Clinical Diagnosis of
Congenital Heart Disease
Dedicated
to
the memory of my parents
## Contributors

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Details</th>
</tr>
</thead>
</table>
| AK Bhattacharyya      | MD DM  
Professor and Head of Cardiology  
Guwahati Medical College, Guwahati |
| CG Bahuleyan          | MD DM  
Former Professor and Head of Cardiology  
Trivendrum Medical College, Trivendrum |
| AK Samal              | MD DM  
Department of Cardiology, VSS Medical College  
Burla |
| G Rajesh              |  
Department of Cardiology, Kottayam Medical College  
Kottayam |
| AN Patnaik            | MD DM DNB  
Associate Professor of Cardiology  
Nizam’s Institute of Medical Sciences, Hyderabad |
| HN Mishra             | MD DM  
Professor of Cardiology, SCB Medical College  
Cuttack |
| Anita Saxena          | MD DM  
Professor of Cardiology  
All India Institute of Medical Sciences, New Delhi |
| IB Vijayalakshmi      | MD DM FICC FICP  
Head of Pediatric Cardiology  
Jayadeva Institute of Cardiology  
Bengaluru |
| B Dalvi               | MD DM FACC (USA)  
Consultant Cardiologist, Glenmark Cardiac Centre  
Mumbai |
| J Yusuf               | MD DM  
Department of Cardiology, GB Pant Hospital  
New Delhi |
| Balu Vaidyanathan     | MD DM  
Department of Pediatric Cardiology  
Amrita Institute of Medical Sciences and Research Centre  
Kochi |
| K Sharada             | MD DM  
Consultant Cardiologist, Care Hospitals  
Hyderabad |
| BR Mishra             | MD DM  
Cardiologist, EKO Imaging Institute, Mangalabag  
Cuttack (Orissa) |
| M Behera              | MD DM  
Professor and Head of Cardiology  
SCB Medical College, Cuttack |
| BRJ Kannan            | MD DM  
Department of Pediatric Cardiology, Amrita Institute of Medical Sciences and Research Centre  
Kochi |
| M Jayarajah           | MD DM  
Professor of Cardiology, Sri Ram Chandra Hospital Cardiac Care Centre, Chennai |
| C Mahadevan           |  
Department of Cardiology, Ramaiah Heart Centre  
MS Ramaiah Medical College, Bengaluru |
| M Satpathy            | MD DM  
Former Professor of Cardiology, Haripur Road  
Dolamundai, Cuttack (Orissa) |
| CD Gupta              | MD DM  
Former Professor and Head of Cardiology  
Jammu Medical College, Jammu |
| ML Kulkarni           | MD FIAP FAMS FCPCC (London)  
Professor and Head of Pediatric  
JJAM Medical College, Davangere, Karnataka |
N Desai  MD DM FACC FICC
Director, Ramaiah Heart Centre
MS Ramaiah Medical College, Bengaluru

N Sudhayakumar  MD DM
Professor and Head of Cardiology
Kottayam Medical College, Kottayam

Naveen Garg  MD DM MNAMS FACA (USA)
Department of Cardiology
Sanjay Gandhi Postgraduate Institute of Medical Science
Lucknow

PC Manoria  MD DM FCCP FICP FICN FICA (USA)
Former Professor and Head Department of Cardiology
Gandhi Medical College, Bhopal

PK Dash  MD DM
Head, Department of Cardiology
Sri Sathya Sai Higher Institute of Medical Sciences
Bengaluru

PK Pati  MD DM
Department of Cardiology, CMC, Vellore

PR Gupta  MD DM
Professor and Head, Department of Cardiology
Institute of Medical Sciences
Banaras Hindu University, Varanasi

R Juneja  MD DM
Department of Cardiology
All India Institute of Medical Sciences, New Delhi

R Kumar
Department of Cardiology
Ramaiah Heart Centre
MS Ramaiah Medical College
Bengaluru

Rohit Manojkumar  MD DM
Department of Cardiology
PGI, Chandigarh

S Guha  Dip Card MD DM
Associate Professor, Department of Cardiology
Kolkata Medical College, Kolkata

S Shah
Department of Cardiology
All India Institute of Medical Sciences, New Delhi

S Venkatesh  DNB DCH
Lecturer, Division of Pediatric Cardiology
BJ Wadia Hospital for Children, Mumbai

SK Trivedi  MD DM
Professor and Head of Cardiology
Gandhi Medical College, Bhopal

SN Rahiman
Department of Pediatrics
JJAM Medical College, Davangere, Karnataka

SN Routray  MD DM
Assistant Professor Cardiology
SCB Medical College, Cuttack

SR Anil  DCH MD DNB (Ped) DNB (Card)
Consultant Pediatric Cardiologist
Apollo Hospital, Hyderabad

SR Mittal  MD DM FAMS FICP FISC (Cardiology)
Professor and Head of Cardiology
Jawaharlal Nehru Medical College, Ajmer

SS Prabhu  MD DCH
Professor, Division of Pediatric Cardiology
BJ Wadia Hospital for Children
Mumbai

Sunita Maheshwari  ABP ABPC (USA)
Consultant Pediatric Cardiologist
Narayana Hrudayalaya, Bengaluru

UA Kaul  MD DM
Former Professor and Director
Department of Cardiology, GB Pant Hospital
New Delhi

V Gouthami  MD DM DNB
Department of Cardiology
Nizam’s Institute of Medical Sciences
Hyderabad

VS Prakash  MD DM
Associate Professor and Chief, Division of Cardiac Electrophysiology/Cardiac Pacing
MS Ramaiah Medical Teaching Hospital
Bengaluru
Preface

Congenital heart disease is generally thought to be a difficult and challenging subject. Due to limitations of diagnostic facilities and suitable treating hospitals, many souls have departed their bodies prematurely, undiagnosed and untreated. Physicians, pediatricians and cardiologists give less attention to congenital heart diseases, as this branch of cardiovascular science is less alluring and rewarding.

As a teacher when I aimed at the postgraduate students in medicine I found there is a definite place for a book on congenital heart disease which should be comprehensive and also with strong clinical bias because it is essential on the part of treating physicians caring for the newborn, the infant and the children to have early diagnosis with accuracy so as to prevent high morbidity and mortality. Recently many pediatric cardiology units have come up and tremendous advances in percutaneous interventions and surgical techniques have been made, so the outlook for congenital heart disease looks brighter today. As a matter of fact, without basic knowledge of anatomy and pathophysiology it is difficult to develop a clinical acumen to make early accurate diagnosis. Further, correct interpretation of recent investigatory procedures will be more difficult. Early diagnosis, initiation of treatment with existing facilities and decision for referral to a standard cardiac center at the right time can definitely save many precious lives.

Although, there are many books available on this subject, they are referral books of very high standard and are expensive for individual possession. Keeping this in mind, I felt the need of a book on congenital heart disease, which can be affordable and cater to the basic need of postgraduate students, medical teachers, pediatricians and practicing cardiologists.

Prominent cardiologists across the country have contributed many chapters from their vast experience and knowledge. I have attempted to describe all aspects of these congenital heart diseases in a uniform pattern. Elaborate description has been made on common diseases. Illustrations with simple hand drawn sketches are given wherever necessary depicting the abnormal anatomy and pathophysiological consequences for clear understanding of the anomaly. Controversial points and details of advanced imaging modalities are deliberately omitted. I have made a sincere effort to use simple teaching language and clear description of the basic clinical findings. Wherever necessary the mechanisms are explained using short bracketed notes. I have tried to keep a link between pre-echo era and present day investigatory tools as regards clinical diagnosis is concerned.

Being a basically clinical book, management of diseases are described in brief (elaborate management schedules are beyond the scope of this book).

References are deliberately omitted to reduce the bulk of the book, as ready references are available in these days of advance information technology. A separate chapter is included on the incidence of congenital heart disease in India and the present status of management facilities available across the country.

I have put my hard and sincere efforts in giving a definite shape to this book. My dream and vision will be fulfilled if this book becomes useful for the students of medicine, pediatrics and physicians dealing with cardiovascular science related to congenital heart disease.

M Satpathy
Acknowledgements

I am greatly indebted to my late teachers Dr PL Wahi, Dr PS Bidwai and Dr HN Khattri whose art of teaching convinced the students that reaching at a correct bedside diagnosis in Congenital Heart Disease is not that difficult. I owe my gratitude to all my teachers particularly to Dr U Kaul and Dr JP Das. Their master teaching on the subject gave me the inspiration for writing a clinical book for the students of medicine.

I am grateful to all the contributors for their benevolent and valuable contribution to make this book a reality. My special thanks to Dr BK Mahala of Narayana Hrudayalaya, Bengaluru, Dr Sanat Kumar Sahoo, Cuttack, Dr AN Patnaik of Nizam’s Institute of Medical Sciences, Hyderabad and Dr PK Dash, Sri Sathya Sai Institute of Higher Medical Sciences, Bengaluru for their unhesitant help and inspiration from time to time.

I owe a debt to Dr SR Anil, Apollo Hospital, Hyderabad, Dr PK Pati, CMC, Vellore, Dr DB Tonpe, Dr M Behera and Dr SS Mishra, Cuttack for providing their clinical materials for my use. I thank Dr Swarupa Panda for her timely help.

My daughters Sanghamitra and Anuradha and their husbands Bhawani and Debasis deserve special thanks for their constant encouragement for the last three years. I must thank my wife Swachhala and youngest daughter Madhulekha and her husband Rajesh for their full-hearted cooperation and patience all throughout the period of preparing the manuscript.

It is my pleasure to thank our secretarial assistants Mr Jyoti K Nanda and Mr Sanat Nayak, who have taken all pains from beginning to the end to complete this hard task.

My special thanks to my Co-editor Dr BR Mishra particularly for preparing schematic diagrams depicting diseases for better and easier understanding of students. It is a rare combination that not only he is a cardiologist but also an excellent artist. I also thank Dr Gitanjali Kar wife of Dr Mishra for her whole hearted cooperation.

I am grateful to Shri Jitendar P Vij (CMD), M/s Jaypee Brothers Medical Publishers (P) Ltd., New Delhi. My special thanks to Mr Tarun Duneja (General Manager Publishing), Mr PS Ghuman (Sr Production Manager) and Mrs Samina Khan for their kind cooperation throughout the period. I also thank Mr Sukhdev Prasad (DTP Operator) and Mr Rakesh Verma (Graphic Designer) for their unhesitant help to complete the work in time and finally my sincere thanks to all the associates of the company.
PART ONE: BASIC

1. Basic Embryology of Congenital Heart Diseases ................................................................. 3
   ML Kulkarni, SN Rahiman
2. Fetal and Neonatal Circulation .......................................................................................... 11
   AK Samal, BR Mishra
3. Bedside Diagnosis and Classification of Congenital Heart Diseases ................................. 14
   IB Vijayalakshmi, M Satpathy
4. Electrocardiogram—Clinically Relevant to Congenital Heart Diseases ............................ 27
   ML Kulkarni, M Satpathy
5. Radiological Diagnosis of Congenital Heart Diseases ....................................................... 33
   K Sharada, V Gouthami

PART TWO: ACYANOTIC LESIONS

6. Clinical Approach to Diagnosis of Cardiac Malpositions ..................................................... 45
   M Behera, BR Mishra
7. Left Ventricular Inflow Obstruction .................................................................................... 53
   B Dalvi, S Venkatesh, SS Prabhu
8. Mitral Valve Prolapse .......................................................................................................... 60
   PC Manoria, SK Trivedi
9. Congenital Mitral Regurgitation ......................................................................................... 67
   M Satpathy
10. Primary Endocardial Fibroelastosis .................................................................................... 71
    M Satpathy
11. a. Atrial Septal Defect (Secundum Type) ......................................................................... 74
    PK Dash, M Satpathy
   b. Atrial Septal Defect (Primum Type) ................................................................................ 83
    Sunita Maheshwari
   c. Atrial Septal Defect (Sinus Venous Type) ........................................................................ 87
    Sunita Maheshwari, M Satpathy
   d. Atrial Septal Defect (Coronary Sinus Type) ...................................................................... 89
    Sunita Maheshwari, M Satpathy
12. Atrial Septal Defect with Associated Common Anomalies ................................................ 91
    M Satpathy
13. a. Ventricular Septal Defect ............................................................................................... 98
    PR Gupta, M Satpathy
   b. Ventricular Septal Defect with Aortic Regurgitation ......................................................... 108
    BR Mishra
c. Ventricular Septal Defect with Pulmonary Stenosis ................................................................. 111
   M Satpathy

d. Left Ventricle to Right Atrial Communication .............................................................................. 113
   M Satpathy

   M Jayarajah, M Satpathy

15. Aorto-pulmonary Window ...................................................................................................... 124
   CG Bahuleyan

16. Complete Atrioventricular Septal Defect .................................................................................. 129
   R Juneja, S Shah

17. a. Congenital Aortic Stenosis ..................................................................................................... 143
   S Guha, M Satpathy

   b. Congenital Aortic Regurgitation ............................................................................................. 156
      M Satpathy

18. Coarctation of the Aorta ........................................................................................................ 160
   N Sudhayakumar, BSJ Nair, M Satpathy

19. Aneurysms of Sinuses of Valsalva ......................................................................................... 170
   UA Kaul, J Yusuf

20. a. Congenital Coronary Artery Anomalies .................................................................................. 178
    BR Mishra

   b. Congenital Coronary Arterial Fistula ....................................................................................... 182
      CG Bahuleyan

   c. Anomalous Left Main Coronary Artery from the Pulmonary Artery ........................................ 187
      Naveen Garg

21. Aortic Arch Anomalies and Vascular Rings ................................................................................ 192
    BR Mishra, M Satpathy

22. a. Congenital Pulmonary Stenosis .............................................................................................. 199
    N Desai, R Kumar, C Mahadevan, VS Prakash

   b. Congenital Pulmonary Regurgitation ....................................................................................... 208
      N Desai, R Kumar, C Mahadevan, VS Prakash

   c. Idiopathic Dilatation of Pulmonary Trunk .............................................................................. 212
      BR Mishra

   d. Peripheral Pulmonary Artery Stenosis .................................................................................... 214
      BR Mishra

23. Congenitally Corrected Transposition of Great Arteries .......................................................... 218
    Rohit Manojkumar

PART THREE: CYANOTIC LESIONS

24. Common Atrium .................................................................................................................... 227
    M Satpathy

25. Tricuspid Atresia .................................................................................................................. 230
    SR Mittal

26. Ebstein’s Anomaly .................................................................................................................. 240
    AK Bhattacharyya, M Satpathy
27. Pulmonary Atresia with Intact Ventricular Septum ................................................................. 249
   V Gouthami

28. a. Tetralogy of Fallot ........................................................................................................... 257
    PK Pati

   b. Absent Pulmonary Valve Syndrome ................................................................................. 268
     BR Mishra

   c. Pulmonary Stenosis with Interatrial Septal Defect .......................................................... 270
      M Satpathy

29. Pulmonary Atresia with Ventricular Septal Defect ............................................................ 273
   V Gouthami, M Satpathy

30. Double Outlet Right Ventricle ......................................................................................... 280
    AN Patnaik

31. Single Ventricle ................................................................................................................. 290
    AN Patnaik

32. Truncus Arteriosus ............................................................................................................. 297
    Anita Saxena

33. Complete Transposition of the Great Arteries .................................................................. 304
    Rohit Manojkumar, M Satpathy

34. Hypoplastic Left Heart Syndrome .................................................................................... 312
    N Sudhayakumar, G Rajesh

35. Total Anomalous Pulmonary Venous Connections .......................................................... 317
    CD Gupta, M Satpathy

36. Anomalous Systemic Venous Connections ....................................................................... 325
    BR Mishra

37. Congenital Pulmonary Arteriovenous Fistula .................................................................. 331
    SN Routray, BR Mishra

38. Complete Interruption of Aortic Arch ............................................................................... 335
    BR Mishra, M Satpathy

39. Eisenmenger Syndrome ..................................................................................................... 339
    SR Anil, M Satpathy

PART FOUR: Miscellaneous

40. Fetal Echocardiography ...................................................................................................... 351
    HN Mishra, BR Mishra

41. Transcatheter Interventions in Congenital Heart Diseases ............................................ 355
    BRJ Kannan

42. Congenital Heart Disease in India ..................................................................................... 361
    Balu Vaidyanathan

Index .............................................................................................................................................. 367
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A₂</td>
<td>Aortic component of second heart sound</td>
</tr>
<tr>
<td>AA</td>
<td>Aortic arch</td>
</tr>
<tr>
<td>AF</td>
<td>Atrial fibrillation</td>
</tr>
<tr>
<td>ALCAPA</td>
<td>Anomalous left coronary artery from pulmonary artery</td>
</tr>
<tr>
<td>AMI</td>
<td>Acute myocardial infarction</td>
</tr>
<tr>
<td>Ao</td>
<td>Aorta</td>
</tr>
<tr>
<td>AP window</td>
<td>Aorto pulmonary window</td>
</tr>
<tr>
<td>AR</td>
<td>Aortic regurgitation</td>
</tr>
<tr>
<td>AS</td>
<td>Aortic stenosis</td>
</tr>
<tr>
<td>ASD</td>
<td>Atrial septal defect</td>
</tr>
<tr>
<td>AV</td>
<td>Aortic valve</td>
</tr>
<tr>
<td>AV valve</td>
<td>Atrioventricular valve</td>
</tr>
<tr>
<td>AVSD</td>
<td>Atrioventricular septal defect</td>
</tr>
<tr>
<td>BP</td>
<td>Blood pressure</td>
</tr>
<tr>
<td>CA</td>
<td>Common atrium</td>
</tr>
<tr>
<td>CHB</td>
<td>Complete heart block</td>
</tr>
<tr>
<td>CHD</td>
<td>Congenital heart disease</td>
</tr>
<tr>
<td>CHF</td>
<td>Congestive heart failure</td>
</tr>
<tr>
<td>CoA</td>
<td>Coarctation of aorta</td>
</tr>
<tr>
<td>cTGA/l-TGA</td>
<td>Congenitally corrected transposition of great arteries</td>
</tr>
<tr>
<td>DOLV</td>
<td>Double outlet left ventricle</td>
</tr>
<tr>
<td>DORV</td>
<td>Double outlet right ventricle</td>
</tr>
<tr>
<td>DTGA</td>
<td>Dextro-transposition of great arteries</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
</tr>
<tr>
<td>ECD</td>
<td>Endocardial cushion defect</td>
</tr>
<tr>
<td>EDM</td>
<td>Early diastolic murmur</td>
</tr>
<tr>
<td>ESM</td>
<td>Ejection systolic murmur</td>
</tr>
<tr>
<td>FiO₂</td>
<td>Fractional inspired oxygen</td>
</tr>
<tr>
<td>HCM</td>
<td>Hypertrophic cardiomyopathy</td>
</tr>
<tr>
<td>HLHS</td>
<td>Hypoplastic left heart syndrome</td>
</tr>
<tr>
<td>ICU</td>
<td>Intensive care unit</td>
</tr>
<tr>
<td>IVC</td>
<td>Inferior vena cava</td>
</tr>
<tr>
<td>JVP</td>
<td>Jugular venous pulse</td>
</tr>
<tr>
<td>LA</td>
<td>Left atrium</td>
</tr>
<tr>
<td>LAD</td>
<td>Left anterior descending (artery)</td>
</tr>
<tr>
<td>LAE</td>
<td>Left atrial enlargement</td>
</tr>
<tr>
<td>LBBB</td>
<td>Left bundle branch block</td>
</tr>
<tr>
<td>LCA</td>
<td>Left coronary artery</td>
</tr>
<tr>
<td>LCX</td>
<td>Left circumflex (artery)</td>
</tr>
<tr>
<td>LPA</td>
<td>Left pulmonary artery</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>LPSB</td>
<td>Left parasternal border</td>
</tr>
<tr>
<td>LSB</td>
<td>Left sternal border</td>
</tr>
<tr>
<td>LSVC</td>
<td>Left superior vena cava</td>
</tr>
<tr>
<td>LV</td>
<td>Left ventricle</td>
</tr>
<tr>
<td>LVF</td>
<td>Left ventricular failure</td>
</tr>
<tr>
<td>LVH</td>
<td>Left ventricular hypertrophy</td>
</tr>
<tr>
<td>LVIO</td>
<td>Left ventricular inflow obstruction</td>
</tr>
<tr>
<td>LVOT</td>
<td>Left ventricular outflow tract</td>
</tr>
<tr>
<td>M1</td>
<td>Mitral component of first heart sound</td>
</tr>
<tr>
<td>MPA</td>
<td>Main pulmonary artery</td>
</tr>
<tr>
<td>MR</td>
<td>Mitral regurgitation</td>
</tr>
<tr>
<td>MRI</td>
<td>Magnetic resonance imaging</td>
</tr>
<tr>
<td>MS</td>
<td>Mitral stenosis</td>
</tr>
<tr>
<td>MVP</td>
<td>Mitral valve prolapse</td>
</tr>
<tr>
<td>MVR</td>
<td>Mitral valve replacement</td>
</tr>
<tr>
<td>P2</td>
<td>Pulmonary component of second heart sound</td>
</tr>
<tr>
<td>PA</td>
<td>Pulmonary artery</td>
</tr>
<tr>
<td>PAH</td>
<td>Pulmonary arterial hypertension</td>
</tr>
<tr>
<td>PAPVC</td>
<td>Partial anomalous pulmonary venous communication</td>
</tr>
<tr>
<td>PDA</td>
<td>Patent ductus arteriosus</td>
</tr>
<tr>
<td>PFO</td>
<td>Patent foramen ovale</td>
</tr>
<tr>
<td>PND</td>
<td>Paroxysmal nocturnal dyspnea</td>
</tr>
<tr>
<td>PPH</td>
<td>Primary pulmonary hypertension (arterial)</td>
</tr>
<tr>
<td>PR</td>
<td>Pulmonary regurgitation</td>
</tr>
<tr>
<td>PS</td>
<td>Pulmonary stenosis</td>
</tr>
<tr>
<td>PSM</td>
<td>Pansystolic murmur</td>
</tr>
<tr>
<td>PV</td>
<td>Pulmonary vein</td>
</tr>
<tr>
<td>PVH</td>
<td>Pulmonary venous hypertension</td>
</tr>
<tr>
<td>RA</td>
<td>Right atrium</td>
</tr>
<tr>
<td>RAE</td>
<td>Right atrial enlargement</td>
</tr>
<tr>
<td>RBBB</td>
<td>Right bundle branch block</td>
</tr>
<tr>
<td>RCA</td>
<td>Right coronary artery</td>
</tr>
<tr>
<td>RHD</td>
<td>Rheumatic heart disease</td>
</tr>
<tr>
<td>RPA</td>
<td>Right pulmonary artery</td>
</tr>
<tr>
<td>RSOV</td>
<td>Rupture of sinus of Valsalva aneurysm</td>
</tr>
<tr>
<td>RV</td>
<td>Right ventricle</td>
</tr>
<tr>
<td>RVF</td>
<td>Right ventricular failure</td>
</tr>
<tr>
<td>RVH</td>
<td>Right ventricular hypertrophy</td>
</tr>
<tr>
<td>RVOT</td>
<td>Right ventricular outflow tract</td>
</tr>
<tr>
<td>S1</td>
<td>First heart sound</td>
</tr>
<tr>
<td>S2</td>
<td>Second heart sound</td>
</tr>
<tr>
<td>S3</td>
<td>Third heart sound</td>
</tr>
<tr>
<td>S4</td>
<td>Fourth heart sound</td>
</tr>
<tr>
<td>SV</td>
<td>Single ventricle</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>SVC</td>
<td>Superior vena cava</td>
</tr>
<tr>
<td>SVT</td>
<td>Supraventricular tachycardia</td>
</tr>
<tr>
<td>T&lt;sub&gt;1&lt;/sub&gt;</td>
<td>Tricuspid component of first heart sound</td>
</tr>
<tr>
<td>TA</td>
<td>Tricuspid atresia</td>
</tr>
<tr>
<td>TAPVC</td>
<td>Total anomalous pulmonary venous communication</td>
</tr>
<tr>
<td>TEE</td>
<td>Trans esophageal echocardiography</td>
</tr>
<tr>
<td>TGA/dTGA</td>
<td>Complete transposition of great arteries</td>
</tr>
<tr>
<td>TS</td>
<td>Tricuspid stenosis</td>
</tr>
<tr>
<td>TTE</td>
<td>Transthoracic echocardiography</td>
</tr>
<tr>
<td>TR</td>
<td>Tricuspid regurgitation</td>
</tr>
<tr>
<td>VSD</td>
<td>Ventricular septal defect</td>
</tr>
<tr>
<td>WPW</td>
<td>Wolff-Parkinson-White syndrome</td>
</tr>
</tbody>
</table>