

Konstantinos Fountas  
Eftychia Z. Kapsalaki *Editors*

# Epilepsy Surgery and Intrinsic Brain Tumor Surgery

A Practical Atlas

 Springer

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Editors

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*To Evie*

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## Foreword

Epilepsy surgery and intrinsic brain tumor surgery share overlapping problems. While neurosurgeons specializing in glioma surgery nowadays know about mapping of brain function, they will not automatically know about the specific problems of epilepsy surgery related to intrinsic brain tumors. Drug-resistant epilepsy is a good indication for a surgical approach, and it is usually performed by specialized members of the neurosurgical team. Whereas the brain tumor surgeon focuses on preservation of function plus complete removal of the tumor, the epilepsy surgeon does the same but also focuses on removal of the epileptogenic area. So the tasks in the two fields are not identical. This book is devoted to the coverage of both, typical brain tumor problems plus the identification and safe removal of the epileptogenic focus related to brain tumors.

Twenty to 30% of all epilepsy surgery cases have involved tumors, mostly those well known to occur in association with drug-resistant epilepsy that in the past were termed long-term epilepsy-associated tumors (LEAT) or more recently low-grade epilepsy-associated tumors. These tumors tend to be more benign; however, a small proportion can turn out to be malignant in the long run. Therefore, complete tumor removal remains an aim also in the field of epilepsy surgery, just like in “normal” intrinsic brain tumor surgery.

Several chapters are devoted to modern diagnostic methods. The two main techniques for functional localization—extraoperative mapping with implanted electrodes and awake craniotomy—are covered, and, in fact, both techniques can also be used for conventional tumor surgery without the presence of drug-resistant epilepsy. For drug-resistant epilepsy, however, they are indispensable.

The book also covers the spectrum of epilepsy surgery including very recently introduced techniques such as responsive stimulation, and it devotes several chapters to specific types of gliomas that may pose specific problems as in insular gliomas.

The covered topics will be of interest for both tumor surgeons and epilepsy surgeons. The book has the potential to increase the interest of brain tumor surgeons in the necessity of including aspects of how to remove the epilepsy focus in low-grade brain gliomas, which are frequently associated with seizures even if these seizures are not drug resistant. The book is thus a contribution to abolish the mental barrier between “pure” glioma surgery and glioma surgery for epilepsy.

Bonn, Germany

Johannes Schramm

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## Foreword

This book bundles the knowledge and experience of about 40 renowned specialists in the diagnosis, clinical and preoperative setup, and therapy of patients with epilepsy and brain tumors. The editors are Eftychia Kapsalaki (neuroradiologist) and Kostas Fountas (neurosurgeon), both from the University Hospital of Larisa connected to the University of Thessaly in Greece, but both trained in the United States and authorities in their specialty. Not surprisingly, about one third of contributors are Greek, but many authors come from other European countries (Belgium, Croatia, Finland, France, Germany, Italy, Spain, and the United Kingdom), Israel, and the United States. The authors are radiologists, physicists, neurologists, epileptologists, neurosurgeons, and neuro-oncologists (Greece).

The focus of the book is the multidisciplinary diagnostic and therapeutic approach of patients with brain tumors and epilepsy in order to achieve better and safer outcome.

In the preoperative neuroimaging of patients with brain tumors and epilepsy, emphasis is on magnetic resonance imaging (MRI). Both conventional MR imaging as well as advanced imaging techniques such as diffusion-weighted imaging, perfusion imaging, diffusion tensor imaging, and functional MR are discussed in detail. Other novel nonradiological diagnostic preoperative examinations such as magnetoencephalography, surface electroencephalography, cortical stimulation, and others are described.

The therapeutic part of the book discusses all recent techniques such as neuronavigation, intraoperative imaging, stimulation techniques, and all available nonsurgical additional treatment modalities.

The editors should be congratulated not only for their personal input but above all for the excellent choice of authors and the high quality of the contributions.

Emeritus Guido Wilms  
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Leuven, Belgium

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## Preface

«Περὶ μὲν τῆς ἱερῆς νούσου καλεομένης ὧδ' ἔχει· οὐδὲν τί μοι δοκεῖ τῶν ἄλλων θειοτέρῃ εἶναι νούσων οὐδέ ἱερωτέρῃ, ἀλλὰ φύσει μὲν ἔχει ἢν καὶ τὰ λοιπὰ νουσήματα, ὅθεν γίνεται.»

*Ἱπποκράτης (460–370 ΠΧ), Περὶ ἱερῆς νούσου*

*“In regard to the so-called “sacred disease,” the situation is the following: this disease is not more sacred or God-given than any other disease, according to my opinion. Contrariwise, it has exactly the same nature, and the same origin as any other disease.”*

*Hippocrates (460–370 BC), About Sacred Disease*

Since the Hippocratic era, the association of epilepsy and brain pathological conditions has been well established. It required, however, several centuries and significant work on animal and human anatomy and physiology before John Hughlings Jackson (1835–1911) postulated that brain tumors might cause focal epilepsy. He observed and described in 1890 olfactory seizures in a patient with a tumor in the right temporo-sphenoidal area and abnormal sensations of smell and taste in a patient with a temporal lobe tumor. His pioneering concept, that epilepsy is a symptom rather than a disease itself, radically changed our approach to the diagnosis and the management of epilepsy.

The recent advances in neuroimaging with the wide clinical application of magnetic resonance (MR) imaging, and all the MR-based imaging modalities provide the opportunity for an early and accurate diagnosis in the majority of epilepsy cases. Furthermore, the emerging hybrid imaging modalities, in which functional parameters are superimposed on highly accurate anatomical imaging studies, allow the identification and the localization of an underlying epileptogenic focus, even in cases in which all structural imaging studies appear normal.

These imaging advances along with the evolution of intraoperative neurophysiological stimulation and mapping techniques, as well as the wide clinical application of neuro-navigational devices, allow the safe and aggressive resection of intrinsic brain tumors and the successful management of the associated epilepsy. Moreover, many of these surgical strategies are applicable even in cases of nonlesional epilepsy, when no anatomical abnormalities can be identified despite the exhaustive preoperative imaging workup of these patients. It has become evident in the past years that techniques from the field of epilepsy surgery can be easily transplanted to that of tumor surgery and vice versa.

The purpose of our current atlas is to serve exactly this emerging need for providing a systematic approach for all the available diagnostic and therapeutic modalities for safely managing patients with gliomas and/or epilepsy. The atlas describes in a practical, reader-friendly way all the currently available diagnostic methodologies for establishing an accurate diagnosis in cases of suspected tumor or in cases of epilepsy. In addition, it explores the exact role of all these methodologies in the presurgical planning of these cases. The contemporary intraoperative and extraoperative stimulation and mapping techniques, along with all the available resection surgical techniques, are also presented. The surgical management of gliomas is presented based on their anatomical location, since certain anatomical areas present certain technical difficulties.



We hope that you will find our publishing effort helpful in the management of patients with intracranial gliomas and/or epilepsy. If our current atlas assists you in improving the way you approach these challenging cases, then our goal has been achieved.

Larisa, Greece  
Larisa, Greece

Eftychia Z. Kapsalaki  
Konstantinos N. Fountas

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## Contents

<b>1 Brain-Tumor Related Epilepsy</b> .....	1
Efthimios Dardiotis, Maria Sokratous, Katerina Markou, and Georgios M. Hadjigeorgiou	
<b>2 The Role of Diffusion Weighted and Diffusion Tensor Imaging in Epilepsy</b> .....	9
Dimitra Tsivaka, Patricia Svolos, Eftychia Z. Kapsalaki, and Ioannis Tsougos	
<b>3 Functional MRI in Epilepsy</b> .....	25
Sotirios Bisdas, Ayisha Al-Busaidi, Laura Mancini, Loizos Siakallis, and Adam Kenji Yamamoto	
<b>4 Imaging with PET/CT in Patients with Epilepsy</b> .....	45
Nikoletta Pianou and Sofia Chatziioannou	
<b>5 Applications of Magnetoencephalography in Epilepsy and Tumor Surgery</b> .....	51
Panagiotis G. Simos, Roozbeh Rezaie, and Andrew C. Papanicolaou	
<b>6 Navigated Transcranial Magnetic Stimulation in Planning Epilepsy Surgery</b> .....	67
Pantelis Lioumis and Jyrki P. Mäkelä	
<b>7 Neuropsychological Evaluation of Patients with Intrinsic Brain Tumors</b> .....	75
Cristina Ramirez-Aubone and Gregory P. Lee	
<b>8 Intracranial Electrode Investigations in the Presurgical Evaluation of Drug-Resistant Epilepsy</b> .....	89
Kyriakos Garganis	
<b>9 Invasive Electroencephalography in Epilepsy</b> .....	107
Demitre Serletis	
<b>10 Stereo-Electroencephalography (SEEG) in the Diagnosis and Evaluation of Medically Intractable Epilepsy</b> .....	115
João Paulo Sant’Ana Santos de Souza and Jorge Gonzalez-Martinez	
<b>11 Extraoperative Cortical Stimulation and Mapping</b> .....	127
Konstantinos N. Fountas and Joseph R. Smith	
<b>12 Awake Craniotomy: Cortical and Subcortical Mapping for Glioma Resection</b> .....	137
Shawn L. Hervey-Jumper and Mitchel S. Berger	
<b>13 Neocortical Resections</b> .....	147
Hans Clusmann	
<b>14 Anterior Temporal Lobectomy and Amygdalo-Hippocampectomy</b> .....	165
Antonio Gonçalves-Ferreira	

<b>15</b>	<b>Selective Amygdalohippocampectomy</b> .....	175
	Dirk Van Roost	
<b>16</b>	<b>Radiating Multiple Subpial Transection: Operative Techniques, Complications and Outcomes</b> .....	183
	Dorota Tassigny, Riëm El Tahry, Géraldo Vaz, Susana Ferrao Santos, Kenou van Rijckevorsel, and Christian Raftopoulos	
<b>17</b>	<b>Corpus Callosotomy</b> .....	189
	Stephen K. Mendenhall, Rahul K. Ahluwalia, and Nicholas M. Barbaro	
<b>18</b>	<b>Vagus Nerve Stimulation for Refractory Epilepsy</b> .....	197
	Tomislav Sajko and Krešimir Rotim	
<b>19</b>	<b>Responsive Stimulation in the Management of Medically Refractory Epilepsy</b> .....	205
	Robert A. McGovern, Garrett P. Banks, and Guy M. McKhann II	
<b>20</b>	<b>Image-Guided Robotic Radiosurgery for the Treatment of Drug-Refractory Epilepsy</b> .....	213
	Pantaleo Romanelli and Alfredo Conti	
<b>21</b>	<b>Surgical Resection Techniques of Central Area Gliomas</b> .....	225
	Michael Sabel, Marion Rapp, Maria Smuga, and Marcel A. Kamp	
<b>22</b>	<b>Surgical Management of Occipital Gliomas</b> .....	239
	Thanasis Paschalis and Konstantinos N. Fountas	
<b>23</b>	<b>Surgical Resection Techniques of Insular Gliomas</b> .....	245
	Abraham Tsitlakidis and Nicolas Foroglou	
<b>24</b>	<b>Systemic Chemotherapy in Brain Gliomas</b> .....	261
	George A. Alexiou and Athanasios P. Kyritsis	
<b>25</b>	<b>Novel Focal Treatment Modalities in Glioma Management</b> .....	269
	Shamik Chakraborty, Katherine Wagner, John Boockvar, and Michael Schulder	
<b>26</b>	<b>Management of Glial Tumor Recurrence</b> .....	281
	Konstantinos N. Fountas and Eftychia Z. Kapsalaki	
	<b>Index</b> .....	293

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