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Failed surgery for temporal lobe epilepsy: Predictors of long-term seizure-free course

J. Janszky [a,b,*], H.W. Pannek [a], I. Janszky [c,d], R. Schulz [a], F. Behne [a], M. Hoppe [a], A. Ebner [a,*]

[a] *Epilepsy Centre Bethel, Klinik Mara 1, Maraweg 21, Bielefeld 33617, Germany*
[b] *Department of Neurology, University of Pécs, Rét u. 2, Pécs 7623, Hungary*
[c] *Department of Public Health Sciences, Karolinska Institute, Stockholm, Sweden*
[d] *Institute of Behavioral Sciences, Semmelweis University, Budapest, Hungary*

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Abstract

Objectives: To identify prognostic factors which predict the outcome 2 years after TLE surgery in those patients who were not seizure-free at the 6-month postoperative examination.
Methods: We included 86 postoperative TLE patients who had undergone presurgical evaluation, including video-EEG and high-resolution MRI, and who had seizures between the second and sixth postoperative months.
Results: 32% of patients were seizure-free in the second postoperative year. We found that normal MRI findings and secondarily generalized seizures (SGTCS) preoperatively were associated with a non-seizure-free outcome, while rare postoperative seizures and ipsilateral temporal IED with seizure-free outcome. Newly administered levetiracetam showed a significant positive effect on the postoperative outcome independent of other prognostic factors. Five of seven patients who received levetiracetam became seizure-free ($p = 0.006$).
Conclusion: One-third of patients who did not become seizure-free immediately after surgery, eventually achieved long-term seizure freedom. We suggest watching for long-term seizure freedom after failed epilepsy surgery especially in patients who had rare postoperative seizures, focal MRI abnormality, ipsilateral temporal spikes, or no SGTCS preoperatively. Levetiracetam may have a positive effect on postsurgical seizures.

Keywords: Prognosis of epilepsy surgery; Generalized tonic–clonic seizures; MRI; Interictal epileptiform discharges; Levetiracetam

* Correspondence to: A. Ebner, Epilepsy Centre Bethel, Klinik Mara 1, Maraweg 21, Bielefeld 33617, Germany. Tel.: +49 5211443697; fax: +49 5211445246; J. Janszky, Department of Neurology, University of Pécs, Rét u. 2, Pécs 7623, Hungary. Tel.: +36 72535910; fax: +36 72535911.
E-mail addresses: janszky@index.hu (J. Janszky), alois.ebner@evkb.de (A. Ebner).

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1. Introduction

Temporal lobe epilepsy (TLE) is the most common type of epilepsy requiring surgical treatment (Engel et al., 1997). Although surgical treatment of TLE has a favourable prognosis, 30–40% of patients do not become seizure-free after temporal lobe resections (Radhakrishnan et al., 1998; McIntosh et al., 2001; Wiebe et al., 2001). On the other hand, even those patients who had postoperative seizures may achieve long-term seizure freedom (Rasmussen, 1970; Ficker et al., 1999; Wieser et al., 2003). The latter term is called “running down phenomenon” and is used to refer to the phenomenon of late remission of postsurgical seizures. This occurs in 5–20% of TLE surgery cases (Rasmussen, 1970; Ficker et al., 1999; Wieser et al., 2003; Bladin, 1987; Berkovic et al., 1995; Salanova et al., 1999). In the early postoperative period (months to a few years after the operation), seizures occur in 47% of patients who then eventually become seizure-free after temporal lobe resection (Rasmussen, 1970). Of patients who were not initially seizure-free, 30–55% eventually became seizure free (Rasmussen, 1970; Bladin, 1987; Salanova et al., 1999). Thus, the running-down phenomenon is an important issue when discussing epilepsy surgery outcome.

There are numerous studies determining prognostic factors for the surgical outcome in TLE (Radhakrishnan et al., 1998; McIntosh et al., 2001), but while others have analyzed the pathophysiology of failed epilepsy surgery (Hennessy et al., 2000), to our knowledge, no study has been conducted in order to determine prognostic factors for long-term seizure outcome in failed epilepsy surgery. Moreover, no study has analyzed whether the postoperative change in administration of antiepileptic drugs (AEDs) in general or certain AED specifically, have an influence on the postoperative outcome. Yet this is something important to consider as it has a strong influence on how we should be counseling our patients in everyday practice. In addition, the identification of prognostic factors may improve general understanding of the pathophysiology of postsurgical epileptogenicity.

In the present study we aimed at identifying prognostic factors which predict the outcome 2 years after TLE surgery in those patients who were not seizure-free at the 6-month postoperative examination.

2. Methods

2.1. Presurgical evaluation at the Epilepsy Surgery Department of the Epilepsy Centre Bethel

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 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 with 32–64 channel EEG recordings lasting 2–10 days. Electrodes were placed according to the 10–10 system, the number of electrodes and their placement varied individually corresponding to the suspected epileptogenic region and side. Usually Fp1, F3, C3, P3, O1, AF7, FC5, CP5, F7, FT7, T7, TP7, P7, SP1, F9, FT9, T9, TP9 and homologous right-sided electrodes were used. The location and frequency of interictal epileptiform discharges (IEDs) were assessed by visual analysis of interictal EEG samples of 2-min duration per hour. Ictal EEG recordings were stored in separate files and were evaluated independently from the interictal data. Postoperative EEG lasting 20–25 min was performed 6 months after surgery using 21 channels. The electrodes were placed according to the 10–20 system including FT9 and FT10 electrodes of the 10–10 system.

In all patients psychiatric and neuropsychological examinations, as well as social assessment, were performed. The presurgical evaluation findings were discussed at a multidisciplinary case conference where decisions were made concerning the possibility and type of surgery.

Patients who underwent epilepsy surgery were reexamined by the presurgery team 6 months and 2 years later and were assessed with regard to the seizure outcome.

Our protocol is for patients to receive AED for a minimum of 2 years postoperatively. The dosage and type of AED remains unchanged unless the patients report side-effects or persisting seizures. The treating physician is responsible for making any decisions about changing the AED regimen.