-reader with intuitive search tools and adjustable font sizes. Elsevier eBooks provide instant portable access to your entire library, no matter what device you're using or where you're located. Make the most effective use of today's imaging techniques, including PET and SPECT. Perform effective interventions using the newest grafts, stents, and coils. See conditions as they appear in practice with more than 2,350 images detailing anatomy, normal anatomic variants, and pathology. Make optimal clinical choices and avoid complications with expert protocols and tricks of the trade. Avoid common problems that can lead to an incorrect diagnosis. Tables and boxes with tips, pitfalls, and other teaching points show you what to look for, while problem-solving advice helps you make sound clinical decisions. Quickly find the information you need thanks to a well-organized, user-friendly format with consistent headings, detailed illustrations, and at-a-glance tables.

mechanical heart valve mri: Cardiac Imaging: The Requisites Lawrence Boxt, Suhny Abbara, 2015-10-14 Get the essential tools you need to make an accurate diagnosis with Cardiac Imaging, 4th Edition! Edited by Lawrence Boxt, MD and Suhny Abbara, MD, this popular volume in The Requisites series concisely delivers the conceptual, factual, and interpretive information you need for effective clinical practice in cardiac imaging. Practice-proven tips and excellent problem-solving discussions are accompanied by over 1000 figures and illustrations of the highest quality. The result is an outstanding review source for certification or recertification, as well as a highly user-friendly resource for everyday clinical practice. Master core knowledge of all imaging modalities currently being used (plain film, ultrasound, CT, and MR), and discusses potential future developments. Focus on the essentials needed to pass the boards and ensure accurate diagnoses in clinical practice. Clearly visualize the findings you're likely to see in practice and on exams through updated and redrawn illustrations and color images interspersed throughout the text for easier and more intuitive access. Gain new insight into a full range of cardiac imaging approaches and findings with new sections on congenital heart disease, emphasizing MRI and CT diagnostic and functional analysis as well as and updated information on valvular, ischemic, pericardial, myocardial, congenital, and thoracic/aortic heart disease. Benefit from the expertise and fresh perspective of new lead editors, Drs. Lawrence Boxt and Suhny Abbara. Access the fully searchable text and downloadable images online at expert consult.

mechanical heart valve mri: Magnetic Resonance Imaging of Congenital Heart Disease Mushabbar A. Syed, Raad H. Mohiaddin, 2023-09-26 This heavily updated textbook focuses on the use of cardiac magnetic resonance (CMR) imaging in pediatric and adult patients with congenital heart disease. Over past two decades, CMR has come to occupy an ever more important place in the assessment and management of patients with congenital heart defects (CHD) and other cardiovascular disorders. The modality offers an ever-expanding amount of information about the heart and circulation, provides outstanding images of cardiovascular morphology and function, is increasingly being used to detect pathologic fibrosis, and has an expanding role in the assessment of myocardial viability. Magnetic Resonance Imaging of Congenital Heart Disease is an excellent foundation for any reader not familiar with the field whether they are imagers or clinicians who deal with cardiovascular disease. It also describes the technical details of MRI techniques to help the clinician understand the most important elements of CMR in assessing and managing their patients. In creating the book, the editors have assembled a world-renowned panel of contributors to review the use of CMR in CHD and make it accessible to those working in the field and to those who use the information derived from CMR in their clinical practice.

mechanical heart valve mri: *Multimodality imaging in cardiomyopathy* Monica Mukherjee, Allison G. Hays, Juan Carlos Lopez-Mattei, Andrew D. Choi, 2023-02-13

mechanical heart valve mri: Advances in Clinical Cardiovascular Imaging, Echocardiography & Interventions HK Chopra, Navin C Nanda, Jagat Narula, 2019-02-28 SECTION 1: BASICS 1. Basics of Cardiac Computed Tomography 2. Basics of Cardiac Magnetic Resonance Imaging 3. New Cardiac Cameras: Single-photon Emission Computed Tomography and Positron Emission Tomography SECTION 2: HYPERTENSION 4. Left Ventricular Hypertrophy Evaluation by Echocardiography in Hypertension 5. Left Atrial Volume Index Evaluation by Echocardiography in Hypertension 6. Advances in Diastology by Echocardiography in Hypertension 7. Advances in Left Atrial Strain Evaluation by Echocardiography in Hypertension 8. Sequential ABPM Navigation Imaging in Hypertension 9. Echocardiographic Evaluation in Hypertension: Diagnostic, Prognostic, and Therapeutic Implications 10. Beta-blocker Effect and Outcome Evaluation by Echocardiography in Hypertension 11. Statin Effect and Outcome Evaluation by Echocardiography 12. ARNIs Effect and Outcome Evaluation by Echocardiography in Hypertension 13. Left Ventricular Hypertrophy and Left Ventricular Mass Index Evaluation by 3D Echocardiography in Hypertension 14. Validation of Chlorthalidone Efficacy and Outcome by Echocardiographic Variables 15. Secondary Hypertension Evaluation: Multimodality Imaging SECTION 3: HEART FAILURE 16. Biomarkers Imaging in Heart Failure 17. Advances in Systolic Heart Failure Evaluation by Echocardiography 18. Cardiac Magnetic Resonance Imaging in Ischemic Heart Failure 19. Role of Cardiovascular Magnetic Resonance Imaging in Nonischemic Cardiomyopathy 20. Echocardiography-guided b-blocker Therapy in Heart Failure 21. Diuretics Effect and Outcome Evaluation in Heart Failure by Echocardiography 22. Device Intervention in Heart Failure 23. Radionuclide Imaging of Cardiac Autonomic Innervation: MIBG 24. Cardiac Radionuclide Imaging to Assess Patients with Heart Failure SECTION 4: ST-ELEVATION MYOCARDIAL INFARCTION AND CORONARY ARTERY DISEASE 25. Biomarkers Imaging in ST-elevation Myocardial Infarction 26. Electrocardiography Imaging in ST-elevation Myocardial Infarction 27. Advances in Echocardiographic Navigation of STEMI Complications 28. Coronary Artery Disease and Advances in Intravascular Ultrasound Imaging 29. Vulnerable Plaque Imaging in Acute Coronary Syndrome: When to Intervene? 30. ST-elevation Myocardial Infarction and Advances in Optical Coherence Tomography 31. Role of OCT in the Subset of CAD Postpercutaneous Coronary Intervention and Postcoronary Artery Bypass Graft 32. Acute Coronary Syndrome: Bifurcation Lesion, Imaging, and Intervention Advances 33. Quantitative Assessment of Myocardial Blood Flow and Fractional Flow Reserve and their Clinical Applications 34. ACS Coronary Intervention and Imaging: Recent Advances--Optical Coherence Tomography 35. Advances in CT Coronary Angiography in Evaluation of CAD 36. TNK Effect and Outcome Evaluation in STEMI by Echocardiography 37. Prognosis and Risk Outcome by Echocardiography in AMI Patients Post-thrombolysis 38. TNK Effect and Outcome Evaluation in

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