



Sponsored by the
European Association of Neurosurgical Societies

Advances and Technical Standards in Neurosurgery

Edited by

L. Symon, London (Editor-in-Chief)

L. Calliau, Gent

F. Cohadon, Bordeaux

J. Lobo Antunes, Lisbon

F. Loew, Homburg/Saar

H. Nornes, Oslo

E. Pásztor, Budapest

J. D. Pickard, Cambridge

A. J. Strong, London

M. G. Yaşargil, Zurich

Volume 21

Springer-Verlag

Wien New York 1994



With 69 partly coloured Figures

This work is subject to copyright

All rights are reserved, whether the whole or part of the material is concerned, specifically those of translation, reprinting, re-use of illustrations, broadcasting, reproduction by photocopying machine or similar means, and storage in data banks

© 1994 Springer-Verlag/Wien

Library of Congress Catalog Card Number 74-10499

Typesetting: Thomson Press, New Delhi, India

by A. Holzhausens Nfg., A-1070 Wien

Product Liability: The publisher can give no guarantee for information about drug dosage and application thereof contained in this book. In every individual case the respective user must check its accuracy by consulting other pharmaceutical literature.

Printed on acid free and chlorine-free bleached paper

ISSN 0095-4829

ISBN-13: 978-3-7091-7369-5

e-ISBN-13: 978-3-7091-6648-2

DOI: 10.1007/978-3-7091-6648-2

Preface

As an addition to the European postgraduate training system for young neurosurgeons we began to publish in 1974 this series of *Advances and Technical Standards in Neurosurgery* which was later sponsored by the European Association of Neurosurgical Societies.

This series was first discussed in 1972 at a combined meeting of the Italian and German Neurosurgical Societies in Taormina, the founding fathers of the series being Jean Brihaye, Bernard Pertuiset, Fritz Loew and Hugo Krayenbühl. Thus were established the principles of European co-operation which have been born from the European spirit, flourished in the European Association, and have throughout been associated with this series.

The fact that the English language is well on the way to becoming the international medium at European scientific conferences is a great asset in terms of mutual understanding. Therefore we have decided to publish all contributions in English, regardless of the native language of the authors.

All contributions are submitted to the entire editorial board before publication of any volume.

Our series is not intended to compete with the publications of original scientific papers in other neurosurgical journals. Our intention is, rather, to present fields of neurosurgery and related areas in which important recent advances have been made. The contributions are written by specialists in the given fields and constitute the first part of each volume.

In the second part of each volume, we publish detailed descriptions of standard operative procedures, furnished by experienced clinicians; in these articles the authors describe the techniques they employ and explain the advantages, difficulties and risks involved in the various procedures. This part is intended primarily to assist young neurosurgeons in their post-graduate training. However, we are convinced that it will also be useful to experienced, fully trained neurosurgeons.

The descriptions of standard operative procedures are a novel feature of our series. We intend that this section should make available the findings of European neurosurgeons, published perhaps in less familiar languages, to neurosurgeons beyond the boundaries of the authors' countries and of Europe. We will however from time to time bring to the notice of our European colleagues, operative procedures from colleagues in the United

States and Japan, who have developed techniques which may now be regarded as standard. Our aim throughout is to promote contacts among neurosurgeons in Europe and throughout the world neurosurgical community in general.

We hope therefore that surgeons not only in Europe, but throughout the world will profit by this series of Advances and Technical Standards in Neurosurgery.

The Editors

Contents

List of Contributors	XIII
----------------------------	------

A. Advances

Biological Markers for Tumours of the Brain. By G. J. PILKINGTON and P. L. LANTOS, Department of Neuropathology, Institute of Psychiatry, London (U.K.)	3
Classification of Brain Tumours	4
General Features of Brain Tumours	5
Investigative and Diagnostic Neuro-Oncology Techniques	6
1. Tumours of Neuroepithelial Tissue	12
1.1. Astrocytic Tumours	12
Astrocytomas	14
Anaplastic (Malignant) Astrocytomas	15
Glioblastoma Multiforme	15
Pilocytic Astrocytomas	17
Pleomorphic Xanthoastrocytomas	17
Subependymal Giant Cell Astrocytomas	18
1.2. Oligodendroglial Tumours	18
1.3. Ependymal Tumours	21
1.4. Choroid Plexus Tumours	21
1.5. Neuronal and Mixed Neuronal-Glial Tumours	23
Dysembryoplastic Neuroepithelial Tumour (DNT)	23
Ganglioglioma	24
Desmoplastic Infantile Ganglioglioma	25
Central Neurocytoma	25
1.6. Pineal Tumours	25
1.7. Embryonal Tumours	26
Primitive Neuroectodermal Tumours (PNETs)	26
Neuroblastomas	28
2. Tumours of Cranial and Spinal Nerves	28
2.1. Schwannomas	28
2.2. Neurofibroma	28
3. Tumours of the Meninges	29
3.1. Meningiomas	29
3.2. Mesenchymal, Non-Meningothelial Tumours	29
Haemangiopericytomas	29

3.3. Tumours of Uncertain Histogenesis	30
Capillary Haemangioblastomas	30
4. Haemopoietic Neoplasms	31
Primary Malignant Lymphomas	31
5. Germ Cell Tumours	31
6. Pituitary Adenomas	32
7. Local Extension from Regional Tumour	32
8. Metastatic Tumours	33
References	33
Histoprognosis of Gliomas. By C. DAUMAS-DUPOINT, Centre Hospitalier Sainte-Anne, Paris (France)	43
Introduction	43
Historical Considerations	44
Intra-tumoral Heterogeneity of Gliomas	46
Intra-tumoral Heterogeneity and Structure Type of Gliomas	47
Structure Type of Gliomas and Imaging	50
Structure Type of Gliomas and Treatment Planning	51
Structure Type and Spatial Kinetics of Gliomas	52
Intra-tumoral Heterogeneity and Tumor Progression: Recent Molecular Biology Data	55
Intra-tumoral Morphological Heterogeneity of Gliomas: Issue of Sampling	56
Current Problems in Histological Typing of Glial Neoplasms	57
Histological Typing of Astrocytomas	58
Pilocytic Astrocytomas versus Ordinary Astrocytoma Cell Types	58
Microcystic Cerebellar Astrocytomas versus Pilocytic Astrocytomas	59
Histological Typing of Oligodendrogliomas	60
Histological Grading System of Astrocytomas	63
Histological Grading of Oligodendrogliomas	66
Histological Typing and Grading in Childhood Gliomas	69
References	72
Brain Protection. By F. COHADON, Clinique Universitaire de Neurochirurgie Hôpital Pellegrin Tripode, Bordeaux (France)	77
I. Introduction: Historical Perspective	78
II. Pathophysiology of Brain Insults	80
1. Aspects of Brain Ischemia	80
Energy Production in the Normal Brain	80
Thresholds and Duration of Ischemia	81
Global Ischemia and Delayed Neuronal Death	82
Focal Ischemia and the “Penumbra” Zone	83
2. Secondary Brain Damage	84
Evolution of Primary Insult	84
Secondary Insults	86
3. Ischemic and Traumatic Insults: Common Mechanism	86

III. Mechanisms of Damage and Related Protections	87
1. Energy Failure and Metabolic Protection	88
Barbiturates and Similar Drugs	89
Hypothermia	90
2. Ca ⁺⁺ Damage, Excitotoxic Mechanisms and Related Therapies ...	92
Mechanism of Ca ⁺⁺ Increased Cytosolic Concentrations	93
Consequences of Increased Cytosolic Ca ⁺⁺ Concentration	97
Evidence of Ca ⁺⁺ Damage in CNS Injuries	100
Pharmacologic Protection Against Ca ⁺⁺ Overload	101
3. Peroxidative Damage and Antioxidant Therapy	104
Free Radical Reactions	105
Origin of Free Radicals in CNS Injury	106
Evidence of Free Radicals Injury in CNS Insult	107
Therapies Against Free Radicals	108
4. Acidotic Damage and Antiacidotic Therapies	110
5. Miscellaneous Mediators of Brain Damage and Neuroprotective Agents	111
IV. Acute Brain Insults and Attempts at Protection	112
1. Intraoperative Brain Protection	113
Cardiovascular Surgery	113
Carotid Surgery	113
Aneurysm Surgery	114
2. Subarachnoid Haemorrhage	115
3. Stroke	116
4. Brain Trauma	117
5. Spinal Trauma	120
V. Concluding Remarks	120
1. Relevance of Experimental Research	121
2. Methodology of Clinical Trials	122
3. Overall Philosophy of Brain Protection	123
References	126

B. Technical Standards

AIDS and the Neurosurgeon – an Update. By S. F. CIRICILLO and M. L. ROSENBLUM, Department of Neurological Surgery, School of Medicine, University of California, San Francisco, CA, and Department of Neuro- logical Surgery, Henry Ford Medical Center, Detroit, MI (U.S.A.) .	155
Summary	155
Introduction	156
Incidence and Epidemiology	157
Neurologic Manifestations	158

Intracranial Mass Lesions	162
Nonviral Infections	163
Cryptococcal Infection	163
Toxoplasmosis	163
Other Fungal Infections	165
Neoplasms	165
Primary CNS Lymphoma	165
Metastatic Neoplasms	168
Cerebrovascular Diseases	168
Viral Infections	169
Progressive Multifocal Leukoencephalopathy	169
Multiple CNS Diseases	169
Peripheral Neuropathic Syndromes	172
Evaluation of the Symptomatic Patient	172
Algorithms to Evaluate the AIDS Patient with Neurologic Symptoms	176
Impact of AIDS on Neurosurgical Practice	178
References	179

The Surgery of Occult Spinal Dysraphism. By M. CHOUX, G. LENA, L. GENITORI, and M. FOROUTAN, Department of Pediatric Neurosurgery, Hôpital des Enfants, La Timone, Marseille (France)	183
--	-----

Introduction	183
Embryology and Foetal Development of the Spinal Cord. Pathogenesis of Malformations	185
I A. Neurulation	185
I B. Deranged Neurulation	185
II A. Canalization and Retrogressive Differentiation	189
II B. Deranged Canalization and Retrogressive Differentiation	190
Classification	190
Age and Sex Distribution	193
Clinical Presentation	194
Indications for Investigations	201
The Lesions	205
I. Spinal Lipomas	205
II. Anomalies of the Spinal Cord and Roots	216
A. Adhesions and Bands	216
B. Tight Filum terminale	217
C. Diastatomyelia and Diplomyelia	218
III. Anterior Meningoceles	224
IV. Dermal Sinus	227
V. Neurenteric Cysts	230
VI. Sacral Agenesis	230
Conclusion	232
References	233

Functional Stereotactic Neurosurgery for Psychiatric Disorders: an Experience in Belgium and The Netherlands. By P. COSYNS¹, J. CAEMAERT², W. HAAIJMAN³, C. VAN VEELEN⁴, J. GYBELS⁵, J. VAN MANEN⁶, and J. CEHA⁷,
¹ University of Antwerpen, Psychiatrist, Antwerp (Belgium), ² University Hospital of Gent, Neurosurgeon, Ghent (Belgium), ³ Hospital for Psychotherapy “Overwaal”, Psychiatrist, Lent (The Netherlands), ⁴ University Hospital of Utrecht, Neurosurgeon, Utrecht (The Netherlands), ⁵ Catholic University of Leuven, Neurosurgeon, Louvain (Belgium), ⁶ Academic Medical Center, Amsterdam, and University Hospital of Groningen, Neurologist, Groningen (The Netherlands), ⁷ Psychiatric Hospital “Ursula Kliniek”, Psychiatrist, Wassenaar (The Netherlands) 239

Preface 242

1. Principles of Psychosurgery 242

 1.1. Introduction 242

 1.2. Historical Overview 244

 1.3. Patient Data 246

 1.4. Ethical and Legal Issues 247

 1.5. Committee on Psychosurgery 248

 1.6. Committee on Psychosurgery: Patient Material 249

2. Stereotactic Techniques 251

 2.1. Psychosurgery in Obsessive Compulsive Disorder 251

 2.1.1. Introduction 251

 2.1.2. Anterior Capsulotomy (AC): the Operative Technique Followed by Caemaert 251

 2.1.3. Subcaudate Tractotomy (SCT) 255

 2.1.4. Surgical Complications of Subcaudate Tractotomy 259

 2.1.5. Technique of Progressive Leucocoagulation Followed by van Veelen and Haaijman 259

 2.2. Psychosurgery in Aggressive Conduct Disorder 262

 2.2.1. Intralaminar (i.La.) and Dorsomedial (MD) Thalamotomy .. 262

 2.2.2. Amygdalotomy 266

3. Patients with Obsessive Compulsive Disorder (OCD) 269

 3.1. Patient Data 269

 3.2. Post-Operative Psychiatric Evaluation 270

 3.3. Comparison of the Results of the Two Stereotactic Techniques (SCT and PL) 271

 3.4. Post-Operative Psychiatric Evaluation: Particular Clinical Observations 273

4. Aggressive Conduct Disorder in Patients with Mental Retardation (IQ 50) 274

 4.1. Patient Data 274

 4.2. Post-Operative Psychiatric Follow-up 275

References 275

Subject Index 281

List of Contributors

- Caemaert, J., MD, University Hospital of Gent, Neurosurgeon, Ghent, Belgium.
- Ceha, J., MD, Psychiatric Hospital "Ursula Kliniek", Psychiatrist, Wassenaar, The Netherlands.
- Choux, M., MD, Professor, Service de Neurochirurgie Pédiatrique, Centre Hospitalier Régional et Universitaire de Marseille, Hôpital des Enfants de la Timone, Bd Jean Moulin, F-13385 Marseille, Cedex 5, France.
- Ciricillo, S. F., MD, Department of Neurological Surgery, The Editorial Office, 1360 Ninth Avenue, Suite 210, University of California, San Francisco, CA 94122, U.S.A.
- Cohadon, F., MD, Professor. Clinique Universitaire de Neurochirurgie, Hôpital Pellegrin Tripode, F-33076 Bordeaux, France.
- Cosyns, P., MD, Universitair Ziekenhaus Antwerpen, Wilrykstraat 10, B-2520 Edegem, Antwerp, Belgium.
- Daumas-Duport, C., MD, Professor, Service de Neurochirurgie, Centre Hospitalier Sainte-Anne, 1 rue Cabanis, F-75674 Paris, Cedex 14, France.
- Foroutan, M., MD, Service de Neurochirurgie Pédiatrique, Centre Hospitalier Régional et Universitaire de Marseille, Hôpital des Enfants de la Timone, Bd Jean Moulin, F-13385 Marseille, Cedex 5, France.
- Genitori, L., MD, Service de Neurochirurgie Pédiatrique, Centre Hospitalier Régional et Universitaire de Marseille, Hôpital des Enfants de la Timone, Bd Jean Moulin, F-13385 Marseille, Cedex 5, France.
- Gybels, J., MD, Catholic University of Leuven, Neurosurgeon, Louvain, Belgium.
- Haaijman, W., MD, Hospital for Psychotherapy "Overwaal", Psychiatrist, Lent, The Netherlands.
- Lantos, P. L., MD, DSc, FRCPath, Professor, Department of Neuropathology, Experimental Neuro-Oncology Group, Bethlem Royal Hospital, University of London, De Crespigny Park, Denmark Hill, London, SE5 8AF, U.K.
- Lena, G., MD, Service de Neurochirurgie Pédiatrique, Centre Hospitalier Régional et Universitaire de Marseille, Hôpital des Enfants de la Timone, Bd Jean Moulin, F-13385 Marseille, Cedex 5, France.
- Van Manen, J., MD, Academic Medical Center, Amsterdam, and University Hospital of Groningen, Neurologist, Groningen, The Netherlands.
- Pilkington, G. J., Ph.D., MIBiol, MRCPath, Department of Neuropathology, Experimental Neuro-Oncology Group, Bethlem Royal Hospital, University of London, De Crespigny Park, Denmark Hill, London, SE5 8AF, U.K.
- Rosenblum, M. L., MD, Department of Neurological Surgery, The Editorial Office, 1360 Ninth Avenue, Suite 210, University of California, San Francisco, CA 94122, U.S.A.
- Van Veelen, C., MD, University Hospital of Utrecht, Neurosurgeon, Utrecht, The Netherlands.