

# Syncope Cases

EDITED BY

**Roberto García-Civera,  
Gonzalo Barón-Esquivias,  
Jean-Jacques Blanc,  
Michele Brignole,  
Angel Moya i Mitjans,  
Ricardo Ruiz-Granell  
and Wouter Wieling**

 **Blackwell**  
Futura

This Page Intentionally Left Blank

## Syncope Cases

This Page Intentionally Left Blank

# Syncope Cases

EDITED BY

**Roberto García-Civera,  
Gonzalo Barón-Esquivias,  
Jean-Jacques Blanc,  
Michele Brignole,  
Angel Moya i Mitjans,  
Ricardo Ruiz-Granell  
and Wouter Wieling**

 **Blackwell**  
Futura

© 2006 by Blackwell Publishing

Blackwell Futura is an imprint of Blackwell Publishing

Blackwell Publishing, Inc., 350 Main Street, Malden, Massachusetts 02148-5020, USA

Blackwell Publishing Ltd, 9600 Garsington Road, Oxford OX4 2DQ, UK

Blackwell Science Asia Pty Ltd, 550 Swanston Street, Carlton, Victoria 3053, Australia

All rights reserved. No part of this publication may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without permission in writing from the publisher, except by a reviewer who may quote brief passages in a review.

First published

1 2006

Library of Congress Cataloging-in-Publication Data

Syncope cases / edited by Roberto García-Civera . . . [*et al.*].

p. ; cm.

Includes bibliographical references.

ISBN-13: 978-1-4051-5109-2

ISBN-10: 1-4051-5109-9

1. Syncope (Pathology)—Case studies. I. García-Civera, Roberto.  
[DNLM: 1. Syncope—diagnosis—Case Reports. 2. Cardiovascular  
Diseases—complications—Case Reports. 3. Syncope—complications  
—Case Reports. 4. Syncope—therapy—Case Reports. WB 182  
S9916 2006]

RB150.S9S96 2006

616'.047—dc22

2005032202

ISBN-13: 978-1-4051-5109-2

ISBN-10: 1-4051-5109-9

A catalogue record for this title is available from the British Library

Commissioning Editor: Gina Almond

Development Editors: Vicki Donald and Beckie Brand

Book Development Assistant: Lauren Brindley

Set in 9/12pt Minion by Graphicraft Limited, Hong Kong

Printed and bound in India by Replika Press

For further information on Blackwell Publishing, visit our website:

[www.blackwellcardiology.com](http://www.blackwellcardiology.com)

The publisher's policy is to use permanent paper from mills that operate a sustainable forestry policy, and which has been manufactured from pulp processed using acid-free and elementary chlorine-free practices. Furthermore, the publisher ensures that the text paper and cover board used have met acceptable environmental accreditation standards.

Blackwell Publishing makes no representation, express or implied, that the drug dosages in this book are correct. Readers must therefore always check that any produce mentioned in this publication is used in accordance with the prescribing information prepared by the manufacturers. The author and the publishers do not accept responsibility or legal liability for any errors in the text or for the misuse or misapplication of material in this book.

# Contents

Contributors, viii

Foreword, xvi

Abbreviations, xviii

## **Part I Neurally mediated (reflex) syncope**

### **Clinical presentation**

- 1 Vasovagal fainting in children and teenagers, 5
- 2 Typical vasovagal syncope (blood/injury phobia), 8
- 3 Reflex syncope in older adults, 10
- 4 Transient loss of consciousness with muscle jerks: syncope or epilepsy? 12
- 5 Tilt-induced syncope: mixed response, 15
- 6 Tilt-induced syncope: cardioinhibitory response, 19
- 7 Tilt-induced syncope: purely vasodepressor response, 21
- 8 Tilt-induced syncope: dysautonomic response, 25
- 9 Tilt-induced syncope: chronotropic incompetence, 27
- 10 Syncope and postural orthostatic tachycardia syndrome, 29
- 11 Electroencephalography recordings during syncope, 34
- 12 Psychogenic reaction during tilt-table testing, 36
- 13 Neuromediated syncope presenting as a paroxysmal atrioventricular block, 38

- 14 Multiple manifestations of the cardioinhibitory mechanism detected during prolonged electrocardiographic monitoring, 41
- 15 Neuromediated syncope masquerading as unexplained falls, 44
- 16 Post-exercise vasovagal syncope, 46
- 17 Post-exercise neuromediated syncope, 49
- 18 Vasovagal syncope interrupting sleep, 52
- 19 Syncope during pregnancy, 55
- 20 A pilot with vasovagal syncope: fit to fly?, 58
- 21 Recurrent syncope in a patient with no structural heart disease and a negative tilt-table test, 60
- 22 Swallow syncope associated with asystole, 62
- 23 Swallow syncope presenting with atrioventricular block, 64
- 24 Transient glossopharyngeal syncope, 66
- 25 Tussive syncope, 69
- 26 Laughter-induced syncope, 71
- 27 Syncope and the eye, 74

### **Treatment**

- 28 Long-term follow-up of vasovagal syncope with a long asystolic pause, 79
- 29 Averting a vasovagal faint with a combination of leg crossing and muscle tensing, 82
- 30 Vasovagal syncope averted using arm-tensing maneuvers, 85
- 31 Training patients in physical countermeasures using continuous on-screen blood-pressure monitoring, 87

- 32 Vasovagal syncope treated with tilt training, 89
- 33 Psychological treatment of malignant vasovagal syncope due to blood phobia, 91
- 34 Syncope relapse in a patient with cardioinhibitory neuromediated syncope treated with pacing, 94

### **Carotid sinus syndrome**

- 35 Carotid sinus syndrome, 99
- 36 Carotid sinus hypersensitivity only during tilting, 101
- 37 Complex cardioinhibitory neurally mediated syncope, 104
- 38 Carotid hypersensitivity syndrome secondary to neck tumor, 106
- 39 Syncope in a case of carotid body paraganglioma, 108
- 40 Recurrent syncope in a carotid sinus patient treated with a pacemaker, 111
- 41 Unexplained falls in older patients, 113

### **Part II Orthostatic hypotension**

- 42 Initial orthostatic hypotension as a cause of syncope in an adolescent, 117
- 43 Initial orthostatic hypotension and syncope due to medications in a 60-year-old man, 120
- 44 Initial orthostatic hypotension induced by standing up from squatting, 123
- 45 Self-induced syncope: the fainting lark, 126
- 46 Self-diagnosis of orthostatic hypotension in a patient with autonomic failure, 128
- 47 Unexplained transient loss of consciousness in a 58-year-old man after *Legionella* pneumonia, 131
- 48 Physical maneuvers that reduce postural hypotension in autonomic failure, 134
- 49 Disabling orthostatic hypotension caused by sympathectomies for hyperhidrosis, 137
- 50 Orthostatic hypotension due to arterial baroreflex failure, 141

- 51 Hypotension due to straining in a patient with a high spinal-cord lesion, 144
- 52 Orthostatic hypotension and syncope in a patient with pheochromocytoma, 147

### **Part III Arrhythmic syncope**

- 53 Syncope and the Brugada syndrome, 153
- 54 Two types of monomorphic ventricular tachycardia as a cause of syncope in Brugada syndrome, 156
- 55 Syncope and Brugada-like electrocardiography pattern appearing during a febrile illness: neurally mediated or arrhythmic syncope? 159
- 56 Syncope in a case of acquired long QT syndrome, 163
- 57 Syncope due to *torsade de pointes* in an HIV-infected patient receiving methadone treatment, 165
- 58 Congenital long QT syndrome, 168
- 59 Long QT syndrome revealed by exercise, 170
- 60 Congenital long QT syndrome: *torsade de pointes* demonstrated by prolonged monitoring, 172
- 61 Short-coupled variant of *torsade de pointes*, 175
- 62 Syncope in a patient with a short QT interval, 177
- 63 Syncope in a woman with no heart disease, a normal electrocardiogram, and a family history of sudden death, 180
- 64 Palpitations and syncope: an unusual case of bradycardia–tachycardia syndrome, 184
- 65 Arrhythmic syncope in a child: catecholaminergic ventricular tachycardia, 187
- 66 Adenosine triphosphate-sensitive paroxysmal atrioventricular block, 190
- 67 Adenosine-dependent syncope? 192
- 68 Syncope due to paroxysmal junctional tachycardia, 194
- 69 Syncope in a patient with atrioventricular nodal reentry tachycardia: reflex hypotension? 197
- 70 Arrhythmic and neuromediated syncope in a young woman, 200

- 71 Syncope and Wolff–Parkinson–White syndrome: atrial fibrillation with rapid ventricular response, 204
- 72 Wolff–Parkinson–White syndrome with unapparent preexcitation in sinus rhythm: atrial flutter with 1 : 1 atrioventricular conduction, 208
- 73 Syncope in a patient with atrial fibrillation: reflex hypotension? 211
- 74 Neuromediated syncope inducing atrial fibrillation, 213
- 75 Effort presyncope due to idiopathic right ventricular tachycardia, 216
- 76 Syncope due to idiopathic left ventricular tachycardia, 219
- 77 Syncope and arrhythmogenic right ventricular dysplasia, 222
- 78 Unexpected electrophysiology study result in a patient with repeated syncopal episodes, 224
- 79 Syncope in a patient with right bundle-branch block and alternating anterior and posterior left fascicular block, 226
- 80 Vasovagal syncope in a patient with bundle-branch block, 229
- 81 Intermittent atrioventricular block suggested by an electrophysiological study, 231
- 82 Syncope in a patient with bundle-branch block and negative electrophysiological study, 234
- 83 Syncope in a patient with bundle-branch block and previous myocardial infarction, 236
- 84 Syncope in a case of left bundle-branch block treated with an implantable defibrillator and biventricular pacing, 238
- Part IV Syncope and cardiovascular disease**
- 85 Acute coronary syndrome presenting as syncope, 243
- 86 Syncope as an isolated manifestation of left main coronary artery occlusion, 246
- 87 Syncope in a patient with myocardial infarction, 248
- 88 Acute myocardial infarction and complete heart block: early revascularization procedure, 250
- 89 Syncope in chronic ischemic heart disease: ventricular tachycardia induced during an electrophysiological study, 252
- 90 Syncope in a patient with an earlier myocardial infarction: induction of ventricular fibrillation during electrophysiological testing, 256
- 91 Syncope in a patient with dilated cardiomyopathy, a negative electrophysiological study, and poor left ventricular function, 260
- 92 Syncope in a patient with obstructive hypertrophic cardiomyopathy and left bundle-branch block, 263
- 93 Atrial flutter with 1 : 1 atrioventricular conduction in a patient with hypertrophic cardiomyopathy, 267
- 94 Syncope in hypertrophic cardiomyopathy, atrial fibrillation, and rapid ventricular response, 270
- 95 Syncopal ventricular tachycardia in a case of midseptal hypertrophic cardiomyopathy with apical aneurysm, 272
- 96 Carcinoid syndrome, 276
- 97 Syncope and myotonic dystrophy, 278
- 98 Syncope in a patient with Kearns–Sayre syndrome, 283
- 99 Syncope in aortic stenosis, 285
- 100 Syncope after aortic valve replacement, 288
- 101 Syncope in a patient with aortic valve prosthesis and wide QRS tachycardia, 291
- 102 Presyncope due to left atrial myxoma, 295
- 103 Syncope due to left atrial thrombus, 298
- 104 Cardiac tamponade presenting as syncope, 300
- 105 Syncope in acute aortic dissection, 304
- 106 Pulmonary embolism presenting as syncope, 307
- 107 Subclavian steal syndrome as a cause of syncope, 310
- 108 Multiple malignant causes of syncope in a young girl, 312
- Index, 317

---



# Contributors

## Editors

### **Gonzalo Barón Esquivias, MD**

Cardiology Department  
Hospital Universitario  
Virgen del Rocío  
Seville  
Spain

### **Jean-Jacques Blanc, MD, FESC**

Professor of Cardiology  
Member, Task Force on Syncope, European Society of  
Cardiology  
Chief, Department of Cardiology  
University of Brest  
Brest  
France

### **Michele Brignole, MD, FESC**

Chairman, Task Force on Syncope, European Society of  
Cardiology  
Chief, Department of Cardiology  
Ospedale Riuniti  
Lavagna  
Italy

### **Roberto García Civera, MD**

Professor of Cardiology, Department of Medicine  
Chief, Arrhythmology Section  
Clinical University Hospital  
University of Valencia  
Valencia  
Spain

### **Angel Moya i Mitjans, MD, FESC**

Chief, Arrhythmology Section  
Member, Task Force on Syncope, European Society of  
Cardiology  
Vall d'Hebron General University Hospital  
Barcelona  
Spain

### **Ricardo Ruiz Granell, MD**

Arrhythmia and Cardiac Pacing Unit  
Clinical University Hospital  
Valencia  
Spain

### **Wouter Wieling, MD, PhD**

Professor of Medicine in Syncope Unit  
Department of Internal Medicine  
Academic Medical Center  
University of Amsterdam  
The Netherlands

## Contributors

### **P. Aguar Carrascosa, MD**

Dr Peset University Hospital  
Valencia  
Spain

### **A. Aguilera, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

### **C. Almodóvar, MD**

Albacete General Hospital  
Albacete  
Spain

### **C. Alonso, MD**

Cardiology Service  
Vall d'Hebron General University Hospital  
Barcelona  
Spain

### **I. Anguera, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

### **E. Arana, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

### **M.F. Arkotxa, MD**

Cardiology Service

Cruces Hospital  
Bilbao  
Spain

**M. Atienzar, MD**

General Hospital  
Albacete  
Spain

**S.M. Ballesteros Pradas, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**A. Bartoletti, MD**

Syncope Center  
Nuovo S. Giovanni di Dio Hospital  
Florence  
Italy

**M.L. Blasco, MD**

Intensive Care Unit  
Clinical University Hospital  
Valencia  
Spain

**M.C. Boer, BSc**

Department of Medicine  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**N. Bottoni, MD**

Unità Operativa di Cardiologia Interventistica  
Azienda Ospedaliera S. Maria Nuova  
Reggio Emilia  
Italy

**A. Carmona Ainat, MD**

Clinical University Hospital  
Zaragoza  
Spain

**P. Castellant, MD**

University Hospital  
Brest  
France

**M. Cazorla, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**T. Cellai, MD**

Geriatric and Cardiology Medicine Unit

University of Florence  
Florence  
Italy

**R. Ceres, MD**

General Hospital  
Albacete  
Spain

**M. Cervantes, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**O. Chapinal, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**N. Colman, MD**

Department of Cardiology  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**P. Cortelli, MD**

Neurological Section  
University of Modena and Reggio Emilia  
Bologna  
Italy

**F. Croci, MD**

Department of Cardiology and Arrhythmologic Center  
Lavagna  
Italy

**B. Daga Calejero, MD**

Clinical University Hospital  
Zaragoza  
Spain

**J.H.A. Dambrink, MD**

Department of Medicine  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**A. Del Rosso, MD**

Cardiology Division  
Ospedale S. Pietro Igneo  
Fuocchchio  
Italy

**A. Destrée-Vonk, MD**

Department of Pediatrics  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**L.S. Díaz de la Llera, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**J.G. van Dijk, MD**

Department of Neurology and Clinical Neurophysiology  
Leiden University Medical Center  
Leiden  
The Netherlands

**N. van Dijk, MD**

Department of Medicine  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**P. Donateo, MD**

Department of Cardiology and Arrhythmologic Center  
Lavagna  
Italy

**J. Enero, MD**

General Hospital  
Albacete  
Spain

**F. Errázquin Sáenz de Tejada, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**P. Fabiani, MD**

Syncope Center  
Nuovo S. Giovanni di Dio Hospital  
Florence  
Italy

**L. Facila, MD**

Cardiology Service  
Clinical University Hospital  
Valencia  
Spain

**J. Fedriani, MD**

General Hospital  
Albacete  
Spain

**M. Fernández Quero, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**A. Ferrero, MD**

Cardiology Service  
Clinical University Hospital  
Valencia  
Spain

**G. Foglia-Manzillo, MD**

Department of Cardiology  
Ospedale Valduce  
Como  
Italy

**J.A. Fournier Andray, MD, PhD, FESC**

Chief of Interventional Cardiology Unit  
Virgen del Rocío University Hospital  
Seville  
Spain

**F. Gaita, MD**

Divisione di Cardiologia  
Ospedale Civile di Asti  
Asti  
Italy

**S. Galán, MD**

Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**A. García Alberola, MD**

Virgen de la Arrixaca University Hospital  
Murcia  
Spain

**L. García Riesco, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**J. García Sacristán, MD**

General Hospital  
Albacete  
Spain

**F. Giada, MD**

Department of Cardiovascular Diseases  
Umberto I Hospital  
Mestre-Venice  
Italy

**M. Gil, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**C. Giustetto, MD**

Divisione di Cardiologia  
Ospedale Civile di Asti  
Asti  
Italy

**M. Gnoatto, MD**

La Paz University Hospital  
Madrid  
Spain

**C. Golzio, MD**

Geriatric and Cardiology Medicine Unit  
University of Florence  
Florence  
Italy

**S. Gómez Moreno, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**M. González Vasserot, MD**

La Paz University Hospital  
Madrid  
Spain

**A. Guisado, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**J.R. Gumà, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**G. Gusi, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**E. Gutierrez Ibáñez, MD**

Clinical University Hospital

Zaragoza  
Spain

**J.R. Halliwill, PhD**

Department of Human Physiology  
University of Oregon  
Eugene, Oregon  
USA

**M.P.M. Harms, MD**

Department of Medicine  
University Medical Center  
Groningen  
The Netherlands

**D.L. Jardine, FRACP, PhD**

Department of General Medicine  
Christchurch Hospital  
Christchurch  
New Zealand

**M. Juez López, MD**

Department of Cardiovascular Diseases  
Clinical University Hospital  
Valencia  
Spain

**J.M. Karemaker, MD**

Department of Physiology  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**R.K. Khurana, MD**

Division of Neurology  
Union Memorial Hospital  
Baltimore, Maryland  
USA

**R.A.M. Kortz, MD**

Department of Cardiology  
Flevoziekenhuis  
Almere  
The Netherlands

**C.T.P. Krediet, MD**

Department of Medicine  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**C. Lafuente, MD**

General Hospital  
Albacete  
Spain

**E. Lage Gallé, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**A. Landi, MD**

Geriatric and Cardiology Medicine Unit  
University of Florence  
Florence  
Italy

**J.W.M. Lenders, MD, PhD**

Professor of Medicines  
Department of Medicine  
Radboud University Nijmegen Medical Center  
Nijmegen  
The Netherlands

**A.M. van Leeuwen, MD**

Department of Medicine  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**J.J. van Lieshout, MD, PhD**

Department of Medicine  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**M. Linzer, MD**

Professor of Medicine  
Section of General Internal Medicine  
University of Wisconsin  
Madison, Wisconsin  
USA

**A. Llácer Escorihuela, MD**

Cardiology Service  
Clinical University Hospital  
Valencia  
Spain

**G. Lolli, MD**

Unità Operativa di Cardiologia Interventistica  
Azienda Ospedaliera S. Maria Nuova  
Reggio Emilia  
Italy

**F. López Pardo, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**R. Maggi, MD**

Department of Cardiology and Arrhythmologic Center  
Lavagna  
Italy

**N. Malin, MD**

Unit of Geriatric and Cardiology Medicine  
University of Florence, Florence  
Italy

**A. Maraviglia, MD**

Geriatric and Cardiology Medicine Unit  
University of Florence  
Florence  
Italy

**J.D. Martínez Alday, MD**

Cardiology Service  
Cruces Hospital  
Bilbao  
Spain

**A. Martínez Brotons, MD**

Cardiology Service  
Clinical University Hospital  
Valencia  
Spain

**J. Martínez León, MD**

Department of Cardiovascular Diseases  
Clinical University Hospital  
Valencia  
Spain

**A. Martínez Martínez, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**A. Martínez Rubio, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**I. Martín González, MD**

Department of Cardiovascular Diseases  
Clinical University Hospital  
Valencia  
Spain

**G. Masotti, MD**

Geriatric and Cardiology Medicine Unit  
University of Florence  
Florence  
Italy

**C. Menozzi, MD**

Unità Operativa di Cardiologia Interventistica  
Azienda Ospedaliera S. Maria Nuova  
Reggio Emilia  
Italy

**J.L. Merino, MD**

La Paz University Hospital  
Madrid  
Spain

**V. Montagud Balaguer, MD**

Dr Peset University Hospital  
Valencia  
Spain

**S. Morell Cabedo, MD**

Cardiology Service  
Clinical University Hospital  
Valencia  
Spain

**J.I. Muñoz, MD**

Department of Pediatrics  
Clinical University Hospital  
Valencia  
Spain

**J. Nicolás, MD**

Cardiology Service  
Beltvitge University Hospital  
Barcelona  
Spain

**F. Nuñez, MD**

Department of Pediatrics  
Clinical University Hospital  
Valencia  
Spain

**D. Oddone, MD**

Department of Cardiology and Arrhythmologic Center  
Lavagna  
Italy

**J.M. Ormaetxe, MD**

Cardiology Service  
Hospital de Basurto  
Bilbao  
Spain

**M.D. Orriach, MD**

Dr Peset University Hospital  
Valencia  
Spain

**R.F.E. Pedretti, MD**

Department of Cardiology  
IRCCS Fondazione Salvatore Maugeri

Tradate  
Italy

**A. Pedrote Martínez, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**R. Peinado, MD**

La Paz University Hospital  
Madrid  
Spain

**A. Peláez González, MD**

Dr Peset University Hospital  
Valencia  
Spain

**J. Pelegrín Díaz, MD**

Clinical University Hospital  
Zaragoza  
Spain

**E. Puggioni, MD**

Department of Cardiology and Arrhythmologic Center  
Lavagna  
Italy

**F. Quartieri, MD**

Unità Operativa di Cardiologia Interventistica  
Azienda Ospedaliera S. Maria Nuova  
Reggio Emilia  
Italy

**A. Raviele, MD**

Department of Cardiovascular Diseases  
Umberto I Hospital  
Mestre-Venice  
Italy

**C.A. Remme, MD**

Department of Experimental Cardiology  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**G. Rodrigo Trallero, MD**

Clinical University Hospital  
Zaragoza  
Spain

**M.J. Rodríguez Puras, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**N. Romero, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**A. Roselló, MD**

Cardiology Service  
Clinical University Hospital  
Valencia  
Spain

**X. Sabaté, MD**

Cardiology Service  
Beltvitge University Hospital  
Barcelona  
Spain

**R. Sáez, MD**

Cardiology Service  
Cruces Hospital  
Bilbao  
Spain

**J. Sagristá, MD**

Cardiology Service  
Vall d'Hebron General University Hospital  
Barcelona  
Spain

**M. Sala, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**A. Salvador Sanz, MD**

Dr Peset University Hospital  
Valencia  
Spain

**A. Sánchez González, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**A. Sánchez Val, MD**

Clinical University Hospital  
Zaragoza  
Spain

**R. Sanjuán Mañez, MD**

Intensive Care Unit  
Clinical University Hospital  
Valencia  
Spain

**M. Santarone, MD**

Cardiology Department  
Ospedale Valduce  
Como  
Italy

**S. Sarzi Braga, MD**

Department of Cardiology  
IRCCS Fondazione Salvatore Maugeri  
Tradate  
Italy

**F. Segura, MD**

Departments of Cardiology and Internal Medicine  
Corporació Sanitària  
Parc Taulí Hospital  
Sabadell  
Spain

**T.A. Simmers, MD**

Amphia Hospital  
Breda  
The Netherlands

**A. Solano, MD**

Department of Cardiology and Arrhythmologic Center  
Lavagna  
Italy

**H.J.L.M. Timmers, MD**

Department of Medicine  
Radboud University Nijmegen Medical Center  
Nijmegen  
The Netherlands

**P. Tornos, MD**

Cardiology Service  
Vall d'Hebron General University Hospital  
Barcelona  
Spain

**M.T. Tuzón Segarra, MD**

Dr Peset University Hospital  
Valencia  
Spain

**A. Ungar, MD**

Geriatric and Cardiology Medicine Unit  
University of Florence  
Florence  
Italy

**B. Vaquerizo, MD**

Dr Peset University Hospital  
Valencia  
Spain

**S.C.J.M. Velzeboer, MD**

Department of Medicine  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

**M. Villa Gil-Ortega, MD**

Department of Cardiology  
Virgen del Rocío University Hospital  
Seville  
Spain

**A.G.R. Visman, MD**

Department of Cardiology  
Beatrix Hospital  
Gorinchem  
The Netherlands

**A.A.M. Wilde, MD**

Professor of Cardiology  
Department of Cardiology  
Academic Medical Center  
University of Amsterdam  
Amsterdam  
The Netherlands

# Foreword

Syncope is one of the most common causes of transient loss of consciousness. Whatever its cause, syncope is a frightening experience and one that usually triggers a demand for prompt medical evaluation. In this setting, patients and their families are often quite alarmed, and seek help in order both to understand what has happened and to take steps to prevent recurrences. They are particularly worried about the implications of such spells for future health and economic well-being. Unfortunately, however, physicians often feel inadequately prepared to deal effectively with these concerns. They tend to be especially uncertain about whether they have investigated the problem properly, whether their diagnosis is accurate, and whether their advice is appropriate and up-to-date.

In terms of its relationship to the broad array of causes of transient loss of consciousness (TLOC), syncope encompasses those conditions in which loss of consciousness is caused by a period of self-limited inadequacy of cerebral perfusion (most often the result of a transient drop in blood pressure). It is this distinctive pathophysiology that distinguishes syncope from other disturbances of global cerebral dysfunction, such as:

- Epilepsy, in which TLOC is due to a primary electrical abnormality of the brain.
- Concussion, in which TLOC is due to cranial trauma.
- Intoxication, in which the reversible disturbance of consciousness has a toxic etiology.
- Psychogenic pseudosyncope (formerly erroneously termed “psychogenic syncope”), which is a condition of psychiatric origin in which TLOC does not really occur.

Given the frequency with which syncope occurs (estimated at 1–3% of all emergency department visits) and its potential for critical clinical implications (e.g., physical injury, driving restriction, loss of occupation, premature loss of independent living status), the development and fostering of a better understanding

of strategies for optimal management of patients who have presumably suffered a syncope event is crucial. In recognition of this need, considerable recent attention has been directed toward identifying the most effective diagnostic techniques and treatments for patients with suspected syncope (e.g., the European Society of Cardiology Syncope Task Force clinical guidelines, published in 2001 and updated in 2004).

This volume, edited by seven prominent authorities on the management of syncope from four different countries and with 130 other contributors, provides a unique additional step in fostering a better understanding of the many factors that can cause syncope in humans, with the ultimate goal of facilitating the provision of more precise and cost-effective care for syncope patients.

In contrast to the somewhat tedious approach taken by most traditional textbooks and guideline statements, the authors of this volume have used a lively and easy-to-read case-study format—a teaching strategy with which medical practitioners are both comfortable and familiar. In essence, the reader encounters an array of realistic clinical scenarios, each described succinctly with pertinent illustrations. Examples of almost every cause of syncope are provided, ranging from various forms of neurally mediated reflex faints to both common and uncommon conditions known to be associated with real or seemingly real syncope events.

The uniform style of the case presentations is particularly pleasing, fostering easy reading and clarity of delivery. For good measure, appended to each case is a brief, focused, and expert editorial commentary. The latter feature is a novel one, providing the reader with a broader and easily understood context for the case as well as carefully selected pertinent citations from the literature.

The contributors to this volume represent a wide range of expertise from many different countries. All are experienced clinicians, and many are internationally

recognized authorities in the evaluation and treatment of syncope. Cardiovascular medicine and physiology, internal medicine, and neuroscience and autonomic control are well represented. The result is a compendium of case studies suited to clinicians of all levels of experience and various specialties. The advanced trainee will find here a clinical experience that is otherwise unobtainable in one place; even many years of clinical practice would be insufficient. Similarly, family physicians, emergency-room doctors, and specialists in internal medicine, pediatrics, cardiology, and neurology will find the case studies to be enjoyable to read,

enlightening, and immediately pertinent to improving their care of often very worrisome patients.

This volume is a valuable contribution to further education in this field. It is a contribution that should be widely read, and one that offers the possibility of markedly enhancing medical care for the syncope patient.

*David G. Benditt, MD, FRCP(C), FACC, FHRS  
Cardiac Arrhythmia Center, University  
of Minnesota Medical School  
Minneapolis, Minnesota*

# Abbreviations

Terms for electrocardiographic deflections and patterns, and pacemaker codes, are not included.

|        |   |                       |  |
|--------|---|-----------------------|--|
| ACC    | American College of Cardiology                        | ICOPER                | International Cooperative Pulmonary Embolism Registry  |
| ACE    | angiotensin-converting enzyme                         | ICU                   | intensive-care unit; intensive coronary unit           |
| AF     | atrial fibrillation                                   | ILR                   | implantable loop recorder                              |
| AICD   | automatic implantable cardioverter-defibrillator      | <sup>123</sup> I-MIBG | <sup>123</sup> iodinated metaiodobenzylguanidine       |
| AMI    | acute myocardial infarction                           | IRAD                  | International Registry of Aortic Dissection            |
| ARVC   | arrhythmogenic right ventricular cardiomyopathy       | ISSUE                 | International Study of Syncope of Uncertain Etiology   |
| ARVD   | arrhythmogenic right ventricular dysplasia            | LASIK                 | laser <i>in-situ</i> keratomileusis                    |
| ATP    | adenosine triphosphate                                | LBBB                  | left bundle-branch block                               |
| AV     | atrioventricular                                      | LQTS                  | long QT syndrome                                       |
| AVB    | atrioventricular block                                | LVEF                  | left ventricular ejection fraction                     |
| AVNRT  | atrioventricular nodal reentry tachycardia            | MD                    | myotonic dystrophy                                     |
| BBB    | bundle-branch block                                   | MRI                   | magnetic resonance imaging                             |
| BBR VT | bundle-branch reentry ventricular tachycardia         | NIDCM                 | nonischemic dilated cardiomyopathy                     |
| cAMP   | cyclic adenosine monophosphate                        | NYHA                  | New York Heart Association (classification)            |
| CI     | cardiac index   | OCR                   | oculocardiac reflex                                    |
| CKMB   | creatinine kinase, myocardial-bound                   | PE                    | pulmonary embolism                                     |
| CPVT   | catecholaminergic polymorphic ventricular tachycardia | PEH                   | post-exercise hypotension                              |
| CSH    | carotid sinus hypersensitivity                        | POTS                  | postural orthostatic tachycardia syndrome              |
| CSM    | carotid sinus massage                                 | PRA                   | plasma renin activity                                  |
| CSS    | carotid sinus syndrome                                | QSART                 | quantitative sudomotor axon reflex test                |
| CT     | computed tomography                                   | RBBB                  | right bundle-branch block                              |
| DC     | direct current  | SI                    | systolic index   |
| EAD    | early afterdepolarization                             | SNRT                  | sinus node recovery time                               |
| ECG    | electrocardiogram, electrocardiography                | TdP                   | <i>torsade de pointes</i>                              |
| EEG    | electroencephalogram, electroencephalography          | TIMI                  | Thrombolysis in Myocardial Infarction (classification) |
| EPS    | electrophysiological study                            | TPRI                  | total peripheral resistance index                      |
| HCM    | hypertrophic cardiomyopathy                           | TST                   | thermoregulatory sweat test                            |
| 5-HIAA | 5-hydroxyindoleacetic acid                            | VASIS                 | Vasovagal Syncope International Study (classification) |
| HIV    | human immunodeficiency virus                          | VF                    | ventricular fibrillation                               |
| HUT    | head-up tilt (test)                                   | VPS                   | Vasovagal Pacemaker Study                              |
| ICD    | implantable cardioverter-defibrillator                | VT                    | ventricular tachycardia                                |



---

## **PART I**

# Neurally mediated (reflex) syncope

This Page Intentionally Left Blank

# Clinical presentation

This Page Intentionally Left Blank

# 1

## CASE 1

# Vasovagal fainting in children and teenagers

W. Wieling

### Case report

A 14-year-old boy was referred to our syncope unit for analysis of an unexplained episode of transient loss of consciousness. The episode occurred while the boy had been standing still after running during a soccer competition game. The patient denied experiencing any prodromal symptoms. The duration of the loss of consciousness was short (< 1 min).

**Table 1.1** Classification of reflex syncope based on triggers.

#### Reflex-mediated

##### *Vasovagal syncope*

- Emotionally induced—e.g., venipunctures, immunizations, sight of blood) (central type)
- Orthostatically induced (peripheral type)

##### *Ocular syncope*

##### *Gastrointestinal*

- Swallow syncope
- Esophageal stimulation
- Gastrointestinal tract instrumentation
- Rectal/vaginal examination
- Defecation syncope

##### *Urogenital*

- (Post-)micturition syncope
- Urogenital tract instrumentation
- Pulmonary airway instrumentation

#### Mechanical/hydraulic factors

##### *Initial orthostatic hypotension*

##### *Increased intrathoracic pressure: cough and sneeze syncope*

- Wind instrument player's syncope
- Weight lifter's syncope
- Mess trick and fainting lark
- Stretch syncope

The patient's general health was excellent. Evaluations by two pediatricians, a pediatric cardiologist and a pediatric neurologist, including several electrocardiograms, an echocardiogram, a 24-h Holter recording, an exercise test, and blood examinations, were unremarkable. The patient was advised to refrain from playing soccer.

Additional history-taking revealed that three additional episodes of transient loss of consciousness had occurred—one while he had been standing still on a warm day during a vacation with his parents in Paris while a street artist was making a drawing of him. The other episodes also occurred when he was standing motionless while a friend of his mother was giving him a haircut. During these episodes, he was reported to be pale and sweating. Nausea was present during one of the episodes.

On the basis of this history, reflex vasovagal syncope was diagnosed. The mechanisms underlying the episodes were explained to the patient and his parents. The young patient and his parents were reassured and informed about lifestyle measures. The boy started to play soccer again, and no further syncopal episodes occurred.

### Comment

By far the most common cause of transient loss of consciousness in young patients is a reflex syncopal event, particularly vasovagal fainting [1,2]. A variety of triggers have been identified (Table 1.1).

Two clinical scenarios in particular are known to provoke vasovagal fainting in young patients. First and foremost are situations that increase the pooling of venous blood below the heart, such as long periods

**Table 1.2** Typical premonitory symptoms for reflex syncope.

---

- Lightheadedness, dizziness
- Palpitations
- Weakness
- Dimming or blurred vision
- Fading hearing, tinnitus
- Nausea, epigastric distress
- Feeling warm or cold
- Facial pallor
- Sweating, dilated pupils

---

of standing motionless, particularly in combination with elevated ambient temperatures. Young patients often experience prodromal signs and symptoms when a spontaneous vasovagal syncope is imminent (Table 1.2) [1,2]. These prodromes are reported to be more intense than those in elderly patients, perhaps related to more robust autonomic control. However, some young patients have little or no prodromal symptoms or do not recognize them, as during the first episode in this patient. The collapse occurs without warning. The second scenario is syncope at the time of distressing emotional situations or pain, which also appears to be more common in the young. A typical example is an event when a blood sample is being taken. Other emotional triggers reported in young patients include having the hair cut or brushed (as in this case), eye examinations or manipulation, dental procedures, or watching television programs about medical matters or animal biology [1–4].

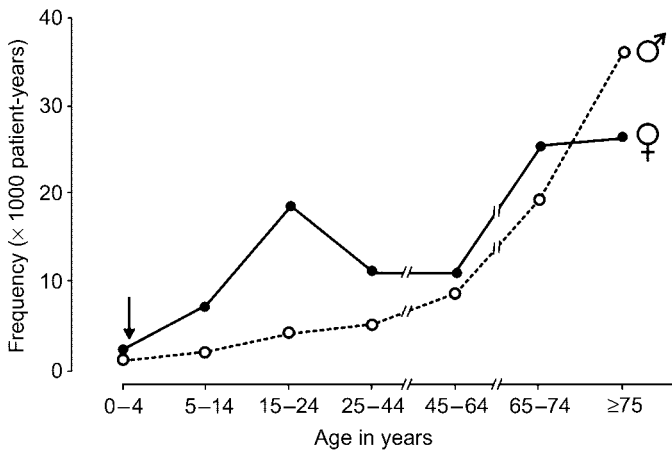
The clinical presentation of vasovagal syncope may vary widely both within and among young patients [1,2]. The trigger may be emotional for one event and

postural for another. Vasovagal episodes may also occur without an identifiable trigger, even in patients who are sitting. Apparently benign vasovagal episodes may also occur during normal daily exercises such as playing, walking, or cycling and even during strenuous exercise. However, when syncope occurs during exercise, a cardiac cause such as a long QT syndrome or catecholaminergic ventricular tachycardia should always be excluded [1,2].

It is important to consider all episodes and not just one unexplained event. When there is a history of typical vasovagal syncope for some of the episodes, the atypical presentations are very likely to be of vasovagal origin as well [1,2]. Events that occur when the patient is supine, in the absence of an emotional stimulus, are unlikely to be vasovagal, but vasovagal syncope during sleep has been described [5]. Additional reflex syncope events that are typical of young patients include initial orthostatic hypotension (see Case 42), adolescent stretch syncope [6], postural tachycardia syndrome, and the fainting lark (see Case 45). “Stretch” syncope may occur during stretching with the neck hyperextended while standing. It is reported to occur in teenage boys with a familial tendency to faint. It has been attributed to the effects of straining (which decreases systemic blood pressure) in combination with decreased cerebral blood flow caused by mechanical compression of the vertebral arteries [6].

The incidence of syncope coming to medical attention appears to be clearly increased in two age groups—the young and the old (Fig. 1.1) [1,7].

A peak in the incidence occurs around the age of 15 years, with girls having more than twice the incidence among boys [8].



**Figure 1.1** Frequency of the symptom of fainting as the reason for presentation in general practices in the Netherlands. The data are drawn from the General Practitioners’ Transition Project, which includes an analysis of 93 297 patient-years. The arrow around 1 year is to indicate that a small peak occurs between 6 and 18 months (breath-holding spells). (Reproduced with permission from [11].)

- bundle-branch block 229–30, 229, 230
  - left 238–40, 239, 240, 260–1, 261, 263–6, 264, 265
  - with negative electrophysiology 234–5, 235
  - with previous myocardial infarction 236–7, 237
  - right 226–8, 227
- bundle-branch reentry 278–82, 278–81
- carcinoid syndrome 276–8, 276, 277
- cardiac arrhythmias 153–5, 153, 154
  - atrial fibrillation 177–9, 177, 178, 206
    - hypertrophic cardiomyopathy 270–1, 270
    - with neuromediated syncope 213–15, 213, 214
    - reflex hypotension 211–12, 211, 212
  - atrial flutter 208–10, 208, 209, 267–9, 268
  - atrioventricular nodal reentry tachycardia 197–9, 198
  - bradycardia-tachycardia syndrome 184–6, 184, 185, 214
  - paroxysmal junctional tachycardia 194–6, 194, 195
  - ventricular fibrillation 154, 187
    - induction during electrophysiological testing 256–9, 257, 258
  - ventricular tachycardia 156–8, 157, 158, 252–5, 253–5
    - bundle-branch reentry 278–82, 278–81
    - catecholaminergic 187–9, 188
    - and effort presyncope 216–18, 216–18
    - idiopathic 216–18, 216–18, 219–21, 220, 221, 223
    - midseptal hypertrophic cardiomyopathy 272–5, 273, 274
    - polymorphic 312–15, 312–14
    - see also torsade de pointes*
- cardiac syncope 41–3, 42, 43
- cardiac tamponade 300–3, 301, 302
- cardioinhibitory mechanisms 41–3, 42, 43
- cardioinhibitory syncope 19–20, 19, 60–1, 60, 61
- complex neurally mediated 104–5, 104, 105
- relapse 94–6, 95
- cardiomyopathy
  - dilated 260–1, 261
  - hypertrophic 267–9, 267, 268
    - with atrial fibrillation 270–1, 270
    - midseptal 272–5, 273, 274
    - obstructive 263–6, 264, 265
- carotid angiography 110, 247
- carotid body paraganglioma 108–10, 108–10
- carotid body tumor 141–3, 142
- carotid hypersensitivity syndrome 106–7, 106
- carotid sinus hypersensitivity 101–3, 101, 102
- carotid sinus massage 99, 104, 106, 108, 109, 113
- carotid sinus syndrome 99–100, 99
  - pacemakers 111–12, 111
- catecholaminergic ventricular tachycardia 187–9, 188
- catheter ablation 216–18, 216–18, 219–21, 220, 221
- children
  - arrhythmic syncope 187–9, 188
  - vasovagal fainting 5–7, 5, 6, 6
- chronic orthostatic intolerance 29–33, 29–31
- chronotropic incompetence 27–8, 28
- clobazam 120–2, 121
- cognitive behavioral therapy 91–3, 92
- congenital long QT syndrome 168–70, 168
  - torsade de pointes* 172–4, 172, 173
- continuous on-screen blood-pressure monitoring 87–8, 88
- convulsive syncope 12–14, 14
- coronary artery occlusion 246–7, 247
- cough syncope 69–70, 69, 70
- defecation syncope 70
- defibrillators 182
- dilated cardiomyopathy 260–1, 261
- drug-induced orthostatic hypotension 120–2, 121
- dysautonomic response 21, 25–6, 25, 104

- effort presyncope 216–18, 216–18
- electroencephalography 34–5, 35
- cardioinhibitory mechanisms 41–3, 42, 43
- electrophysiology tests
- induction of ventricular fibrillation 256–9, 257, 258
  - negative 234–5, 235, 260–1, 261
  - positive 224–5, 224
- epilepsy 10–11, 12–14, 14, 180
- exercise-induced syncope
- long QT syndrome 170–1, 170, 171
  - orthostatic hypotension 47, 131–2, 132
- extra-adrenal pheochromocytoma 110
- eye pressure, and syncope 74–5
- factional disorder 36
- fainting lark 6, 13, 125, 126–7, 127
- febrile illness 159–62, 159–61
- fitness to fly 58–9, 59
- fludrocortisone 135
- fluvoxamine 120–2, 121
- gastroesophageal reflux 62–3, 62
- glossopharyngeal neuralgia 66–8, 66, 67, 107
- glossopharyngeal syncope, transient 66–8, 66, 67
- hand gripping in prevention of syncope 85–6, 85, 86
- head-up tilt test 79–81, 79, 80
- heart block 250–1, 250
- hiatus hernia 64–5, 64, 65
- HIV 165–7, 165, 166
- hyperhidrosis 137–40, 137–9
- hypertrophic cardiomyopathy 267–9, 267, 268, 270–1, 270
- midseptal 272–5, 273, 274
  - obstructive 263–6, 264, 265
- hyperventilation 146
- see also* fainting lark
- hypoadrenergic orthostatic hypotension syndrome 134–6, 135, 136
- hypotension 21–4, 22, 23
- due to straining 144–5
  - orthostatic *see* orthostatic hypotension
  - post-exercise 47
- idiopathic orthostatic intolerance 29–33, 29–31
- idiopathic orthostatic tachycardia 29–33, 29–31
- idiopathic ventricular fibrillation 187
- implantable defibrillator
- left bundle-branch block 238–40, 239, 240, 260–2, 261
  - ventricular tachycardia 252–5, 253–5
- intermittent atrioventricular block 231–3, 231, 232
- International Study of Syncope of Uncertain Etiology (ISSUE) 234, 259
- ischemia-related syncope 243–5, 243, 244, 249
- ischemic heart disease 252–253–5
- Italian protocol 160
- Kearns–Sayre syndrome 283–4, 283
- laughter-induced syncope 71–3, 72
- left atrial thrombus 298–9, 298, 299
- left bundle-branch block 238–40, 239, 240, 260–1, 261, 263–6, 264, 265
- left coronary artery occlusion 246–7, 247
- left fascicular block 226–8, 227
- left ventricular function 260–1, 261
- left ventricular tachycardia 219–21, 220, 221
- leg crossing in prevention of syncope 82–4, 82, 83, 135, 136
- Legionella* pneumonia 131–3, 132
- long QT syndrome 53, 56
- acquired 163–4, 163, 164
  - congenital 168–70, 168
  - torsade de pointes 172–4, 172, 173
  - exercise-induced 170–1, 170, 171
- lyre sign 108
- malignant causes 312–15, 312–14
- mess trick 126
- methadone 165–7, 165, 166
- mineralocorticoids 117–18
- Munchausen syndrome 37
- muscle jerks 12–14, 14
- muscle tensing in prevention of syncope 82–4, 82, 83

- myocardial infarction 248–9, 248, 249  
and complete heart block 250–1, 250  
previous 236–7, 237, 256–9, 257, 258  
myotonic dystrophy 278–82, 278–81
- neck tumor 106–7, 106
- neurally mediated syncope *see* reflex  
syncope
- neurally mediated syncope 159–62,  
159–61  
arrhythmic, in adolescents 200–3,  
201, 202  
with atrial fibrillation 213–15,  
213, 214  
masquerading as unexplained falls  
44–5, 44  
post-exercise 47–8, 49–51, 49, 50  
presenting as paroxysmal  
atrioventricular block 38–40, 39  
nocturnal vasovagal syncope 52–4, 53
- obstructive hypertrophic cardiomyopathy  
263–6, 264, 265
- oculocardiac reflex 74–5
- older patients  
unexplained falls 113–14, 113, 114  
*see also individual conditions*
- orthostatic hypotension 10–11, 159–62,  
159–61  
in adolescents 117–19, 118  
arterial baroreflex failure 141–3, 142  
drug-induced 120–2, 121  
following sympathectomies for  
hyperhidrosis 137–40, 137–9  
pheochromocytoma 147–9, 148  
physical countermeasures 134–6,  
135, 136  
arm tensing 85–6, 85, 86  
hand gripping 85–6, 85, 86  
leg crossing 82–4, 82, 83, 135, 136  
muscle tensing 82–4, 82, 83  
patient training 87–8, 88  
tilt training 89–90, 89  
self-diagnosis 128–30, 129  
standing up from squatting 120–2,  
121, 123–5, 123, 124
- pacemakers  
carotid sinus syndrome 111–12, 111
- hypertrophic cardiomyopathy with left  
bundle-branch block 263–6,  
264, 265  
Kearns–Sayre syndrome 283–4, 283
- pacing 94–6, 95  
biventricular 238–40, 239, 240
- palpitations 184–6, 184, 185, 197–9, 198,  
208–10, 208, 209, 267–9, 267, 268
- paroxetine 200–3, 201, 202
- paroxysmal atrioventricular block  
38–40, 39
- paroxysmal junctional tachycardia  
194–6, 194, 195
- partial dysautonomia 32
- pericardial effusion 300–3, 301, 302
- pharyngodynia 66
- pheochromocytoma 147–9, 148  
extra-adrenal 110
- physical countermeasures 134–6,  
135, 136  
arm tensing 85–6, 85, 86  
hand gripping 85–6, 85, 86  
leg crossing 82–4, 82, 83, 135, 136  
muscle tensing 82–4, 82, 83  
patient training 87–8, 88  
tilt training 89–90, 89
- pipamperone 120–2, 121
- polymorphic ventricular tachycardia  
312–15, 312–14
- post-exercise hypotension 47
- post-exercise neuromediated syncope  
47–8, 49–51, 49, 50
- post-exercise vasovagal syncope 46–8, 46
- postmicturition syncope 70
- postprandial hypotension 11
- postural orthostatic tachycardia  
syndrome 29–33, 29–31
- pregnancy-associated syncope 55–7, 56
- presyncope  
atrial myxoma 295–7, 296  
effort, with ventricular tachycardia  
216–18, 216–18
- prodrome 6, 15
- prolonged monitoring 172–4, 172, 173
- psychogenic reaction 36–7, 37
- psychological treatment 91–3, 92
- pulmonary embolism 307–9, 308
- quantitative sudomotor axon reflex test 32

- radiofrequency ablation 291–2, 293
- rapid ventricular response 270–1, 270
- recurrent syncope 60–1, 60, 61
- reflex hypotension 197–9, 198
- atrial fibrillation 211–12, 211, 212
- reflex syncope
- children and teenagers 5–7, 5, 6, 6
  - older adults 10–11
  - premonitory symptoms 6
- relapse 94–6, 95
- revascularization procedures 250–1, 250
- right bundle-branch block 226–8, 227
- right ventricular tachycardia 216–18, 216–18, 223
- Romano–Ward syndrome *see* long QT syndrome
- self-induced syncope *see* fainting lark
- short QT syndrome 177–9, 177, 178, 187
- spinal-cord lesion 144–5
- squatting, orthostatic hypotension after
- rising from 120–2, 121, 123–5, 123, 124
- straining 144–5
- stretch syncope 6
- subclavian steal syndrome 310–11, 311
- sudden cardiac death 170–1, 170, 172–4, 172, 173, 180–3, 181, 182
- arrhythmic syncope 177–9, 177, 178
  - Brugada syndrome 180–3, 181, 182
  - torsade de pointes* 180–3, 181, 182
- suffocation roulette 126
- swallow syncope
- with asystole 62–3, 62
  - with atrioventricular block 64–5, 64, 65
- sympathectomy 137–40, 137–9
- tachycardia
- atrioventricular nodal reentry 197–9, 198
  - idiopathic orthostatic 29–33
  - ventricular 156–8, 157, 158, 252–253–5
    - bundle-branch reentry 278–82, 278–81
    - catecholaminergic 187–9, 188
    - and effort presyncope 216–18, 216–18
    - midseptal hypertrophic cardiomyopathy 272–5, 273, 274
    - polymorphic 312–15, 312–14
    - wide QRS 291–4, 292, 293
- teenagers *see* adolescents
- thermoregulatory sweat test 32
- thrombus, left atrial 298–9, 298, 299
- tilt-induced syncope *see* tilt-table testing
- tilt-table testing
- cardioinhibitory response 19–20, 19
  - cardioinhibitory syncope 104–5
  - carotid sinus hypersensitivity 101–3, 102
  - carotid sinus syndrome 111
  - chronotropic incompetence 27–8, 28
  - dysautonomic response 25–6, 25
  - electroencephalography 34–5, 35
  - Italian protocol 160
  - mixed response 15–18, 16, 17
  - negative 60–1, 60, 61
  - psychogenic reaction 36–7, 37
  - pure vasodepressor response 21–4, 22, 23
- tilt training 89–90, 89
- tonsillar tumor 107
- torsade de pointes* 163, 164, 165–7, 165, 166, 187, 217, 245
- congenital long QT syndrome 172–4, 172, 173
  - short-coupled variant 175–6, 175, 176, 187
  - sudden cardiac death 180–3, 181, 182
- transient glossopharyngeal syncope 66–8, 66, 67
- transient loss of consciousness 131–3, 132
- treatment
- physical countermeasures
    - arm tensing 85–6, 85, 86
    - hand gripping 85–6, 85, 86
    - leg crossing 82–4, 82, 83
    - muscle tensing 82–4, 82, 83
    - patient training 87–8, 88
    - tilt training 89–90, 89
  - psychological 91–3, 92
- tumors
- atrial myxoma 295–7, 296
  - carcinoid 276–8, 276, 277