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Prognostic factors for surgery of neocortical temporal lobe epilepsy

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Summary

Objectives: In the current classification of epilepsies two forms of temporal lobe epilepsy (TLE) were included: mesial and lateral (neocortical) TLE. We aimed at identifying prognostic factors for the surgical outcome of lesional neocortical TLE.
Methods: We included consecutive patients who had undergone presurgical evaluation including ictal video-EEG and high-resolution MRI, who had TLE due to neocortical lateral epileptogenic lesions, who had a lesionectomy and who had >2-year follow-up.
Results: There were 29 patients who met the inclusion criteria. Twenty of them became postoperatively seizure-free. Patients' mean age was 34.8 ± 9 years (range 18–52). The age at epilepsy onset was 20.1 ± 8 years. We found that left-sided surgery ($p = 0.048$) and focal cortical dysplasia (FCD) on MRI ($p = 0.005$) were associated with non-seizure-free outcome, while lateralized/localized EEG seizure pattern ($p = 0.032$), tumors on the MRI ($p = 0.013$), and a favorable seizure situation at the 6-month postoperative evaluation were associated with 2-year postoperative seizure-freedom ($p < 0.001$). Multivariate analysis indicated that the side of surgery was not an independent predictor.
Conclusion: More than two-thirds of the patients with neocortical TLE became seizure-free postoperatively. Lateralized/localized EEG seizure pattern and tumors on the MRI were associated with postoperative seizure-freedom, while FCD were associated with a poor outcome. The 6-month postoperative outcome is a reliable predictor for the long-term outcome.
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Introduction

Temporal lobe epilepsy (TLE) is the most common type of epilepsy requiring surgical treatment[1] and with a favorable surgical prognosis because 60–70% of patients become seizure-free after TLE surgery.[2,3] In the current classification of epilepsies and epileptic syndromes two forms of TLE were included: mesial and lateral (neocortical) TLE.[4]

Compared to mesial TLE, the clinical picture of neocortical TLE is different. The history of febrile seizures is not characteristic.[5–7] Auditory and visual auras occur more frequently than in mesial TLE.[8,9] Seizures rarely begin with oral automatism[5] but a motionless stare[7] or motor phenomena[5,10] are characteristic early ictal signs. Ictal dystonia[6,10–12] occurs infrequently. Interictal and ictal EEG features can also be different from mesial TLE.[11,13] Moreover, some studies found that the surgical outcome in neocortical TLE is less favorable than in mesial TLE,[11] but others did not find such a difference.[14,15] Sudden epileptic death may occur more frequently in neocortical TLE than in mesial TLE.[14]

The majority of patients with TLE have mesial TLE,[16] whereas neocortical TLE occurs in about 10% of all TLE cases.[15] Since mesial TLE is the most frequent TLE form, large multivariate studies investigating the surgical outcome in TLE include mostly[3,17,18] or exclusively[19] mesial TLE patients, whereas neocortical TLE patients make up only a small portion of these studies.[20] Because the neocortical and mesial TLE seem to be two different syndromes which require different types of surgery, it is reasonable to assume that different factors may influence the surgical outcome in them.

Determination of prognostic factors for surgery is important for counseling our patients in everyday practice. In addition, the identification of prognostic factors may improve general understanding of the pathophysiology of surgical failure and of spatial extension of the epileptogenic zone.

In the present study we aimed at identifying prognostic factors which predict the outcome 2 years after epilepsy surgery of TLE with neocortical lesions.

Methods

Presurgical evaluation at the Epilepsy Surgery Department of the Epilepsy Centre, Bethel

Since observed variables were based on presurgical evaluation of epileptic patients, our procedure is briefly described below.

In patients who were considered possible candidates for epilepsy surgery, a detailed clinical history was taken. Therapy resistance to first-line antiepileptic drugs was evaluated. High-resolution MRI was performed in all patients. MRI pictures in most patients were made by a Siemens Magnetom Impact 1.5-T scanner, and included T1-weighted three-dimensional volume, protondensity, FLAIR, and T2-weighted images.

Patients underwent continuous video-EEG monitoring lasting 2–10 days. In all patients a psychiatric and a neuropsychological examination, as well as social assessment, was performed. Findings of presurgical evaluation were discussed at a multidisciplinary case conference, where decisions were made concerning the possibility and type of surgery.

Patients who underwent epilepsy surgery were re-examined 6 months and 2 years later with an assessment of the seizure outcome as well as with an evaluation of the psychiatric, neuropsychological and social status.

Our protocol is for patients to receive antiepileptic drugs (AED) for a minimum of 2 years postoperatively. The dosage and type of AED remain unchanged unless the patients report side-effects.

Patient selection

For this study we included all patients who had undergone presurgical evaluation at our center including ictal video-EEG recordings and high-resolution MRI, who were >16 years, who had temporal lobe epilepsy due to neocortical lateral epileptogenic lesions on the MRI, who had had a lesionectomy between 1993 and 2002 and who had >2-year postsurgical follow-up. Patients with mesiotemporal pathology (for example, hippocampal sclerosis) or mesiotemporal resections were not included. All the patients had a detailed clinical history, MRI and long-term video-EEG with ictal and interictal recordings. In order to lateralize the speech representation, speech-activated functional MRI or Wada test was performed in 20 patients. The technical details are described elsewhere.[21,22]

Data collection

The following group of variables were investigated: (1) age at epilepsy onset, (2) duration of epilepsy, (3) presence of secondarily generalized tonic-clonic seizures (SGTCS), (4) seizure semiology, (5) unilateral interictal epileptiform discharges (IED), (6) presence of localized/lateralized EEG seizure pattern, (7) localization and lateralization of the resection, (8) MRI-based diagnosis of the epileptogenic lesion and (9) seizure situation at the 6-month post-

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