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Microsurgery of the Temporo-Medial Region

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To Christine, Raffaele, Prisca, and Fulvia

Foreword

Although in the last few years more experience in the field of epilepsy surgery with amygdalo-hippocampectomies was gained in several hospitals, a detailed microanatomical and microsurgical description meeting the requirements of the modern neurosurgeon has not been achieved so far. Recently the allocortex – the so-called “limbic system” – has doubtlessly received more attention, as can be gathered from the recently published monography by Duvernoy, which however only considers anatomical points of view. Lately not only epilepsies but also tumorsurgical operations on the border between temporal lobe and basal ganglia can be – thanks to modern MR-examinations – carried out more exactly. Here the tumor-conditioned deformations of the temporo-medial area and its connections with the adjacent basal ganglia as well as their blood supply are of great importance. Using conventional techniques the postoperative morbidity was especially high until recently.

The author has at the suggestion of his teacher G. M. Yaşargil approached the problem first of all morphologically by developing his own techniques of brain dissection. After some developmental and topographic-anatomical descriptions he has described the vessel-supply by using injection-preparations. Particular aspects of A. chorioidea ant. with her lateral, medial and Tractus opticus penetrating perforating arteries to the basal ganglia and Capsula int. have never been described in such a convincing manner before.

It is of great importance in the operative removal of the amygdalo-hippocampal area to realize that it is not sufficient to preserve the A. chorioidea ant. alone but to preserve the small perforators running to the optic tract, and supplying also the capsular area and the basal ganglia beyond the tract. So the good operative results reported become comprehensible. In addition to a clear description of functional, clinical and anatomical points the book has the aim to deduce the resulting operative techniques, while different procedures allow – according to individual anatomical details – special modifications. All procedures include the essential principle of cutting the fiber connections of the temporal lobe at the „mouth of the Sylvian fissure“ between the optic tract and the inferior ventricular horn as well as the connection between lateral and posterior Sylvian area and the roof of the ventricle which in conventional neurosurgery are carried out only with the

greatest reservations and are moreover only possible by considering the mentioned morphological aspects. Such approaches allow the direct loosening of the allocortex without having to extirpate the whole temporal lobe.

One may object that in such an operation the temporal lobe will lose essential connections to the surrounding cerebral structures anyway. Realizing that this planned approach which has been used already by Yaşargil with great success, preserves the whole blood-supply of the temporal lobe and so the vessel-supply of the surrounding structures, it becomes clear, that there is little danger of a postoperative oedema and consecuting infarction of surrounding brain.

Everyone performing epilepsy-surgery today should use this book just as the publications of Yaşargil as a basis for information, because the microanatomical details, the functional connections and the operative techniques are described here in a successful and convincing manner.

W. Seeger

Preface

Our understanding of the structure and function of the temporal lobe has evolved in parallel with the concept of the development of the hippocampus from a phylogenetically ancient area related to olfaction, to the core of a neural system underlying memory processing and emotion. A major turning point was the translation of basic biophysical and biochemical data, stemming from animals and cellular studies, into models for epileptogenesis in humans. These advances created a need for ablative procedures able to remove selectively the medio-basal limbic focus without damage to the surrounding areas of the temporal lobe. The development of selective amygdalohippocampectomy as a surgical treatment for medio-basal (limbic) epilepsy represents one consequence of these rationales.

Although investigation of the limbic structures has been focused on epileptogenesis, it is increasingly evident that a fundamental distinction should be made between the medio-basal (allocortical) and the lateral (neocortical) temporal areas, not only in connection with the evaluation and treatment of functional disorders, but also in order to achieve adequate management of conventional pathological processes. Indeed, the phylogenetic, ontogenetic and physiological aspects distinguishing the two areas of the temporal lobe converge to underlie different categories of lesion. While temporo-lateral lesions usually coincide with a structural abnormality, temporo-medial lesions regularly consist of both a morphological and a functional component.

In recent years, neuroimaging and invasive evaluation have expanded considerably our understanding of temporo-medial lesions, but also raised new challenges that require improvements in our approach to this area.

The major object of this study is to analyse the medial part of the temporal lobe as a distinct surgical region. The first section describes the morphology of the temporo-medial region from a developmental, topographical and microsurgical point of view.

The second section is devoted to a simplified analysis of the clinical manifestations, so as to provide a guideline for the interdisciplinary planning of invasive procedures.

The third section describes the ancillary investigations which are indispensable for characterizing the structural and functional features of temporo-medial lesions. In discussing neuroimaging, special atten-

tion is paid to its anatomical aspects, considered as a basis for surgical strategies. With regard to invasive methods for evaluating lesions, we confine ourselves to those few, that can be easily applied to large collectives, and which provide sufficient information in the majority of cases.

The fourth section deals with the surgical aspects of temporo-medial lesions, and especially with the selection of the optimal approach having regard to the location of a given process, and to the extent of the functional changes. The last section is devoted to commentaries concerning the neuropathological aspects and the outcome of surgery in the temporo-medial region.

I am particularly grateful to Professor H. Dietz (Director of the Neurosurgical Department MHH, Hannover) for having given me the opportunity to investigate surgical approaches to the temporo-medial area and to Professor H. G. Wieser, Zürich, for his encouragement and physiological advice when I was introducing invasive investigations at the Medical School in Hannover.

I am deeply indebted to Professor G. F. Walter (Director of the Neuropathological Department MHH, Hannover) who provided the anatomical material and helped me to clarify the neuropathological aspects.

I am also thankful to Professor H. Künkel (Director of the Neurological Department MHH, Hannover), to Dr. K. Weissenborn and to Dipl. Psychol. N. Rückert for the neurophysiological and the neuropsychological evaluation of the present series and for the important stimuli they provided during the preparation of this study.

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