Complex Arrhythmias: Self Assessment

Edward K. Chung
Complex Arrhythmias: Self Assessment

157 figures, 1985

KARGER


Edward K. Chung

MD, FACP, FACC, Professor of Medicine,
Thomas Jefferson University;
Director of the Heart Station,
Thomas Jefferson University Hospital, Philadelphia, Pa., USA

National Library of Medicine, Cataloging in Publication
Chung, Edward K.
Complex arrhythmias: self assessment/
Edward K. Chung.Basel;
Bibliography: p. includes index.
1. Arrhythmia-case studies
2. Electrocardiography-case studies
I. Title
WG 330 C559c
ISBN 3-8055-3639-9

Drug Dosage
The author and the publishers have exerted every effort to ensure that drug selection and dosage set forth in this text are in accord with current recommendations and practice at the time of publication. However, in view of ongoing research, changes in government regulations, and the constant
flow of information relating to drug therapy and drug reactions, the reader is urged to check the package insert for each drug for any change in indications and dosage and for added warnings and precautions. This is particularly important when the recommended agent is a new and/or infrequently employed drug.

All rights reserved.
No part of this publication may be translated into other languages, reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, microcopying, or by any information storage and retrieval system, without permission in writing from the publisher.

© Copyright 1985 by
S. Karger AG, P.O. Box, CH-4009 Basel (Switzerland)
Typeset in Hong Kong by Asco Trade Typesetting Limited
Printed in Switzerland by Thür AG Offsetdruck, Pratteln
ISBN 3-8055-3639-9

To my wife, Lisa
and my children, Linda and Christopher

Contents

Abbreviations XII
Preface XIII

Case 1 Sinus rhythm with Wenckebach A-V block in recent diaphragmatic MI 1
Case 2 Mobitz type II A-V block with intermittent demand pacemaker beats and bifascicular block (RBBB with left anterior hemiblock) 3
Case 3 Sinus rhythm with frequent blocked A-V JPCs or RBs 5
Case 4 Sinus rhythm with Wenckebach A-V block with a blocked APC 7
Case 5 Sinus rhythm and frequent APCs with aberrant ventricular conduction 9
Case 6 Atrial impure flutter with frequent aberrant ventricular conduction as a result of Ashman’s phenomenon 11
Case 7 AF with LBBB 13
Case 8 AF with anomalous A-V conduction in WPW syndrome, type-B 15
Case 9 AF with rapid ventricular response and intermittent LBBB 19
Case 10 Bradycardia-dependent RBBB with partial BFB and possible partial TFB (discussion of BBBB) 21
Case 11 Sinus rhythm with intermittent non-paroxysmal A-V JT producing incomplete A-V dissociation (digitalis-induced 25)
Case 12 Atrial flutter-fibrillation with occasional aberrant ventricular conduction as a result of Ashman’s phenomenon 27
Case 13 WPW syndrome, type-A 29
Case 14 Interpolated VPCs with an APC 31
Case 15 Sinus rhythm with Wenckebach A-V block and blocked reciprocal beats associated with intermittent left anterior hemiblock and Chung’s phenomenon (aberrant atrial conduction) 33
Case 16 Sinus tachycardia with 2:1 A-V block and a VPC associated with recent diaphragmatic MI 35
Case 17 Artificial pacemaker-induced ventricular rhythm with atrial capture 37
Case 18 Artificial pacemaker-induced ventricular rhythm (over-driving) with Wenckebach ventriculoatrial block 39
Case 19 Artificial pacemaker-induced ventricular rhythm with Wenckebach ventriculoatrial block and frequent reciprocal beats 41
Case 20 Sinus rhythm with frequent VPCs causing ventricular trigeminy and LBBB 43
Case 21 Sinus rhythm with 2:1 A-V block (intra-His block) 45
Case 22 Sinus rhythm with frequent blocked APCs 47
Case 23 AF with A-V JER due to complete A-V block as a result of digitalis intoxication 49
Case 24 Atrial flutter with 2:1 A-V response 51
Case 25 Sinus rhythm with paroxysmal atrial tachycardia 53
Case 26 Atrial flutter with 2:1 A-V conduction and RBBB associated with pulmonary embolis 55
Case 27 Atrial flutter with 3:1 A-V block 57
Case 28 Atrial tachycardia with non-paroxysmal A-V JT producing complete A-V dissociation in DI 59
Case 29 Sinus bradycardia with intermittent A-V JER producing incomplete A-V dissociation due to SSS 61
Case 30 A-V JT or reciprocating tachycardia 63
Case 31 Atrial flutter with 2:1 A-V conduction associated with recent diaphragmatic and posterior MI 65

VII

Contents

Case 32 Multifocal atrial tachycardia (MAT) associated with COPD 67
Case 33 Left atrial rhythm 69
Case 34 Artificial pacemaker-induced ventricular rhythm with 2:1 electrical alternans 71
Case 35 Two to one ventricular electrical alternans associated with uremic pericardial effusion 73
Case 36 Sinus rhythm with intermittent RBBB and fixed left anterior hemiblock 75
Case 37 Sinus rhythm with atrial bigeminy and demand ventricular pacemaker escape-bigeminy 77
Case 38 BFB (combination of RBBB and left posterior hemiblock) in cardiomyopathy 79
Case 39 Multifocal atrial tachycardia with a VPC 81
Case 40 Sinus rhythm and atrial bigeminy with tachycardia-dependent RBBB 83
Case 41 Paroxysmal A-V junctional tachycardia or reciprocating tachycardia with Wenckebach A-V block in recent diaphragmatic MI 85
Case 42 Sinus rhythm with an APC and intermittent demand pacemaker-induced ventricular rhythm associated with BFB (RBBB with LAHB) 87
Case 43 WPW syndrome, type-A 89
Case 44 Atrial flutter-fibrillation with rapid ventricular response associated with diaphragmatic postero-lateral MI 91
Case 45 Sinus tachycardia with BFB (incomplete RBBB with LAHB) associated with recent posterolateral MI 93
Case 46 Atrial flutter with 2:1 A-V conduction and recent postero-lateral MI associated with BFB (RBBB with LAHB) 95
Case 47 Sinus bradycardia with intermittent non-paroxysmal ventricular tachycardia associated with recent anterior MI 97
Case 48 Non-paroxysmal A-V junctional tachycardia in DI 99
Case 49 Sinus rhythm with LBBB associated with acute diaphragmatic MI 101
Case 50 Sinus rhythm and an interpolated VPC with concealed ventriculoatrial conduction 103
Case 51 AF with anomalous A-V conduction in WPW syndrome, type-A 105
Case 52 Sinus rhythm with first degree A-V block and LBBB associated with 2:1 electrical alternans 107
Case 53 Left atrial rhythm associated with BFB (RBBB with LAHB) 109
Case 54 Sinus bradycardia with intermittent demand ventricular pacemaker rhythm and RBBB 111
Case 55 Sinus rhythm with bilateral bundle branch block (RBBB on one occasion and LBBB on another occasion) 113
Case 56 Sinus tachycardia with 2:1 A-V block associated with acute diaphragmatic MI and old anterior MI 115
Case 57 Sinus rhythm with 4:3 Wenckebach A-V block 117
Case 58 Sinus tachycardia and frequent APCs with aberrant ventricular conduction 119
Case 59 LBBB with primary T wave change suggestive of acute anterior MI 121
Case 60 WPW syndrome, type-A, associated with RBBB 123
Case 61 Sinus bradycardia with ventricular parasystole and RBBB 125
Case 62 Sinus bradycardia with A-V junctional parasystole 127
Case 63 Sinus bradycardia with Wenckebach A-V block and occasional A-V junctional escape beats associated with recent diaphragmatic MI 129
Case 64 Ventricular flutter associated with acute anterior MI 131
Case 65 AF with intermittent bidirectional ventricular tachycardia 133
Case 66 SSS manifested by sinus arrest and intermittent A-V junctional escape rhythm 135
Case 67 Sinus rhythm and frequent APCs producing atrial bigeminy with aberrant ventricular conduction associated with BFB (RBBB with left anterior hemiblock) 137
Case 68 Sinus bradycardia and interpolated APCs with aberrant ventricular conduction 139
Case 69 Pulmonary embolism manifested by marked sinus tachycardia with P-pulmonale and right axis deviation as well as posterior axis deviation of the QRS complexes 141
Case 70 Advanced hyperkalemia-induced ECG abnormalities including tall and peaked T waves and RBBB with diffuse intraventricular block along with flat P waves and first degree A-V block 143
Case 71 Pulmonary embolism manifested by marked sinus tachycardia, APCs, P-pulmonale, RBBB,

VIII

Contents

right axis deviation of the QRS complexes and marked S-T segment depression involving many leads 145
Case 72 WPW syndrome, type-B 147
Case 73 Artifacts due to muscle tremors resembling atrial flutter or runaway artificial pacemaker 149
Case 74 Atrial flutter with Wenckebach A-V response (4:1 and 2:1 alternating conduction ratios) and RBBB associated with antero-septal MI 151
Case 75 Multifocal atrial tachycardia (MAT) 153
Case 76 AF with BFB (combination of RBBB and left anterior hemiblock) 155
Case 77 Sinus rhythm with Wenckebach A-V block and frequent reciprocal (echo) beats 157
Case 78 Sinus rhythm with Wenckebach A-V block and reciprocal beats initiating reciprocating (reentrant) tachycardia 159
Case 79 AF with advanced A-V block causing frequent ventricular escape beats suggestive of SSS 161
Case 80 Sinus rhythm with frequent VPCs producing ventricular bigeminy (descriptions of malignant ventricular arrhythmias) 163
Case 81 Artificial pacemaker-induced ventricular rhythm with dual ventriculoatrial conduction 165
Case 82 Digitalis-induced atrial tachycardia with 6:1 A-V block and frequent VPCs causing ventricular group beats 167
Case 83 Sinus tachycardia with intermittent LBBB 169
Case 84 Sinus rhythm with intermittent non-paroxysmal A-V junctional tachycardia producing incomplete A-V dissociation in digitalis toxicity 171
Case 85 Non-paroxysmal A-V junctional tachycardia or reciprocating tachycardia 173
Case 86 Sinus rhythm and frequent A-V junctional premature contractions (some aberrantly conducted and some blocked) 175
Case 87 Sinus rhythm and intermittent non-paroxysmal ventricular tachycardia with 3:2 Wenckebach exit block 177
Case 88 Sinus rhythm and intermittent reciprocating tachycardia with occasional aberrant ventricular conduction and occasional artificial pacemaker-induced ventricular beats 179
Case 89 Sinus bradycardia with sinus arrest leading to ventricular escape-bigeminy and atrial parasystole in a patient with SSS 181
Case 90 Sinus bradycardia with sinus arrest due to SSS 183
Case 91 A-V junctional escape rhythm 185
Case 92 Sinus rhythm and frequent APCs, some interpolated and some aberrantly conducted 187
Case 93 AF with intermittent accelerated ventricular escape rhythm (intermittent non-paroxysmal ventricular tachycardia) 189
Case 94 Sinus tachycardia with Wenckebach A-V block associated with acute diaphragmatic-lateral MI 191
Case 95 Sinus tachycardia with 4:3 Wenckebach S-A block 193
Case 96 Sinus tachycardia with advanced Mobitz type II A-V block and LBBB associated with frequent accelerated ventricular escape beats 195
Case 97 WPW syndrome, type A 197
Case 98 WPW syndrome, type A associated with RBBB 199
Case 99 Sinus rhythm with atypical Wenckebach (Mobitz type I) A-V block 201
Case 100 Sinus tachycardia with complete A-V block 203
Case 101 Sinus rhythm with congenital complete A-V block 205
Case 102 Artificial pacemaker-induced ventricular rhythm and intermittent atrial 'capture with Wenckebach ventriculoatrial block and frequent reciprocal beats 207
Case 103 A-V junctional parasystole 209
Case 104 Digitalis-induced atrial tachycardia with 2:1 A-V block 211
Case 105 Sinus rhythm with Wenckebach A-V block and intermittent reciprocating tachycardia associated with intermittent RBBB 213
Case 106 Sinus rhythm with intermittent fascicular tachycardia producing incomplete A-V dissociation 215
Case 107 Sinus tachycardia with 3:2 Wenckebach A-V block and RBBB and aberrant ventricular conduction due to Ashman’s phenomenon 217

IX

Contents

Case 108 Sinus bradycardia with diaphragmatic-postero-lateral MI and RBBB 219
Case 109 Acute extensive anterior MI associated with RBBB and low voltage 221
Case 110 Bifascicular block (RBBB with left posterior hemiblock), tall and peaked T waves, diffuse intraventricular block and flat P waves due to advanced hyperkalemia 223
Case 111 Prolonged Q-T interval due to broad and tall T wave as a result of central nervous system disorder 225
Case 112 Sinus tachycardia with diaphragmatic-postero-lateral MI associated with RBBB and low voltage 227
Case 113 RBBB with left posterior hemiblock in a patient with tetralogy of Fallot 229
Case 114 Sinus tachycardia with 6:5 Wenckebach A-V block and a ventricular escape beat 231
Case 115 Sinus tachycardia with varying degree A-V block and intermittent non-paroxysmal A-V junctional tachycardia leading to ventricular standstill 233
Case 116 Torsade de pointes (multiformed ventricular tachycardia) in a patient with acute extensive anterior MI 235
Case 117 Chaotic ventricular rhythm (possible ventricular dissociation) 237
Case 118 AF with A-V junctional escape rhythm due to complete A-V block and frequent VPCs in a patient with digitalis intoxication 239
Case 119 Sinus rhythm and A-V junctional escape rhythm with LBBB associated with ventricular bigeminy 241
Case 120 Sinus rhythm with frequent blocked (non-conducted) APCs 243
Case 121 Sinus tachycardia with frequent VPCs producing ventricular bigeminy 245
Case 122 Atrial flutter-fibrillation with occasional aberrant ventricular conduction as a result of Ashman’s
phenomenon 247
Case 123 Atrial pacing rhythm and RBBB with diaphragmatic and extensive anterior MI associated with post-cardiotomy syndrome 249
Case 124 Sinus rhythm with intermittent RBBB 251
Case 125 RBBB associated with recent diaphragmatic and extensive anterior MI 253
Case 126 AF with very rapid ventricular response 255
Case 127 Supraventricular tachycardia 257
Case 128 Recent diaphragmatic MI associated with LBBB 259
Case 129 Artificial pacemaker-induced ventricular rhythm 3:2 Wenckebach ventriculoatrial block and reciprocal beats 261
Case 130 Multifocal atrial tachycardia (MAT) 263
Case 131 Sinus bradycardia with A-V JER producing incomplete A-V dissociation and occasional aberrant ventricular conduction in a patient with DI 265
Case 132 SSS manifested by sinus bradycardia with occasional ventricular escape beats and VPCs 267
Case 133 SSS manifested by marked sinus bradycardia, A-V junctional escape beats as well as ventricular escape beats, and areas of sinus arrest with AF and VPCs leading to brady-tachyarrhythmia 269
Case 134 SSS manifested by sinus bradycardia, with first degree A-V block, and frequent VPCs with ventricular tachycardia leading to brady-tachyarrhythmia 271
Case 135 SSS manifested by type II S-A block 273
Case 136 SSS manifested by marked sinus bradycardia, S-A block (type II), and frequent ventricular escape beats associated with LBBB 275
Case 137 Sinus rhythm with intermittent LBBB and occasional APCs 277
Case 138 Sinus rhythm with frequent VPCs leading to ventricular trigeminy and intermittent LBBB ... 279
Case 139 Sinus arrhythmia with intermittent WPW syndrome 281
Case 140 Sinus rhythm with intermittent LBBB 283
Case 141 Sinus rhythm with intermittent non-paroxysmal A-V junctional tachycardia producing incomplete A-V dissociation and occasional aberrant ventricular conduction in a patient with DI 285
Case 142 A-V junctional escape rhythm with Wenckebach A-V block and frequent reciprocal beats 287
Case 143 Sinus tachycardia with 5:4 Wenckebach A-V block associated with acute diaphragmatic MI 289
Case 144 Sinus bradycardia with A-V junctional escape-bigeminy and BFB consisting of RBBB and left anterior hemiblock 291
Contents

Case 145 Digitalis-induced AF with bidirectional ventricular tachycardia 293
Case 146 Digitalis-induced double A-V junctional escape rhythms and a reciprocal beat producing incomplete A-V dissociation 295
Case 147 Malfunctioning pacemaker manifested by runaway pacemaker 297
Case 148 Malfunctioning pacemaker manifested by extremely rapid pacing rate (runaway pacemaker) with pre-existing complete A-V block 299
Case 149 Malfunctioning pacemaker manifested by slow and irregular pacing 301
Case 150 Atrial flutter with A-V junctional escape rhythm due to complete A-V block 303

Suggested Readings 305
Subject Index........................................................................................ 307

XI

Abbreviations

AF Atrial fibrillation
AMI Anterior myocardial infarction
APC Atrial premature contraction
AT Atrial tachycardia
A-V Atrioventricular
BBBB Bilateral bundle branch block
BFB Bifascicular block
BTS Brady-tachyarrhythmia syndrome
CAD Coronary artery disease
CCU Coronary care unit
CHF Congestive heart failure
CNS disorder Central nervous system disorder
COPD Chronic obstructive pulmonary disease
DC shock Direct current shock
ER Emergency room
JEB Junctional escape beat
JER Junctional escape rhythm
JPC Junctional premature contraction
JT Junctional tachycardia
LAHB Left anterior hemiblock
LBBB Left bundle branch block
LPHB Left posterior hemiblock
LVH Left ventricular hypertrophy
MI Myocardial infarction
MVPS Mitral valve prolapse syndrome
PAT Paroxysmal atrial tachycardia
RB Reciprocal beat
RBBB Right bundle branch block
RVH Right ventricular hypertrophy
S-A Sino-atrial
SSS Sick sinus syndrome
TFB Trifascicular block
VEB Ventricular escape beat
VER Ventricular escape rhythm
VF Ventricular fibrillation
VPC Ventricular premature contraction
VT Ventricular tachycardia
WPW syndrome Wolff-Parkinson-White syndrome

Preface

It is not my intention to describe every aspect of ECG abnormalities and cardiac arrhythmias. Rather, the primary intention is to include all ECG tracings showing relatively common ECG abnormalities and somewhat complex cardiac arrhythmias which are frequently encountered in our medical practice. Thus, the book is written primarily for busy practicing physicians including family physicians, internists, cardiologists, emergency room physicians and medical house officers as well as cardiology fellows. In addition, medical students, cardiac care nurses and anesthesiologists will obtain great benefit by reading this book. The secretarial activity was carried out cheerfully by Ms. Michele Harvey, the personal
secretary to the author. Her able assistance and efforts have been most valuable in the completion of this book.

It has been my pleasure to share the work to complete this valuable book with the staff of S. Karger Publishers.

Lastly, I will always owe deep gratitude and appreciation to my father, Dr. Il-Chun Chung, who has always provided guidance and inspiration for me.

Bryn Mawr, Pa.

Edward K. Chung, MD

XIII