

CONTENTS

Section 1 CLINICAL CARDIOLOGY

Chapter 1.	Jugular Venous Pulse: Elusive but Adorable.....	3
	<i>Varun S Narain, Gaurav Choudhary</i>	
	▪ Examination of the Jugular Venous Pulse	3
	▪ Interpretation of the Jugular Venous Pulse	4
	▪ Identification of Waves	6
	▪ Abnormal Contours: What They Say	7
Chapter 2.	How to Measure Blood Pressure in Children and Adults? A Guide	11
	<i>Justin Paul G, Sandeep S, Kumaran S</i>	
	▪ History of Blood Pressure Measurement	11
	▪ Noninvasive Techniques	11
	▪ Present-day Methods	12
	▪ Practical Points in Blood Pressure Measurement	13
	▪ Procedure of Measuring Blood Pressure	13
	▪ Ambulatory Blood Pressure Monitoring	14
	▪ Blood Pressure Measurement in Special Populations	14
Chapter 3.	Peripheral Signs of Aortic Regurgitation: Revisited.....	17
	<i>S Shanmugasundaram, B Vinodkumar, U Ilayaraja</i>	
	▪ Typical Arterial Pulse of Significant Aortic Regurgitation	17
	▪ Peripheral Signs of Aortic Runoff	18
	▪ Investigations	20
Chapter 4.	Clinical Examination in Atrial Fibrillation.....	21
	<i>Ganesh Kumar Kasinadhuni, Parag Barwad</i>	
	▪ Physical Examination	21
	▪ Systemic Examination	22

Chapter 5.	Continuous Murmur	25
	<i>Ranjit Kumar Nath</i>	
	▪ Physiologic Classification	25
	▪ Differential Diagnosis	26
Chapter 6.	Dynamic Auscultation	32
	<i>Rishi Sethi, Akshyaya Pradhan, Snigdha Boddu</i>	
	▪ Physiological Maneuvers	32
	▪ Pharmacological Maneuvers	36

Section 2 VALVULAR HEART DISEASE—RHEUMATIC HEART DISEASE

Chapter 7.	Challenges in the Diagnosis and Management of Acute Rheumatic Fever	39
	<i>Anita Saxena</i>	
	▪ Diagnosis of Rheumatic Fever	39
	▪ Major Criteria	40
	▪ Minor Manifestations	41
	▪ Management	42
Chapter 8.	Pathogenesis of Rheumatic Fever and Rheumatic Heart Disease: What have we Learned?	46
	<i>Santhosh Satheesh, Sasinthar Rangasamy</i>	
	▪ Three Components of Rheumatic Fever Pathogenesis	46
	▪ Immunological Mechanisms in Acute Rheumatic Fever and Rheumatic Heart Disease	47
	▪ Controversies in Pathogenesis of Acute Rheumatic Fever/ Rheumatic Heart Disease	49
	▪ Evolution into Chronic Rheumatic Heart Disease	50
	▪ Recent Conflicting Evidences in Rheumatic Heart Disease Pathogenesis	50
	▪ Knowing the Pathogenesis of RHD: How Does it Help in Tackling the Disease?	50
Chapter 9.	Decline of Rheumatic Heart Disease: Is it Real?	53
	<i>Prakash C Negi, Sanjeev Asotra, Sachin Sondhi</i>	
	▪ Methods of Detection	53
	▪ Data Sources for Estimation of Burden of RF/RHD	53

- Epidemiological Trends of Burden of RHD in India 54
- Decline of Rheumatic Heart Disease: Is it Real? 56
- Estimated Burden of Disease 57
- Challenges and Opportunities for Prevention and Control of Rheumatic Fever/Rheumatic Heart Disease 57

Chapter 10. Clinical Assessment of Severity of Valvular Heart Disease..... 60

Ajith Ananthakrishna Pillai, Devendra Kanshilal Sharma, Balachander Jayaraman

- Mitral Stenosis 60
- Mitral Regurgitation 64
- Aortic Regurgitation 66
- Acute Aortic Regurgitation 69
- Aortic Stenosis 69
- Tricuspid Stenosis 71
- Tricuspid Regurgitation 71
- Pulmonary Stenosis 72
- Pulmonary Regurgitation 72
- Multivalvular Lesions 72

Chapter 11. Subclinical Rheumatic Heart Disease 74

RK Gokhroo, Kailash Chandra

- Prevalence of Clinical and Subclinical RHD 74
- Is Early Recognition Beneficial? 74
- Diagnostic Criteria for Latent RHD 75
- Definite RHD 75
- Borderline RHD 76
- Limitations for WHF Criteria 76
- Targets for Screening 77
- The Natural History of Subclinical RHD 77
- Management of Definite RHD 77
- Management of Borderline RHD 77

Chapter 12. Natural History of Mitral and Aortic Valve Regurgitation 79

Sudhir S Shetkar, Sivasubramanian Ramakrishnan, Kewal C Goswami

- Natural History of Mitral Regurgitation 79
- Natural History of Aortic Regurgitation 81

Chapter 13.	Natural History of Rheumatic Mitral Stenosis.....	87
	<i>Vivek Chaturvedi</i>	
	▪ Natural History of Mitral Stenosis in the Era Prior to Definitive Therapy	87
Chapter 14.	Percutaneous Transvenous Mitral Commissurotomy: Tips and Tricks.....	92
	<i>CN Manjunath, Vijaykumar JR, BC Srinivas</i>	
	▪ Anatomy and Pathophysiology	92
	▪ Indications for BMV	92
	▪ Contraindications	92
	▪ Technique	92
	▪ BMV Technique	93
	▪ Percutaneous Transvenous Mitral Commissurotomy (PTMC) in Left Atrium Clot	96
	▪ Manjunath's Classification of LA Clot	98
	▪ Lutembacher's—ASD/RHD Severe MS with Severe Submitral Disease	99
Chapter 15.	Clinical Diagnosis of Tricuspid Valve Disease	106
	<i>Sudeep Kumar, Pramod Sagar BK</i>	
	▪ Clinical Anatomy of Tricuspid Valve	106
	▪ Physiology	106
	▪ Etiology of Tricuspid Valve Abnormalities	107
	▪ Tricuspid Stenosis	107
	▪ Tricuspid Regurgitation	107
	▪ Symptoms of Tricuspid Valve Disease	110
	▪ Physical Signs	110
	▪ Effect of Various Maneuvers	112
	▪ Electrocardiogram	113
	▪ Chest X-ray	113
Chapter 16.	Atrial Fibrillation in Rheumatic Heart Disease	115
	<i>Krishnakumar S, Harkrishnan S</i>	
	▪ Pathophysiology	115
	▪ Inflammation and Structural Remodeling	115
	▪ Pulmonary Veins, Electrical Remodeling and Stretch	115
	▪ Thromboembolism and Anticoagulation	116
	▪ Management	116

- Correction of Underlying Disorder 116
- Control of Ventricular Rate 116
- Rhythm Control 117

Chapter 17. Prevention of Rheumatic Fever/
Rheumatic Heart Disease 119

Anil Bharani, Anjali Bharani

- Epidemiology 119
- Diagnosis of Rheumatic Fever 119
- Prevention of Rheumatic Fever/Rheumatic Heart Disease 119

Section 3 VALVULAR HEART DISEASE—OTHERS

Chapter 18. Newer Valve Guidelines: What Suits
Indians and What does not? 127

Rajiv Ananthakrishna, Srinivas B Chikkaswamy

- Valvular Heart Disease: The Indian Perspective 127
- General Considerations in Evaluating Valvular Heart Disease 127
- Specific Valvular Lesions 128
- Other Considerations 131
- Common Case Scenarios in Routine Clinical Practice 131
- The Future 132

Chapter 19. Role of Two- and Three-dimensional
Echocardiography in Valvular Lesions 133

Raziye E Akdogan, Ahmed Y Salama, Hanan Fadala, Navin C Nanda

- Mitral Stenosis and Regurgitation 133
- Aortic Stenosis and Regurgitation 138
- Tricuspid Stenosis and Regurgitation 141
- Pulmonary Stenosis and Regurgitation 145

Chapter 20. Pitfalls in Assessment of Valvular Heart Disease 148

Jagdish C Mohan, Vishwas Mohan, Madhu Shukla

- Assessment of Mitral Regurgitation 148
- Methods to Assess Severity of Rheumatic Mitral Regurgitation 150
- Assessment of Mitral Stenosis 156
- Assessment of Aortic Valve 165
- Assessment of Aortic Regurgitation 172

Chapter 21. Nonrheumatic Mitral Regurgitation..... 180*CM Nagesh, Laxmi H Shetty*

- Mitral Valve Anatomy 180
- Etiology 180
- Pathophysiology 181
- Clinical Features 182
- Diagnosis 183
- Quantitation of Primary and Ischemic Mitral Regurgitation 183
- Treatment 185
- Treatment in Primary Mitral Regurgitation 186
- Treatment in Secondary Mitral Regurgitation 186
- Percutaneous Techniques 186

Chapter 22. Bicuspid Aortic Valve in 2018: What we Must Know?..... 190*KM Krishnamoorthy, Deepa S Kumar*

- Embryology 190
- Anatomy 190
- Dysfunction of BAV 192
- Anomalies of Aorta 192
- Pathophysiology of Aortopathy 192
- Genetics 192
- Natural History 192
- Diagnosis 193
- Intervention 194
- Balloon Valvuloplasty 194
- Surgical Aortic Valvuloplasty 196
- Indications of Surgery for Aortopathy 196
- Pregnancy and BAV 196
- Exercise and BAV 197

Chapter 23. Low-gradient Aortic Stenosis 199*Vishal Batra, Mohit D Gupta, Girish MP*

- Technical Pitfalls and Measurement Errors 199
- Classical (Reduced Left Ventricular Ejection Fraction)
Low-flow, Low-gradient Aortic Stenosis 200
- Paradoxical (Preserved Left Ventricular Ejection Fraction)
Low-flow, Low-gradient Aortic Stenosis 202
- Normal-flow, Low-gradient Aortic Stenosis 202

Chapter 24.	Infective Endocarditis: What is New?	204
	<i>SK Dwivedi, Mahim Saran</i>	
	▪ Prevention	204
	▪ Impact of Guideline Change	204
	▪ Prevention of Health Care-associated IE	205
	▪ Diagnosis	205
	▪ Imaging	205
	▪ Microbiology	206
	▪ Prognostic Assessment	206
	▪ Management	207
	▪ Antimicrobial Therapy	207
	▪ Surgical Indications	208
	▪ IE in Special Subgroups	208
Chapter 25.	Prophylaxis for Infective Endocarditis in India	212
	<i>KH Srinivasa, Nishanth KR</i>	
	▪ Rationale for Prophylaxis Against IE	212
	▪ Cardiac Conditions at Risk for IE	212
Chapter 26.	Mechanical Prosthetic Valve Thrombosis	216
	<i>Ganesan Karthikeyan</i>	
	▪ Incidence of Left-sided PVT	216
	▪ Clinical Presentation and Diagnosis of Left-sided PVT	216
	▪ Management of Left-sided PVT	217
	▪ Recommendations for Management	217
Chapter 27.	Percutaneous Valve Interventions beyond Transcatheter Aortic Valve Implantation	219
	<i>Vijay Kumar Trehan, Safal Singh, Siddhant Trehan</i>	
	▪ Mitral Valve Repair	220
	▪ Mitral Valve Replacement	225
	▪ Percutaneous Therapies for Tricuspid Valve	229
	▪ Transcatheter Pulmonary Valve Implantation	231

Section 4 CONGENITAL HEART DISEASE—KEY ISSUES

Chapter 28. Epidemiology of Congenital Heart Disease in India.....235

Anita Saxena

- Risk Factors 235
- Incidence and Prevalence 235
- Prevention 237
- Current Status of CHD Care in India 239

Chapter 29. Assessment of Congenital Heart Defects with Left-to-Right Shunts and Pulmonary Hypertension for Operability.....243

R Krishna Kumar

- Objectives of the Review 244
- Correlating Preoperative Hemodynamics with Lung Biopsy Findings and Clinical Outcomes 244
- Clinical and Noninvasive Correlates of Hemodynamic Changes in Left-to-Right Shunts 245
- Accurate Hemodynamic Assessment in Shunt Lesions: Who Needs it Most? 245
- Role of Clinical Examination, ECG, Chest X-ray, Echocardiography and Arterial Blood Gas 246
- Hemodynamic Assessment in the Catheterization Laboratory 247

Chapter 30. Pregnancy and Congenital Heart Disease.....252

Arima Nigam

- Physiological Changes During Pregnancy 252
- Maternal and Fetal Risk 253
- High-risk Pathophysiologic States 254
- High-risk Anatomic Lesions 255
- Cardiovascular Drugs in Pregnancy 255
- Recommendations Regarding Anticoagulation Management 255
- Thrombolytic Therapy in Pregnancy 256
- Percutaneous Intervention/Surgery During Pregnancy 257
- Genetic Counseling 257
- Mode of Delivery 257
- Care in Puerperium 257

Chapter 31. A Simplified Approach to the Management of Congenitally Corrected Transposition of Great Arteries259

R Suresh Kumar, R Saileela

- Clinical Presentation and Natural History 259
- Management 259
- Heart Block in CCTGA 263
- Pregnancy in CCTGA 263

Section 5

CONGENITAL HEART DISEASE—EVALUATION OF CHD

Chapter 32. ECG in Pediatric Cardiology.....267

BRJ Kannan

- Basics of Recording and Interpretation 267
- Normal Variations and Related Abnormalities 267
- Analysis of P Wave 271
- Analysis of PR Segment 271
- Analysis of QRS Complex 273
- Cardiac Position-related QRS Changes 274
- Analysis of ST Segment 274
- Analysis of T Wave 274
- Some Disease-specific ECG Changes 275

Chapter 33. Chest X-ray in Congenital Heart Disease281

Arun Sharma, Vineeta Ojha, Sanjiv Sharma

- Technical Consideration 281
- Sequential Approach for Interpretation 281
- Chest X-ray and CHD Classification: Simplified Approach 284

Chapter 34. Traps and Pitfalls in Echocardiographic Diagnosis289 of Congenital Heart Disease

K Sivakumar

- Anatomical Errors 289
- Functional Errors 294

Chapter 35. Fetal Echocardiography: Current Status and Role in Management of Congenital Heart Defects.....296

Balu Vaidyanathan

- Concept of Universal Screening of Fetal Heart 296
- 3D/4D Static Fetal Echocardiography 296
- Impact of Fetal Echocardiography and Prenatal Diagnosis of CHD 297

Chapter 36. Advances in CT Angiography for Congenital Heart Disease 302

Arun Sharma, Gurpreet S Gulati

- **Challenges to Cardiac Imaging** 302
- **Technical Improvements in Cardiac CT** 302
- **Choosing the Optimal Imaging Modality in CHD** 302
- **Clinical Applications of CT in CHD** 303
- **Limitations** 306

Chapter 37. Best Use of Cardiac MRI in Congenital Heart Disease 309

Mahesh Kappanayil, Rajesh Kannan

- **Cardiac MRI** 309

Section 6

ACYANOTIC CONGENITAL HEART DISEASE

Chapter 38. Natural History of Ventricular Septal Defect 319

Sakshi Sachdeva, Shyam S Kothari

- **Natural History of Ventricular Septal Defect** 319

Chapter 39. Ventricular Septal Defect with Aortic Regurgitation..... 326

Manoj Kumar Rohit, Kanabar Kewal

- **History** 326
- **Epidemiology** 326
- **Pathogenesis** 326
- **Morphology** 327
- **Physiological Effects** 327
- **Natural History** 327
- **Clinical Presentation** 327
- **Treatment** 328

Chapter 40. Imaging of Atrial Septal Defect..... 332

Kshitij Sheth, Bharat Dalvi

- **Embryology of Interatrial Septum** 332
- **Anatomy of Ostium Secundum Atrial Septal Defect** 332
- **Types of Atrial Septal Defect** 332
- **Echocardiographic Imaging of the Atrial Septal Defect** 333
- **Three-dimensional Transesophageal** 336

Chapter 41.	Lutembacher's Syndrome	340
	<i>Bhanu Duggal, Yash Shrivastava, Pintu Sharma</i>	
	▪ Epidemiology	340
	▪ Clinical Features	340
	▪ Investigations	341
Chapter 42.	Which Device for which Patent Ductus Arteriosus?	344
	<i>IB Vijayalakshmi</i>	
	▪ Selection of Various Devices	344
	▪ Morphologic Classification of PDA	344
	▪ When is Each Device Used?	344
	▪ Amplatzer Vascular Plugs	347
	▪ Which Device in PDA With PAH?	347
	▪ Feasibility Test for Device Closure	348
Chapter 43.	Aneurysms of the Sinuses of Valsalva	351
	<i>Kewal C Goswami, Sivasubramanian Ramakrishnan, Siddharthan Deepti</i>	
	▪ Epidemiology	351
	▪ Pathological Anatomy and Etiology	351
	▪ Clinical Presentation	352
	▪ Diagnosis	352
	▪ Management	357
Chapter 44.	Coarctation of Aorta in Adults: Diagnosis	360
	and Current Management Strategies	
	<i>PV Suresh</i>	
	▪ Classification	360
	▪ Clinical Presentation	360
	▪ Diagnostic Evaluation	361
	▪ Indications of Intervention	362
<div> <div>Section 7</div> <div>CYANOTIC CONGENITAL HEART DISEASE</div> </div>		
Chapter 45.	Approach to Cyanosis in Newborn	371
	<i>Anita Saxena</i>	
	▪ Normal Cardiopulmonary Adaptation at Birth	371
	▪ Causes of Central Cyanosis in the Newborn	372

- Initial Evaluation of the Newborn with Cyanosis 372
- Hyperoxia Test 373
- Approach to a Newborn with Cyanotic Congenital Heart Disease 373
- Role of Pulse Oximetry 374
- Chest Radiograph 374
- Electrocardiography 374
- Echocardiography 374
- Initial Management 375

Chapter 46. Cyanosis in Adults.....378

Raghavan Subramanyan, R Saileela

- Pathophysiology 378
- Methemoglobinemia 379
- Differential Diagnosis of Cyanosis 379
- Hemoglobin Work-up in a Cyanotic Patient 381
- Treatment Strategy 382

Chapter 47. Eisenmenger Syndrome: An Update.....384

Sylvia Colaco, Prashant Bobhate

- Definition and Classification 384
- Epidemiology 384
- Classification 384
- Pathophysiology 385
- Natural History 387
- Clinical Features 388
- Cerebrovascular Events 389
- Pulmonary Dysfunction 389
- Renal Function and Uric Acid Clearance 389
- Other Miscellaneous Organ Involvement 389
- Investigations 389
- Management Strategy 390
- Other Conventional Therapies 391
- Targeted Therapy 391
- Surgical Management 393
- Future Trends 393

Chapter 48. Adults with Repaired Tetralogy of Fallot.....397

Snehal Kulkarni

- Surgical Repair of Unoperated TOF in Adults 397
- Subsets Who Do Better On Long-term Follow-up 397

- Issues on Long-term Follow-up in Adults 398
- Periodic Holter Monitoring 399
- Computed Tomography 399
- Magnetic Resonance Imaging 400
- Nuclear Scintigraphy 400
- Cardiac Catheterization and Angiography 401
- Serial Estimation of Brain Natriuretic Peptide 401
- Electrophysiology Study for Risk Stratification 401
- Standardized Clinical Assessment and Management Plans 401
- Pregnancy in Patients with TOF 401
- Predictors of Complications on Follow-up 401
- Reoperations in Adults with Repaired TOF 401
- Percutaneous Pulmonary Valve Replacement/Implantation 401

Chapter 49. Single Ventricle Pathway: Simplified.....403

Nageswara Rao Koneti, Vinoth Doraiswamy

- Morphology 403
- Hemodynamics 404
- Clinical Features 404
- Investigations 404
- Management 405
- Long-term Follow-up of Fontan 408

Chapter 50. Fontan Circulation: Simplified.....410

Jay Relan, Saurabh Kumar Gupta

- Fontan Physiology 410
- Indications for Fontan Operation 410
- Selecting a Patient for Fontan Operation 411
- Preparing for Fontan Operation 411
- To Stage or Not to Stage Cavopulmonary Connection 412
- Different Types of Fontan Circulation 414
- Clinical Effects of Fontan Circulation 415
- Long-term Effects and Complications 415
- Outcome 417

Chapter 51. Ebstein's Anomaly: What's New?.....419

Jayaranganath M, Usha MK

- Anatomy 419
- Embryology 419

- Arrhythmias 420
- Etiology and Genetic Factors 421
- Differential Diagnosis 421
- Pathophysiology 421
- Natural History 421
- Examination 422
- Treatment 424

Chapter 52. Total Anomalous Pulmonary Venous Connection: An Overview428

Sivasubramanian Ramakrishnan, Arvind Balaji, Kewal C Goswami

- History 428
- Prevalence and Etiology 428
- Embryology 428
- Morphology 428
- Associated Lesions 429
- Pathophysiology 429
- Natural History 430
- Clinical Features 430
- Other Imaging 433
- Management 433

Chapter 53. Pulmonary Arteriovenous Malformations435

Edwin Francis, Annu Jose, Bijesh Viswambaran

- History 435
- Etiology 435
- Clinical Features 435
- Investigations 436
- Management 436

Chapter 54. Systemic Effects of Cyanosis439

Neeraj Awasthy, Naveen Kumar

- Systemic Problems with Cyanosis 439
- Failure to Thrive 439
- Cyanotic Spell 440
- Brain Abscess 440
- Hematological Complications 441
- Vascular Complications 441
- Renal Problems 442

- Rheumatological Complications 442
- Bacterial Endocarditis 443
- Pulmonary Complications 443
- Gallbladder stones 443
- Ventricular Dysfunction 444
- Dental abnormalities 444

Section 8 CARDIOMYOPATHY

Chapter 55. Outcomes of Dilated Cardiomyopathy in 2018.....449

KK Talwar, Raghav Bansal

- Epidemiology and Natural History 449
- Etiological Classification of DCM 450
- Evaluation of DCM 451
- Management of DCM 452
- Specific Considerations for Common Secondary Etiologies 454

Chapter 56. Genetics of Cardiomyopathies: An Overview460

Ajay Bahl

- General Principles 460
- Dilated Cardiomyopathy 461
- Hypertrophic Cardiomyopathy 462
- Idiopathic Restrictive Cardiomyopathy 462
- Arrhythmogenic Right Ventricular Cardiomyopathy 462
- Indian Context 462

Chapter 57. Noninvasive Evaluation of Suspected Heart Muscle Disease464

Krishnam Raju P, Chandramukhi Sunehra

- Echocardiography 464
- Cardiac Magnetic Resonance Imaging 466
- Nuclear Cardiac Imaging 467
- Cardiac Computed Tomography 467
- Dilated Cardiomyopathy 467
- Hypertrophic Cardiomyopathy 468
- Noncompaction Cardiomyopathy 470
- Restrictive Cardiomyopathy 471
- Idiopathic Restrictive Cardiomyopathy 472

- Cardiac Amyloidosis 472
- Cardiac Magnetic Resonance Imaging 474
- Nuclear Imaging in Cardiac Amyloidosis 474
- Cardiac Sarcoidosis 474
- Electrocardiogram 475
- Echocardiography 475
- Cardiac Magnetic Resonance 475
- Positron Emission Tomography (PET) 475
- Anderson-Fabry Disease 476
- Echocardiographic Features 476
- Cardiac Magnetic Resonance Imaging 476
- Nuclear Imaging in Fabry Disease 476
- Endomyocardial Fibrosis and Löffler's Endocarditis 477
- Echocardiography 477
- Cardiac Magnetic Resonance Imaging 477
- Arrhythmogenic Right Ventricular Dysplasia 477
- Reversible Cardiomyopathies 478
- Chemotherapy and Radiation-induced Cardiomyopathy 478

Chapter 58. Curable Forms of Ventricular Dysfunction481

Tamiruddin A Danwade, Calambur Narasimhan

- Ischemic Cardiomyopathy (Coronary Artery Disease) 481
- Hypertensive Heart Disease 482
- Diabetes Mellitus 483
- Valvular Heart Disease 483
- Alcoholic Cardiomyopathy 483
- Cocaine 484
- Medications 484
- Infectious Cardiomyopathy 484

Chapter 59. Myocarditis: An Update492

Neeraj Pandit, Mohit Bhutani

- Etiopathogenesis 492
- Classification of Myocarditis 492
- Clinical Features 492
- Investigations 493
- Natural Course of Disease 494
- Management 495
- Future Directions 497

Chapter 60. Tachycardiomyopathy	500
<i>Vikas Kataria, Gautam Singal, Mohan Nair</i>	
▪ Introduction	500
▪ Definition	501
▪ Epidemiology	503
▪ Pathophysiology	503
▪ Clinical Features	503
 Chapter 61. The Role of Cardiovascular Magnetic Resonance in Risk Stratification of Hypertrophic Cardiomyopathy	506
<i>Martin S Maron</i>	
▪ Introduction	506
▪ Cardiovascular Magnetic Resonance Characterization of Left Ventricular Hypertrophy and Impact on Risk Assessment	506
▪ Left Ventricular Apical Aneurysm: High-risk Subgroup	506
▪ CMR Tissue Characterization in HCM	507
▪ Late Gadolinium Enhancement and Sudden Death Risk	508
▪ Pattern of Late Gadolinium Enhancement	510
▪ Additional CMR Methods of Tissue Characterization	511
▪ Quantification of Late Gadolinium Enhancement	512
▪ Late Gadolinium Enhancement and Systolic Dysfunction	512
 Chapter 62. Constrictive Pericarditis and Restrictive Cardiomyopathy: How to Differentiate?	514
<i>V Jacob Jose</i>	
▪ Pathophysiology of Constriction	514
▪ Echo Doppler Signs	515
▪ Cardiac Computed Tomography	517
▪ Cardiac Magnetic Resonance (CMR)	517
▪ Multimodality Imaging	517
▪ Invasive Hemodynamics (Cardiac Catheterization)	520
 Chapter 63. Tubercular Pericarditis	523
<i>GC Khilnani, Saurabh Mittal</i>	
▪ Epidemiology	523
▪ Pathogenesis	523
▪ Clinical features	523
▪ Diagnosis	524
▪ Differential Diagnosis	525
▪ Treatment	525

Chapter 64. Surgery for Chronic Constrictive Pericarditis, Tuberculous Pericarditis and Effusive-Constrictive Pericarditis 526

Ujjwal Kumar Chowdhury, Lakshmi Kumari Sankhyan, Suruchi Hasija

- Etiological Search 526
- Clinical Challenge and Diagnostic Dilemma of CCP 526
- Surgical Techniques and Results 530
- Post-pericardiectomy Low Cardiac Output Syndrome 530
- Specific Disease Entities 531
- Management 532
- Tuberculous Pericarditis 532
- Tuberculous Pericardial Effusion 532
- Treatment 533

Chapter 65. An Update on Restrictive Cardiomyopathy 536

Ramalingam Vadivelu, Rajesh Vijayvergiya

- Etiology 536
- Clinical Presentation 536
- Diagnosis 536
- Echocardiographic Findings in RCM 536
- Hemodynamic in RCM 539
- Common Causes of RCM 540

Chapter 66. Tropical Endomyocardial Fibrosis?..... 546
A Vanishing Curious Disease

Jaganmohan A Tharakan, Shomu Bohora, Sanjay G

- Epidemiology 546
- Endomyocardial Fibrosis in India 547
- Etiology of Endomyocardial Fibrosis 548
- Clinical Presentation 548
- Laboratory Investigations 548
- Natural History and Management 549
- Is the Incidence and Prevalence of EMF on the Decline—
A Vanishing and Curious Disease? 550

Chapter 67. Cardiac Amyloidosis: Diagnosis and Management 552

Santosh Kumar Chellapuram, Lalit Kumar

- Pathophysiology 552
- Clinical features 552

- AL Amyloidosis 553
- Cardiac Magnetic Resonance and Radionuclear Testing 553
- Cardiac Biomarkers 554
- Management of Cardiac Failure 555
- Transthyretin-related Amyloidosis 557
- Novel Strategies 557
- Cardiac Transplantation 557

Chapter 68. Cardiac Sarcoidosis.....559

Ajit Thachil

- Incidence and Prevalence 559
- Presentations 559
- Prognosis 560
- Diagnosis 561
- Differential Diagnosis 563
- Imaging in Cardiac Sarcoidosis 563
- Treatment 566

Section 9 VASCULAR SYSTEM

Chapter 69. Imaging and Classification of Takayasu's Arteritis.....575

Monotosh Panja, Arindam Pande, Madhumanti Panja

- Imaging in Takayasu's Arteritis 575
- Chest Radiographic Features 575
- Ultrasonography 575

Chapter 70. Immunotherapy for Nonspecific Aortoarteritis581

Narendra Bagri, Uma Kumar

- Disease Activity and Severity 581
- Immunotherapy 582
- Corticosteroids 582
- Nonbiological Disease Modifying Antirheumatic Drugs 582
- Other DMARDs 583
- Biologic Disease Modifying Anti-rheumatic Drugs 584
- Other Biological agents 584
- Immunotherapy During Surgery and Perioperative Period 584
- Follow-up 584

Chapter 71.	Interventions in Takayasu Arteritis (Nonspecific Aortoarteritis)	586
	<i>Sanjay Tyagi, Ankit Bansal</i>	
	▪ Pathophysiology	586
	▪ Imaging for Interventions in Takayasu Arteritis	586
	▪ Interventions in Takayasu Arteritis	587
	▪ ARCH Artery Interventions	589
	▪ Recent Advances	593
Chapter 72.	Aortic Diseases: When to Proceed with Surgery?	598
	<i>Shiv Kumar Choudhary, Aayush Goyal</i>	
	▪ Aortic Aneurysms	599
	▪ Acute Aortic Syndromes	601
	▪ Traumatic Aortic Injury	604
	▪ Arteritis	604
Chapter 73.	Aortic Diseases: When and How to Proceed for Interventional Management?	607
	<i>Mumun Sinha, Sanjiv Sharma</i>	
	▪ Imaging of Aortic Diseases	607
	▪ Steno-occlusive Lesions of Aorta	608
	▪ Dilatative or Aneurysmal Lesions	609
	▪ Aortitis	609
	▪ Aortic Dissection	610
	▪ Diseases Specific to Aortic Root and Ascending Aorta	611
Chapter 74.	Pulmonary Embolism: When to do What?	615
	<i>Bishav Mohan, Shibba Takkar Chhabra</i>	
	▪ Anticoagulation	615
	▪ Systemic Thrombolytic Therapy	616
	▪ Catheter-based Therapy	616
Chapter 75.	Evaluation of Pulmonary Hypertension: A Simplified Algorithm.....	624
	<i>Abhishek Goyal, Gurpreet S Wander</i>	
	▪ Definition and Classification	624
	▪ Algorithmic Approach to Pulmonary Hypertension	624

Chapter 76. Recent Advances in the Management of
Idiopathic Pulmonary Artery Hypertension630

Rajesh Kalyankar, BKS Sastry

- Pharmacotherapy 630
- Combination Therapy 630
- Oral Anticoagulants 630
- Stem Cell Therapy 632
- Pulmonary Artery Denervation 632
- Potts Shunt 632
- Experimental Therapies 632

Chapter 77. Kawasaki Disease: What We Should Know?635

M Zulfikar Ahamed, Z Sajan Ahmad

- Historical Perspective 635
- Epidemiological Perspective 635
- Pathology 636
- Clinical Diagnosis 636
- Laboratory Evaluation 637
- Cardiovascular Manifestations in KD 638
- Other Abnormalities 640
- Other Investigations 640
- Natural History 640
- Special Concerns in KD 640
- Treatment of KD 641
- Standard Protocol Followed in Our Institution 642
- Long-term Management 643
- Protocol for Management 644
- Interventions in KD 644
- Natural History 645
- Long-term Cardiac Damage 645
- Indications for Coronary Angiography 645

Section 10 ELECTROCARDIOLOGY

Chapter 78. Common Pitfalls and Artifacts in ECG Interpretation651

SB Gupta

- Limitations 651
- Normal ECG in Pathological Conditions 651

- Common Pitfalls in Diagnosis of Coronary Artery Disease on ECG 652
- Abnormal ECG with Normal Hearts 654
- Common Artifacts in ECG Interpretation 654
- Lead Misplacements 656

Chapter 79. Computerized ECGs: Strengths and Limitations.....663

Kartikeya Bhargava

- Computerized ECG: Methodology and Technical Aspects 663
- Accuracy of Computer-Interpreted Electrocardiograms 664
- Utility of Computer-Interpreted ECG in Specific Diagnosis 664
- Computerized ECGs: Strengths and Limitations—
General Comments and Concluding Remarks 667

Chapter 80. ECG Assessment of Supraventricular Tachycardia.....675

Amit Vora, Samhita Kulkarni

- Steps in the ECG Analysis of SVTs 675
- ECG Analysis of Different SVTs 675

Chapter 81. ECG Assessment of Wide QRS Tachycardia684

Binay Kumar, Yash Lokhandwala

- Types of Wide QRS Tachycardia 684
- Steps for Ventricular Tachycardia Discrimination 684
- Assessment of QRS Regularity 685
- Identification of P Wave 687
- Relationship between P and QRS 687
- Morphologic Analysis of the Wide QRS Complex:
Comparison with Sinus Rhythm 688

Chapter 82. Atrioventricular Block: Diagnosing the Level of Block.....692

Avinash Anantharaj, Anandaraja Subramanian

- Localization of the Site of Block 693

Chapter 83. STEMI Equivalents.....699

Arun K Chopra

- Isolated True Posterior Myocardial Infarction 699
- Hyperacute T Waves 699
- De Winter Sign 700
- Isolated ST Depression in AVL 700

- Wellens' Syndrome 700
- Isolated ST Elevation in AVR 700
- New or Presumed New Left Bundle Branch Block 701
- Stemi Equivalents in Paced Patients 703

Section 11 LET'S FACE THE VIVA

Chapter 84. Recent Advances in Echocardiographic Strain Imaging709

Nobuyuki Kagiya, Yuko Soyama, John Gorcsan III

- Fundamentals of Strain Imaging 709
- Global Longitudinal Strain 709
- Normal Longitudinal Strain Values 709
- Relationship of GLS to Ejection Fraction 710
- GLS in Heart Failure with Reduced Ejection Fraction 710
- GLS in Heart Failure with Preserved Ejection Fraction 712
- GLS in Acute Heart Failure 712
- Longitudinal Strain in Cardiac Amyloidosis 712
- GLS in Monitoring Cardiotoxicity for Chemotherapy 713
- GLS in Valvular Heart Disease 713

Chapter 85. Hemodynamic Assessment in the Cardiac Catheterization Laboratory716

Jaganmohan A Tharakan, Sanjay G

- How to Perform an Invasive Hemodynamic Study? 716
- General Cues Obtained During any Hemodynamic Study 716
- Provocative Maneuvers in Cardiac Catheterization Laboratory 717
- Evaluation of Patients with Congenital Heart Diseases 719
- Evaluation of a Patient with Pulmonary Hypertension 721
- Transpulmonary Gradient, Diastolic Pulmonary Gradient 721
- Heart Failure and Transplantation 721
- Pericardial Diseases 722
- Evaluation of Obstructive Lesions 722
- Evaluation of Patients with Ischemic Heart Disease 725
- Postmyocardial Infarction 728

Chapter 86. Interpretation of Catheterization Traces.....729

Sriram Rajagopal, Lakshmi Gopalakrishnan

- Steps in the Process of Interpretation 729
- Normal Physiology 729
- Technical Aspects 730
- Correlation of Pressure Traces with Electrocardiographic Events 731

Chapter 87. Interpreting a Nuclear Stress Test.....736*Girish Kumar Parida, Abhinav Singhal, Chetan D Patel*

- Patient Preparation 736
- Stress Protocols 736
- Radiotracers and Image Acquisition Protocol 737
- Image Display 737
- Interpretation 737
- Gated SPECT Parameters 741
- Final Reporting of MPS 743

Chapter 88. Cardiac Tumors: Practical Approach and Management.....746*Kewal C Goswami, Preetam Krishnamurthy*

- Epidemiology 746
- Classification 746
- Histopathology 747
- Clinical Features 747
- Examination 749
- Clinical Diagnosis 749
- Diagnostic Evaluation 751
- Management 753
- Benign Cardiac Tumors 753
- Malignant Cardiac Tumors 755

Index.....761