# Case Studies in Stroke

Neurologists learn from their patients, and this selection of 60 stroke cases will inform and challenge clinicians at all stages in their careers. Including both common and unusual cases, the aim is to reinforce diagnostic skills through careful analysis of individual presenting patterns, and to guide treatment decisions. Each case consists of a clinical history, examination findings and special investigations, usually involving imaging before a diagnosis is given. There then follows for each case a discussion of the clinical issues raised by the case, in which the main teaching points are emphasized. Selected references, frequently including the first description, are provided at the conclusion of each case.

Drawing on the expertise of leading teachers and practitioners, and liberally illustrated, these case studies and the discussions that accompany them are an essential guide to learning the complexity of stroke diagnosis.

**Michael G. Hennerici** is Professor of Neurology at the University of Heidelberg, and Chairman at the Department of Neurology, University Hospital in Mannheim, and the editor, with Stephen Meairs, of *Cerebrovascular Ultrasound; Theory, Practice and Future Developments*, published by Cambridge University Press. He is Chairman of the European Stroke Conference.

**Michael Daffertshofer** is Professor of Neurology at the University of Heidelberg, and former

**Louis Caplan** is Professor of Neurology at Harvard Medical School and Senior Neurologist at Beth Israel Deaconess Medical Center, Boston. He is the editor, with Julien Bogousslavsky, of *Stroke Syndromes* and *Uncommon Causes of Stroke*, both published by Cambridge University Press.

**Kristina Szabo** is Senior Lecturer at the University of Heidelberg, University Hospital in Mannheim and the MR-Neurology Research Unit, and is an expert in neuroimaging.

# Case Studies in Stroke

## Common and Uncommon Presentations

Michael G. Hennerici, M.D.
Department of Neurology
Universitätsklinikum Mannheim
University of Heidelberg
Germany

Michael Daffertshofer, M.D.
Department of Neurology
Universitätsklinikum Mannheim
University of Heidelberg
Germany

Louis R. Caplan, M.D.
Cerebrovascular Division
Beth Israel Deaconess Medical Center
Harvard Medical School, USA

Kristina Szabo, M.D.
Department of Neurology
Universitätsklinikum Mannheim
University of Heidelberg
Germany

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press
The Edinburgh Building, Cambridge CB2 2RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9780521673679



First published 2007

Printed in the United Kingdom at the University Press, Cambridge

*A catalog record for this publication is available from the British Library*

ISBN-13 978-0-521-67367-9 paperback
ISBN-10 0-521-67367-4 paperback



Every effort has been made in preparing this publication to provide accurate and up-to-date information which is in accord with accepted standards and practice at the time of publication. Although case histories are drawn from actual cases, every effort has been made to disguise the identities of the individuals involved. Nevertheless, the authors, editors and publishers can make no warranties that the information contained herein is totally free from error, not least because clinical standards are constantly changing through research and regulation. The authors, editors and publishers therefore disclaim all liability for direct or consequential damages resulting from the use of material contained in this publication. Readers are strongly advised to pay careful attention to information provided by the manufacturer of any drugs or equipment that they plan to use.

To our friends and colleagues in the Department of Neurology, University Hospital, Mannheim, Ruprecht-Karls-University of Heidelberg, who contributed to this book. We gratefully acknowledge their daily enthusiasm and dedication to treat stroke patients, who teach us how to better meet their needs.

# Contents

## The following cases described herein have been published previously

Case 8 Lanczik, O., Szabo, K., Gass, A., & Hennerici, M. G. Tinnitus after cycling. *Lancet* 2003; **362**:292.

Case 13 Amoiridis, G., Wöhrle, J. C., Langkafel, M., Maiwurm, D., & Przuntek, H. Spinal cord infarction after surgery in a patient in the hyperlordotic position. *Anesthesiology* 1996; **84**:228–230.

Case 14 Lie, C., Schwenk, S., Szabo, K., Lanczik, O., Hennerici, M. G., & Gass, A. Bilateral internal carotid artery dissection mimicking inflammatory demyelinating disease. *J. Neuroimaging* 2003; **13**:359–361.

Case 17 Sedlaczek, O., Grips, E., Bäzner, H., Claus, A., Wöhrle, J., & Hennerici, M. Infarction of the central cerebellar arbor vitae and transient loss of spatial orientation. *Neurology* 2005; **65**:168.

Case 18 Binder, J., Pfleger, S., & Schwarz, S. Images in cardiovascular medicine. Right atrial primary cardiac lymphoma presenting with stroke. *Circulation* 2004; **110**:e451–452.

Case 25 Szabo, K., Gass, A., Rossmanith, C., Hirsch, J. G., & Hennerici, M. G. Diffusion- and perfusion-weighted MRI demonstrates synergistic lesions in acute ischemic Foix–Chavany–Marie syndrome. *J. Neurol.* 2002; **249**:1735–1737.

Case 32 Sommer, A., Meairs, S., Gueckel, F., Cornelius, A., & Schwartz, A. Traumatic brachiocephalic pseudoaneurysm presenting with delayed stroke: case report. *Neuroradiology* 2000; **42**:742–745.

Case 36 Kern, R., Kreisel, S., Zoubaa, S., Szabo, K., Gass, A., & Hennerici, M. Cognitive impairment, aphasia, and seizures in a 51-year-old man. *Lancet Neurol.* 2005; **4**:445–450.

Case 52 Gass, A. & Hennerici, M. G. MRI of basilar-artery-aneurysm growth. *Lancet Neurol.* 2003; **2**:128.

# Contributors

Hansjörg Bäzner, M.D.
Rolf Kern, M.D.
Johannes Binder, M.D.
Achim Gass, M.D.
Oliver Sedlaczek, M.D.
Stefan Schwarz, M.D.
Christian Blahak, M.D.
Martin Griebe, M.D.
Christian Sick, M.D.
Johannes Wöhrle, M.D.
Tobias Back, M.D.
Simone Bukow, M.D.
Anastasios Chatzikonstantinou, M.D.
Yaroslav Epifanov, M.D.
Marc Fatar, M.D.
Alex Förster, M.D.
Bianca Götz, M.D.
Eva Grips, M.D.
Micha Kablau, M.D.
Anne-Christine Karow, M.D.
Stefan Kreisel, M.D.
Oliver Lanczik, M.D.
Stephen Meairs, M.D.
Christian Peters, M.D.
Yogesh Shah, M.D.

# Abbreviations

| | |
|---|---|
| ACA | anterior cerebral artery |
| ADC | apparent diffusion coefficient (MRI) |
| aCH | acetylcholine |
| ADEM | acute disseminated encephalomyelitis |
| AO | aorta |
| APL | antiphospholipid antibodies |
| aPTT | activated partial thromboplastin time |
| ASD | atrial septal defect |
| AVM | arteriovenous malformation |
| CAA | cerebral amyloid angioplasty |
| CBF | cerebral blood flow |
| CBS | cystathionine beta synthetase |
| CCF | carotid cavernous fistula |
| CRP | C-reactive protein |
| CSF | cerebrospinal fluid |
| CCT | cranial computed tomography |
| CT | computed tomography |
| CTA | computed tomography angiography |
| CVT | cerebral venous thrombosis |
| CWS | capsular warning syndrome (Donnan syndrome) |
| DCS | decompression sickness |
| DVT | deep vein thrombosis |
| DWI | diffusion-weighted imaging (MRI) |
| ECASS | European Cooperative Acute Stroke Study |
| ECD | extracranial Doppler |
| ECG | electrocardiogram |
| EEG | electroencephalography |
| EP | evoked potential |
| FCMS | Foix–Chavany–Marie syndrome |
| FLAIR | fluid attenuated inversion recovery (MRI) |
| fMRI | functional MRI |
| GCS | Glasgow Coma Score |

| | |
|---|---|
| HITS | high intensity transient signals (Doppler sonography) |
| ICA | internal carotid artery |
| ICH | intracerebral hemorrhage |
| ICU | intensive care unit |
| INR | international normalized ratio |
| MCA | middle cerebral artery |
| MRA | magnetic resonance angiography |
| MRI | magnetic resonance imaging |
| NIHSS | National Institute of Health Stroke Scale |
| NVAF | non-valvular atrial fibrillation |
| PCA | posterior cerebral artery |
| PE | pulmonary embolism |
| PET | positron emission tomography |
| PFO | patent foramen ovale |
| PICA | posterior inferior cerebellar artery |
| PWI | perfusion-weighted imaging (MRI) |
| RCTs | randomized clinical trials |
| rt-PA | recombinant tissue plasminogen activator |
| SAH | subarachnoid hemorrhage |
| SVE | subcortical vascular encephalopathy |
| TCD | transcranial Doppler sonography |
| TEE | transesophageal echocardiography |
| TGA | transient global amnesia |
| TIA | transient ischemic attack |
| VA | vertebral artery |
| WML | white matter lesions |

# Preface

Despite increasing research interest in basic neurosciences, and through randomised clinical trials, case reports remain the daily experience of academic physicians. Stroke is an important and rapidly growing field in neurology and beyond, placing a large burden on patients, relatives and the economy in industrialized societies. Widely disregarded a quarter of a century ago, the diagnostics of brain tissue and vascular structures and classification of stroke subtypes, prognosis and outcome have improved considerably. This has led to better management through very early, specific treatment on stroke units, as well as primary and secondary prevention strategies in subjects at risk. Interdisciplinary work amongst neurologists, who generally lead the stroke team, cardiologists, neurosurgeons, interventional radiologists and physiotherapists, speech therapists, rehabilitation and preventive medicine physicians has created a widespread stroke network around the world. Supported by academic grants, a large scientific community is now involved in international research, and major stroke conferences attract thousands of attendees to exchange their ideas, from bench-to-bedside and vice versa.

Despite these worldwide, interdisciplinary activities, physicians, and neurologists in particular, still enjoy the challenge of evaluating patients who present with diagnostic and therapeutic difficulties. This is reflected by the continued popularity of *Case Histories* and *Case Reports* during the *European Stroke Conference* as well as their presentation in major leading world journals. This is line with earlier authors in stroke history, from the seventeenth century (e.g. J.J. Wepfer and T. Willis) to the present day (e.g. C. Miller-Fisher and J. Marshall), who have contributed to our current understanding based on meticulous history taking and tireless commitment to their patients. Following in their footsteps, members of the Department of Neurology, Mannheim, collected 60 cases, some of which have already been published previously, offering a range of informative presentations with an emphasis of critical aspects in history, examination, investigations, therapeutic decisions, secondary prevention or rehabilitation. Just enough information has been presented in the title of each case (see Contents) to attract the reader's attention without providing give-away clues or a definite diagnosis or management advice if possible. Once the reader has made up his own mind, he

may turn the page and read a brief commentary or summary of the case, accompanied by a short list of references including early descriptions and recent reviews or controversies of the condition discussed as far as they are available. For an outside opinion, Louis Caplan from Harvard Medical School, one of the pioneers of clinical stroke research, kindly agreed to read all the cases carefully, discuss specific aspects in detail as he has been used to throughout his career and suggest occasional re-writing.

These cases are aimed at improving the knowledge of all our medical colleagues interested in stroke. Students and residents will find the exercises in topical and functional diagnosis in common cases of stroke stimulating. The cases are designed to check their individual expertise and knowledge. Physicians with greater neurological expertise will hopefully appreciate the presentation of uncommon cases and may recall similar cases that have challenged them in the past. This book will have achieved its goal if readers at any stage of their career enjoy reading, discussing and following up some of our ideas and thoughts to the benefit of treating their own patients.

Stroke neurology probably represents a unique medical speciality, where systematic thinking based on highly sophisticated neuroanatomy and neurophysiology, and expressed through clinical examination and investigative findings, finds its way into more general medical disciplines. Neurologists are traditionally experts in addressing pathophysiology and differential diagnosis, and are still fascinated by extremely rare illnesses despite serving regularly in emergency and intensive care teams.

We follow the specific techniques of neurology in crystallizing all elements of a complex case into a few informative sentences to help students and residents to increase their skills of analytic listening to the history and the clinical findings. We attempt to quickly localize the site of the lesion, deduce the probable pathophysiological process, formulate a differential diagnosis and estimate the prognosis and outcome once treatment decisions have been established. This approach has been used for all the cases of this book, as it reflects daily practice and is considered to be effective in other disciplines as well.

We gratefully acknowledge the cooperation of the internal medicine physicians, neuroradiologists, neurosurgeons, psychologists and radiologists as well as our emergency and intensive care colleagues in the Universitätsklinikum Mannheim, University of Heidelberg for their continuous support in the care of stroke patients. Some of the cases presented clearly carry their signature, enthusiasm and input in providing and interpreting data and figures collected. Furthermore, we appreciate the careful and continuous support of our secretaries, Birgit Fleig, Maria Garcia-Knapp, and Erika Schneider, in preparing the manuscript and necessary preparation of the book. We offer special thanks to the staff of

Cambridge University Press for their general support and their meticulous editorial work. Last but not least, we are most grateful to our families and partners – without their love and support this book would not have been possible.

We hope that readers will enjoy these cases and that the lessons learned will assist them in providing better care for their patients.

**Michael Hennerici**
**Michael Daffertshofer**
**Louis Caplan**
**Kristina Szabo**