Rui M. S. S. A. Almeida Fabio Biscegli Jatene *Editors* Nathalia Ribeiro Pinho de Sousa Gabriel Romero Liguori · Marcus Rodrigo Monteiro Leila Nogueira Barros *Associate Editors*



Cardiovascular Surgery A Clinical Casebook



Cardiovascular Surgery

Rui Manuel de Sousa Sequeira Antunes de Almeida Fabio Biscegli Jatene Editors

Nathalia Ribeiro Pinho de Sousa Gabriel Romero Liguori Marcus Rodrigo Monteiro Leila Nogueira Barros Associate Editors

Cardiovascular Surgery

A Clinical Casebook



Editors

Rui Manuel de Sousa Sequeira Antunes de Almeida Department of Cardiology and Cardiovascular Surgery University Center Assis Gurgacz Foundation Cascavel, PR Brazil Fabio Biscegli Jatene Department of Cardiovascular Surgery University of São Paulo Medical School São Paulo, SP Brazil

Associate Editors

Nathalia Ribeiro Pinho de Sousa Faculdade de Medicina da Universidade Federal do Ceará Fortaleza, CE Brasil

Marcus Rodrigo Monteiro Universidade Federal de São Paulo Escola Paulista de Medicina Residente de Cirurgia Geral SUS SP São Paulo, SP Brazil Gabriel Romero Liguori Instituto do Coração (InCor) Hospital das Clínicas HCFMUSP Faculdade de Medicina Universidade de São Paulo São Paulo, SP Brazil

Leila Nogueira Barros Faculdade de Ciências Médicas da Santa Casa de São Paulo Residente de Cirurgia Cardiovascular da Santa Casa de São Paulo São Paulo, SP Brazil

ISBN 978-3-319-57083-9 ISBN 978-3-319-57084-6 (eBook) https://doi.org/10.1007/978-3-319-57084-6

Library of Congress Control Number: 2018961581

© Springer Nature Switzerland AG 2019

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Foreword

It was a pleasure and privilege to write the preface to this book, *Cardiovascular Surgery: A Clinical Casebook*. A great number of books on cardiovascular surgery are written every year, both here in Brazil and internationally. Some of these publications deal with a special field or subspecialty. Each one plays an important role in updating the literature and educating new trainees. The main limitation of all books is the time period required to prepare the text for publication, when new advances will undoubtedly appear in a rapidly developing specialty such as cardiovascular surgery.

This book has a number of features that make it special—and therefore make me happy to comment on it here. First, the text was prepared by graduate medical students in English, thus fulfilling the recommendation that all medical students have proficiency in this particular language. Furthermore, the authors come from different medical schools and were supervised by an editorial board of professionals from different academic institutions.

Secondly, the book focuses on clinical cases, with additional questions and answers based on a particular case. There is also discussion of the subjects related to the case and literature references. This format is of utmost practical importance for students and trainees in cardiovascular surgery. For decades, our specialty has become progressively more complex and is incorporating more technology into its practice. Transcatheter and minimally invasive procedures have introduced even more complexity into the procedures of cardiovascular surgery.

vi Foreword

This field can be highly challenging for medical students and residents. Educational programs and participation in cardiovascular surgery societies can help in the training of future specialists. However, the current 5-year minimum duration for residency is longer than that of other specialties. Furthermore, there is a greater need for human and financial resources at the institutions where these younger colleagues can practice their specialty after training. These factors may discourage potential candidates from entering the field of cardiovascular surgery. However, a number of initiatives can help to increase students' interest in pursuing a career as a cardiovascular surgeon and are fundamental to the future of the specialty, including the academic leagues of cardiovascular surgery, the participation of students in congresses of the specialty, and this book, which has been mainly prepared by students.

Finally, I want to congratulate the medical students who prepared the cases and participated in other aspects of the chapters in this book. I also congratulate the supervisors who supported this initiative and contributed to the quality of the publication.

Noedir A. G. Stolf Emeritus and Senior Professor University of São Paulo Medical School São Paulo, SP, Brazil

Preface

The book Cardiovascular Surgery—A Clinical Casebook is a great team effort from a group of medical students who are interested in cardiovascular surgery. Born from the wish to contribute to the development of graduating medical students and residents in this specialty, this book was a massive undertaking by students that belong to academic leagues in cardiology and cardiovascular surgery, as well as the Department of Academic Leagues of the Brazilian Society of Cardiovascular Surgery.

The initial dream for this book was to publish 20 chapters from different national leagues, but the final publication ended up having 40 chapters. The book is divided into 12 sections that are of great importance to this field: aortic disease, arrhythmias, cardiac tumors, coronary insufficiency, congenital heart disease, endovascular therapies, heart failure, heart transplantation, mechanical circulatory support, pericardial disease, pulmonary embolism, and valvular heart disease.

Each section discusses one or more clinical cases using a common format, which includes the clinical presentation, diagnosis, assessment, and treatment. After the clinical case presentation, the authors of each chapter answer some questions related to any challenging points, positions that are not well defined in current practice, and any controversies in a way that allows the reader to follow a straight line of clinical judgment. All 40 clinical cases are especially relevant because

they are common cases that were chosen by the cardiac surgeon to orientate the students. The chapters are richly illustrated with figures from common imaging examinations and the surgery itself.

This book can be read from front to back or in no particular order. It should be consulted when you have a similar clinical case and have to make clinical or surgical decisions. Furthermore, it will allow you to see if your clinical judgment and conduct is similar to or different from those of the chapter's authors.

This is a unique book for two reasons. First, it was written and edited by students, under the supervision of cardiovascular surgeons. Furthermore, it is a work of the medical students of the Brazilian Society of Cardiovascular Surgery; however, it was not written in their native language so that a large number of global students would also have the opportunity to read it.

Professor Noedir Stolf was invited to write the Introduction because of his great contributions to cardiac surgery and medical education. He is a true believer in the formation of young people in this specialty and is a mentor to a great number of residents. We personally think that early exposure to cardiovascular surgery during medical school, in addition to a true mentor relationship, are the primary factors that influence a medical school graduate to embrace this specialty.

On behalf of all authors, we hope that you enjoy reading this book, are able to review the concepts and ideas on all the cases present herein, and learn from what is described and the manner in which the patients were treated.

> Rui M. S. Almeida Paraná Western State University Medical School Dean University Center FAG Cascavel, PR, Brazil

Contents

Part I Aorta Disease	
Aortic Dissection Associated with Ischemic Stroke Rízia Kérem Gonçalves Martiniano, Filipe Alves Nery, Luciano Castiglioni Andriato, Sergio Rodrigues Maranha, and Leonardo Cristiano Frigini	3
Bentall-De Bono Technique in the Ascending	
Aorta Aneurysm, Aortic Regurgitation, and Coronary Reimplantation Filipe T. K. S. Almeida, Luana Luiza Vieira, Adriana Fernandes Silva, Evandro Luis Queiroz Flores, and Rui M. S. Almeida	13
Correction of Interrupted Aortic Arch in an Adult: Ascending-to-Descending Aorta Bypass Dhaisa Thaina Souza Conceição, Daiane Thaysa Brito Nakamura, Tailana Paiva Dourado,	25
Jackson Brandão Lopes, and Bruno da Costa Rocha	25
Giant Ruptured Sinus of Valsalva Aneurysm Saulo Victor Benevides Nunes, Anderson Dias Arruda, Yasmine Lailla Vasconcelos Rodrigues, Joaquim David Carneiro Neto,	37

x Contents

Retroesophageal Right Aortic Arch Associated
with an Aortic Aneurysm and a Ventricular Septal Defect
Aortic Aneurysm
Hybrid Strategy on Aortic Arch Disease
Part II Arrhythmias
Mitral Valve Disease and Atrial Fibrillation. 97 Daniel Tomasi Keppen Sequeira de Almeida, Jéssica Nathiele Meotti, Mateus Fagundes, Evandro Luis Queiroz Flores, and Rui M. S. Almeida
Late Arrhythmia After Fontan Repair
Paroxysmal Atrial Fibrillation Due to Repeated Episodes of Severe Hypoglycemia in Patient with Type I Diabetes Mellitus
Part III Cardiac Tumors
Cardiac Leiomyosarcoma

Part IV Coronary Insufficiency
Intra-aortic Balloon Pump in Acute Myocardial Infarction and Ischemic Mitral Insufficiency
Diagnosis and Management of Takotsubo Syndrome (Broken Heart Syndrome)
Kawasaki Disease with Coronary Artery Bypass Grafting
Stable Angina and Revascularization in Type 1 Diabetic Patient
Unusual Mechanism of Myocardial Infarction in Prosthetic Valve Endocarditis

Part V Congenital Heart Disease
Atrioventricular Septal Defect with Pulmonary Hypertension After the First Year of Life
Surgical Treatment of Atrial Septal Defect by Occluder Device
Percutaneous Occlusion of a Patent Foramen Ovale 215 Laura Gomes Flores, Cassiana Tomazoni, Patrícia Freitag, Evandro Luis Queiroz Flores, and Rui M. S. Almeida
Transposition of Great Arteries with Pulmonary Valve Stenosis After Jatene Procedure
Part VI Endovascular Therapies
Transcatheter Aortic Valve Replacement (TAVR) and Angioplasty in a High-Risk Patient
Aortic Coarctation

Endovascular Treatment for Abdominal
Aortic Aneurysm
Rômulo Martins de Camargo, Rodrigo Mendes,
Nelson Américo Hossne Junior,
Eduardo Gregório Chamlian, and Fabiano André Pereira
Part VII Heart Failure
Acute Heart Failure Without Prior History
of Myocardial Dysfunction
Felipe Bruno Santos da Cunha, Diogo Assis Souza,
Henrique Louzan Machado,
and Helmgton José Brito de Souza
Part VIII Heart Transplantation
Cardiac Transplantation in Situs Inversus Totalis:
A Surgical Challenge
Vanessa Lopes Vieira,
Guilherme Henrique Ribeiro de Carvalho,
Leandro Pedro Goloni Bertollo,
Fabio Biscegli Jatene, and Fabio Antonio Gaiotto
Part IX Mechanical Circulatory Support
Mechanical Circulatory Support in Patient
with Pulmonary Dysfunction
Amanda Dorighetto Tomazelli,
Matheus Ramos Dal Piaz, Nathalia Spandl Falqueto,
and Melchior Luiz Lima
Pediatric Ventricular Assist Device (VAD)
as Successful Bridge to Heart Transplantation 311
Guilherme Henrique Ribeiro de Carvalho,
Vanessa Lopes Vieira, Leandro Pedro Goloni Bertollo,
Fabio Biscegli Jatene, and Luiz Fernando Caneo

Use of Venoarterial Extracorporeal Membrane Oxygenation (VA-ECMO) in an Adult Patient with Septic and Cardiogenic Shock	325
Circulatory Assistance in a Patient with Respiratory Failure	341
Part X Pericardial Disease	
Constrictive Pericarditis: A Late Complication of Tuberculosis	355
Hodgkin's Disease and Pericardial Effusion 3 Bárbara Liss de Sousa Freire, Emanuel Sampaio Araújo, Rodrigo Mont'Alverne Guimarães, Joaquim David Carneiro Neto, and José Antônio de Lima Neto	36 7
Pericardiocentesis: A Lifesaving Procedure	375

xvi Contents

Rheumatic Mitral Valve Stenosis: A Surgical Case Vitor Abaurre Amaral, Lissa Canedo Rocha, Gabriel Donato Amorim, and Melchior Luiz Lima	445
Sutureless Aortic Prosthesis Implantation: The First Brazilian Experience with Perceval Device Rodrigo Petersen Saadi, Marina Petersen Saadi, João Carlos Guaragna, and Eduardo Keller Saadi	463
Thrombosis of a Mechanical Mitral Valve Prosthesis Gilberto Loiola De Vasconcelos, Saulo Victor Benevides Nunes, Joaquim David Carneiro Neto, and Camila Lopes do Amaral	471
Index	485

Contributors

Leonardo Jadyr Silva Rodrigues Alves Unified School of Brasília (UNICEUB), Brasília, DF, Brazil

Rafael Ramos Amaral Unified School of Brasília (UNICEUB), Brasília, DF, Brazil

Vitor Abaurre Amaral School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

Gabriel Donato Amorim School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

Heloísa Guedes Andrade Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Luciano Castiglioni Andriato University Center of Espírito Santo (UNESC), Colatina, ES, Brazil

Emanuel Sampaio Araújo Federal University of Ceará (UFC), Sobral, CE, Brazil

Anderson Dias Arruda Federal University of Ceará (UFC), Sobral, CE, Brazil

Fernando Antibas Atik Cardiology Institute of Federal District (ICDF), Brasília, DF, Brazil

Débora Cristina Haack Bassani Santa Cruz do Sul University (UNISC), Santa Cruz do Sul, RS, Brazil

Leandro Pedro Goloni Bertollo Faculty of Medicine of University of São Paulo (FMUSP), São Paulo, SP, Brazil

Elisa Cao Bicalho School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

Valquiria Pelisser Campagnucci Santa Casa de São Paulo School of Medical Sciences (FCMSCSP), São Paulo, SP, Brazil

Luiz Fernando Caneo Faculty of Medicine of University of São Paulo (FMUSP), São Paulo, SP, Brazil

Marcos Antonio Cantero Federal University of Grande Dourados (UFGD), Dourados, MS, Brazil

Lucas Alves Bessa Cardoso Federal University of Viçosa (UFV), Viçosa, MG, Brazil

João Vitor Ferreira Carvalho Federal University of Grande Dourados (UFGD), Dourados, MS, Brazil

Marisa Wanderley Casado Federal University of Paraíba (UFPB), João Pessoa, PB, Brazil

Eduardo Gregório Chamlian Federal University of São Paulo (UNIFESP), São Paulo, SP, Brazil

Graziela Chequer Minas Gerais Federal University (UFMG), Belo Horizonte, MG, Brazil

Eugênio Antônio Mascarenhas Colonnezy Federal University of Bahia (UFBA), Salvador, BA, Brazil

Dhaisa Thaina Souza Conceição Federal University of Bahia (UFBA), Salvador, BA, Brazil

Anderson Berni Cristofari Santa Cruz do Sul University (UNISC), Santa Cruz do Sul, RS, Brazil

Vanessa Dias D'Avila Sperandio School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

Fernando Augusto Alves da Costa Anhembi Morumbi University (UAM), São Paulo, SP, Brazil

Claudio Ribeiro da Cunha Cardiology Institute of Federal District (ICDF), Brasília, DF, Brazil

Felipe Bruno Santos da Cunha Unified School of Brasília (UNICEUB), Brasília, DF, Brazil

Assiane Gabriela Anceles da Rocha Catholic University of Pernambuco (UNICAP), Recife, PE, Brazil

Amanda Késsia da Silva Sales Federal University of Ceará (UFC), Sobral, CE, Brazil

Rayane da Silva Souza Federal University of Paraíba (UFPB), João Pessoa, PB, Brazil

Luciana Baltazar da Silveira de Araujo Federal University of Bahia (UFBA), Salvador, BA, Brazil

Daniel Tomasi Keppen Sequeira de Almeida Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Filipe T. K. S. Almeida Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Rui M. S. Almeida Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Mamede Francisco Johnson de Aquino Filho Federal University of Ceará (UFC), Sobral, CE, Brazil

Nilton Freire de Assis Neto Anhembi Morumbi University (UAM), São Paulo, SP, Brazil

Rômulo Martins de Camargo Federal University of São Paulo (UNIFESP), São Paulo, SP, Brazil

Guilherme Henrique Ribeiro de Carvalho Faculty of Medicine of University of São Paulo (FMUSP), São Paulo, SP, Brazil

Laryssa Alves de Farias Catholic University of Pernambuco (UNICAP), Recife, PE, Brazil

Orival de Freitas Filho Faculty of Medicine of University of São Paulo (FMUSP), São Paulo, SP, Brazil

Daniel Bartholo de Hyppolito Santa Casa of Sao Paulo School of Medical Sciences (FCMSCSP), São Paulo, SP, Brazil

Eduardo Teles de Lima Lopes Federal University of Viçosa (UFV), Viçosa, MG, Brazil

José Antônio de Lima Neto Federal University of Ceará (UFC), Sobral, CE, Brazil

Thainá de Lima Quinteiro Federal University of Bahia (UFBA), Salvador, BA, Brazil

Maria Tereza de Magalhães Andrade Federal University of Bahia (UFBA), Salvador, BA, Brazil

André Gorle de Miranda Chaves Minas Gerais Federal University (UFMG), Belo Horizonte, MG, Brazil

Eugênio Patrício de Oliveira Federal University of Paraíba (UFPB), João Pessoa, PB, Brazil

Felipe Bezerra Martins de Oliveira Cardiology Institute of Federal District (ICDF), Brasília, DF, Brazil

Jéssica Silva de Paula Minas Gerais Federal University (UFMG), Belo Horizonte, MG, Brazil

Bárbara Liss de Sousa Freire Federal University of Ceará (UFC), Sobral, CE, Brazil

Helmgton José Brito de Souza Unified School of Brasília (UNICEUB), Brasília, DF, Brazil

Jéssica Krieger de Souza Federal University of Grande Dourados (UFGD), Dourados, MS, Brazil

Gilberto Loiola De Vasconcelos Federal University of Ceará (UFC), Sobral, CE, Brazil

Camila Lopes do Amaral Federal University of Ceará (UFC), Sobral, CE, Brazil

Thiago do Amaral Cavalcante Unified School of Brasília (UNICEUB), Brasília, DF, Brazil

Carla Mayara Forte dos Santos Federal University of Ceará (UFC), Sobral, CE, Brazil

Caroline Kelli Domingues dos Santos State University of Western Paraná (UNIOESTE), Cascavel, PR, Brazil

Tailana Paiva Dourado Federal University of Bahia (UFBA), Salvador, BA, Brazil

Ana Carolina Gonçalves e Silva Cardiology Institute of Federal District (ICDF), Brasília, DF, Brazil

Mateus Fagundes Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Nathalia Spandl Falqueto School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

André Maurício Souza Fernandes Federal University of Bahia (UFBA), Salvador, BA, Brazil

Marcus Vinícius Silva Ferreira Cardiology Institute of Federal District (ICDF), Brasília, DF, Brazil

Heraldo Guedis Lobo Filho Federal University of Ceará (UFC), Fortaleza, CE, Brazil

José Glauco Lobo Filho Federal University of Ceará (UFC), Fortaleza, CE, Brazil

Maikon Augusto Vogado Aranda Florenciano Federal University of Grande Dourados (UFGD), Dourados, MS, Brazil

Evandro Luis Queiroz Flores Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Laura Gomes Flores Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Mariana Vano Galvão Almeida França Anhembi Morumbi University (UAM), São Paulo, SP, Brazil

Patrícia Freitag Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Leonardo Cristiano Frigini University Center of Espírito Santo (UNESC), Colatina, ES, Brazil

Edmo Atique Gabriel Grandes Lagos Faculty (UNILAGO), São José do Rio Preto, SP, Brazil

Fabio Antonio Gaiotto Faculty of Medicine of University of São Paulo (FMUSP), São Paulo, SP, Brazil

Letícia Lanzarin Gehm Santa Cruz do Sul University (UNISC), Santa Cruz do Sul, RS, Brazil

João Carlos Guaragna Pontifical Catholic University of Rio Grande do Sul (PUC- RS), Porto Alegre, RS, Brazil

Basem Juma Abdalla Abdel Hamid Santa Cruz do Sul University (UNISC), Santa Cruz do Sul, RS, Brazil

Augusto Emilio Hinterholz Santa Cruz do Sul University (UNISC), Santa Cruz do Sul, RS, Brazil

Yuri Justi Jardim Faculty of Medicine of University of São Paulo (FMUSP), São Paulo, SP, Brazil

Fabio Biscegli Jatene Faculty of Medicine of University of São Paulo (FMUSP), São Paulo, SP, Brazil

Armindo Jreige Júnior Cardiology Institute of Federal District (ICDF), Brasília, DF, Brazil

Nelson Américo Hossne Junior Federal University of São Paulo (UNIFESP), São Paulo, SP, Brazil

Roque Aras Junior Federal University of Bahia (UFBA), Salvador, BA, Brazil

Flávia Cristina Kufner Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Francisco Coelho Lamachia Santa Cruz do Sul University (UNISC), Santa Cruz do Sul, RS, Brazil

Caroline Cleophas Lobo Leite Federal University of Ceará (UFC), Fortaleza, CE, Brazil

Isadora Simão Almeida Liberato Anhembi Morumbi University (UAM), São Paulo, SP, Brazil

Melchior Luiz Lima School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

Rodolpho Poeys Lima Federal University of Viçosa (UFV), Viçosa, MG, Brazil

Jackson Brandão Lopes Federal University of Bahia (UFBA), Salvador, BA, Brazil

Henrique Louzan Machado Unified School of Brasília (UNICEUB), Brasília, DF, Brazil

Sergio Rodrigues Maranha University Center of Espírito Santo (UNESC), Colatina, ES, Brazil

Rízia Kérem Gonçalves Martiniano University Center of Espírito Santo (UNESC), Colatina, ES, Brazil

Fernanda Schuh Martins Santa Cruz do Sul University (UNISC), Santa Cruz do Sul, RS, Brazil

Rodrigo Mendes Federal University of São Paulo (UNIFESP), São Paulo, SP, Brazil

Jéssica Nathiele Meotti Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Gabriel Lorente Mitsumoto Santa Casa de São Paulo School of Medical Sciences (FCMSCSP), São Paulo, SP, Brazil

Rodrigo Mont'Alverne Guimarães Federal University of Ceará (UFC), Sobral, CE, Brazil

Daniela Moraes Santa Cruz do Sul University (UNISC), Santa Cruz do Sul, RS, Brazil

Leonardo Jadyr Silva Rodrigues Alves Unified School of Brasília (UNICEUB), Brasília, DF, Brazil

Daiane Thaysa Brito Nakamura Federal University of Bahia (UFBA), Salvador, BA, Brazil

Filipe Alves Nery University Center of Espírito Santo (UNESC), Colatina, ES, Brazil

Joaquim David Carneiro Neto Federal University of Ceará (UFC), Sobral, CE, Brazil

Saulo Victor Benevides Nunes Federal University of Ceará (UFC), Sobral, CE, Brazil

Gabrielle Santos Oliveira Cardiology Institute of Federal District (ICDF), Brasília, DF, Brazil

Letícia Oliveira Grandes Lagos Faculty (UNILAGO), São José do Rio Preto, SP, Brazil

Fabiano André Pereira Federal University of São Paulo (UNIFESP), São Paulo, SP, Brazil

Matheus Ramos Dal Piaz School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

Matheus Duarte Pimentel Federal University of Ceará (UFC), Fortaleza, CE, Brazil

Luiz Antonio Rivetti Presidente do Instituto de Pesquisa e Inovação Tecnológica da Santa Casa de São Paulo, São Paulo, SP, Brazil

Bruno da Costa Rocha Federal University of Bahia (UFBA), Salvador, Salvador, Brazil

Lissa Canedo Rocha School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

Yasmine Lailla Vasconcelos Rodrigues Federal University of Ceará (UFC), Sobral, CE, Brazil

Carlos Henrique Romancini State University of Western Paraná (UNIOESTE), Cascavel, PR, Brazil

Gabriel Prado Saad Minas Gerais Federal University (UFMG), Belo Horizonte, MG, Brazil

Eduardo Keller Saadi Pontifical Catholic University of Rio Grande do Sul (PUC- RS), Porto Alegre, RS, Brazil

Marina Petersen Saadi Pontifical Catholic University of Rio Grande do Sul (PUC- RS), Porto Alegre, RS, Brazil

Rodrigo Petersen Saadi Pontifical Catholic University of Rio Grande do Sul (PUC- RS), Porto Alegre, RS, Brazil

Pedro Rafael Salerno Catholic University of Pernambuco (UNICAP), Recife, PE, Brazil

Manuela Xavier Cajado Sampaio Salvador University (UNIFACS), Salvador, BA, Brazil

Larissa Lucas Schloicka Cardiology Institute of Federal District (ICDF), Brasília, DF, Brazil

Fábio Selig Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Adriana Fernandes Silva Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Felipe Machado Silva Santa Casa de Sao Paulo School of Medical Sciences (FCMSCSP), São Paulo, SP, Brazil

Joely Nataly Silva Federal University of Ceará (UFC), Fortaleza, CE, Brazil

Pedro Guimarães Silva Federal University of Bahia (UFBA), Salvador, BA, Brazil

Carolina Kuchenbecker Soares Minas Gerais Federal University (UFMG), Belo Horizonte, MG, Brazil

Diogo Assis Souza Unified School of Brasília (UNICEUB), Brasília, DF, Brazil

Gabriel Pelegrineti Targueta Federal University of Paraíba (UFPB), João Pessoa, PB, Brazil

Henry Eiji Toma Santa Casa de Sao Paulo School of Medical Sciences (FCMSCSP), São Paulo, SP, Brazil

Amanda Dorighetto Tomazelli School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

Cassiana Tomazoni Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Camila Rocha Vieira Torres Federal University of Paraíba (UFPB), João Pessoa, PB, Brazil

Priscilla Gomes Tosta School of Sciences of Santa Casa de Misericórdia de Vitória (EMESCAM), Vitória, ES, Brazil

Anna Luiza Amâncio Vidal Federal University of Viçosa (UFV), Viçosa, MG, Brazil

Luana Luiza Vieira Assis Gurgacz Foundation University (FAG), Cascavel, PR, Brazil

Vanessa Lopes Vieira Faculty of Medicine of University of São Paulo (FMUSP), São Paulo, SP, Brazil

Raphaella von Sohsten Calabria Lima Catholic University of Pernambuco (UNICAP), Recife, PE, Brazil

Antonio Eduardo Zerati Faculty of Medicine of University of São Paulo (FMUSP), São Paulo, SP, Brazil

Nágila Simon Ziebell Santa Cruz do Sul University (UNISC), Santa Cruz do Sul, RS, Brazil