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Psychosocial outcome in epilepsy after extratemporal surgery

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ABSTRACT

Objective: Only limited data exist on psychosocial long-term outcome after epilepsy surgery in patients with extratemporal epilepsy. The aim of this study was to investigate psychosocial outcome after extratemporal epilepsy surgery and to assess factors predicting favorable outcome.

Method: Sixty-five out of 104 eligible patients who had undergone extratemporal epilepsy surgery at our epilepsy center between 1990 and 2015 (mean age: 42.2 years; 75% of the resections in the frontal lobe) completed a questionnaire asking about seizure status, employment status, marital and living situation, driving status, depressive symptoms, and quality of life (QOL). Follow-up was on average 9.2 years after surgery (range: 1–26 years). **Results:** Thirty-eight (58%) patients were free of disabling seizures (Engel class I), and 28 (43%) have not experienced any seizures after surgery (Engel class IA). Employment rate in the primary labor market remained at 45%, but more patients lost employment (14%) than gained employment (8%). Postoperative employment was predicted by preoperative employment ($p = .007$), seizure freedom ($p = .025$), older age at seizure onset ($p = .018$), younger age at follow-up ($p = .035$), and female gender ($p = .048$). Seizure-free patients were more likely to be driving; have a partner, particularly in males; and have lower depressive scores. Quality of life at follow-up was best predicted by employment ($p = .012$), partnership ($p = .025$), and seizure freedom ($p = .025$). In contrast, recurrence of seizures and early seizure onset were associated with poor psychosocial outcome, particularly in men.

Conclusion: The study provides support that extratemporal surgery can lead to improved QOL and favorable psychosocial outcome. Seizure freedom is important but not the only determinant of good psychosocial outcome.

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1. Introduction

Epilepsy surgery is an effective treatment option in many patients with focal seizures refractory to drug treatment. Several studies have shown that seizure freedom or a significant reduction in seizure frequency can substantially improve quality of life (QOL; [1–9]). Apart from seizure freedom as one major goal of epilepsy surgery, patients also hope for improvements in employment and driving status, medication intake, and social life [10–12]. However, data on psychosocial long-term outcome after epilepsy surgery are reported less frequently.

Systematic reviews revealed improvements in several psychosocial outcome measures when seizure freedom is attained [9,13,14]. Various studies demonstrated a favorable employment outcome in patients free

of seizures after surgery [1,4,15–19]. While preoperative employment was a significant predictor of postoperative employment [16,20,21], recurrence of seizures was associated with a higher likelihood to remain unemployed [1,17,18]. Epilepsy surgery is also associated with improved driving status, and this effect was obviously dependent on seizure freedom [1,19,20,22,23]. Limited data exist on marital status, but the status remained unchanged in the majority of the cases [14,24].

Comorbidities, such as depression and anxiety disorder, are common in epilepsy and decrease QOL [8,25]. Patients with favorable seizure outcome after surgery showed improvements in depression and symptoms of anxiety [26] and were less often on antidepressant medications than patients with disabling seizures [19]. On the other side, affective symptoms can offset the positive effects of seizure control on QOL [8]. Other factors such as employment, driving status, and patient's satisfaction with surgery have shown to be significant predictors of improved QOL as well [5].

While previous studies on psychosocial outcome pooled patients with temporal and extratemporal resections or focused only on patients

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with temporal lobe surgeries [14], little is known about the long-term outcome in patients suffering from extratemporal epilepsy. Patients with extratemporal resections have a less favorable seizure outcome compared with those who had temporal lobe resections [9,13]. In addition, different cognitive deficits [27,28] and postoperative cognitive changes [29–31] may affect the psychosocial outcome differently. Therefore, we examined postoperative psychosocial outcome solely in patients who underwent extratemporal epilepsy surgery. Here, we considered employment, marital status, setting of living, depression, and QOL as psychosocial outcome measures and analyzed possible predictors for a favorable psychosocial outcome and good QOL.

2. Method

2.1. Patients

A total of 118 patients underwent extratemporal surgery at our epilepsy center between 1990 and 2015 and had a follow-up at least 12 months after surgery. Patients younger than 16 years at last follow-up (one patient) as well as foreign patients living outside Germany or Austria or not fluent in German (14 patients) were excluded, leaving 103 potential patients for inclusion.

2.2. Data collection

All eligible participants were contacted via telephone. The purpose of the study was explained, and after agreement, a questionnaire was mailed to the patients. It recorded demographic information (date of birth, gender, handedness), seizure-related medical information (age at seizure onset, frequency of seizures before surgery and at follow-up, dates of surgeries, complications related to the surgery, current medication), and psychosocial information (professional training, employment status, marital status, living situation before and at follow-up, driving status). Rating scales of well-being assessed on a 7-point Likert scale were included (e.g., QOL). The “Neurological Disorders Depression Inventory for Epilepsy” (NDDI-E) was included to screen for depressive symptoms [32,33]. Patients were reminded if the questionnaire was not returned after four weeks. In addition, patients were contacted again by phone to clarify inconsistencies or missing answers. Additional medical information was obtained from the medical records of our center, and data from the questionnaire were cross-checked with those from the medical records.

The study procedures were reviewed and approved by the Ethical Committee of the Medical Faculty of the Friedrich Alexander University. All patients gave informed consent via telephone.

2.3. Data analysis

Postoperative seizure outcome was defined according to Engel’s outcome classification. The patients were classified into the following subgroups: free of disabling seizures (class I), rare disabling seizures (class II), worthwhile improvement (class III), and no change (class IV). Statistical analysis used two groups with patients free of disabling seizures (class I) and patients not free of disabling seizures (classes II–IV). Analyses on demographic information also compared patients completely free of seizures since surgery (class IA) with patients classified in classes II–IV.

Employment status was classified according to the following categories: employed in the primary labor market, employed in the secondary labor market, students, unemployed, homemaker, retired due to old age, and on disability benefits. In this categorization, being employed in the secondary labor market included all subjects working in a sheltered workshop or having a so-called “minijob,” which is a form of marginal employment in Germany that allows someone to earn up to €450 a month free of tax. Patients in professional training or vocational rehabilitation were considered as employed in the primary labor market.

Employment status was further divided into full-time (≥ 35 h per week) and part-time (< 35 h per week). Disability benefits comprised all benefits because of limitations in his or her ability to work due to illness including granted temporary or permanent disability pension, accident benefits, vocational disability benefits, or benefits because of reduction in earning capacity. Patients could be assigned to different categories. For instance, a patient could work part-time or have a “minijob” and additionally receive disability benefits. For statistical analysis of the characteristics of employment status, we considered employment in the primary labor market as the favorable outcome and compared those patients with patients not employed in the primary labor market (secondary labor market, unemployed, homemaker, on disability benefits). Similar to what was done in other studies, we considered full-time students equivalent of being employed in the primary labor market [17,34]. Patients who were retired due to old age were excluded from analyses regarding employment status.

Marital status was classified as single, cohabited/married, divorced, and widowed. For statistical analysis, the dichotomous variable of partnership (yes, no) was used. Living situation could be alone, with parents, with a partner or own family, in a group home or shared apartments, and combinations of them (e.g., group home and parents). Driving status data specified the presence of a driving license (yes, no) and whether patients currently drive a motor vehicle (yes, no).

Statistical analyses were conducted using Statistical Package for the Social Sciences (SPSS, version 21.0, IBM, USA). Comparisons between groups used Student’s *t*-tests for continuous variables (e.g., age) and chi-square tests or Fisher’s exact tests for categorical data (e.g., gender, partnership). To test for changes in preoperative and postoperative status (e.g., employment, partnership), the McNemar test was used. Multivariate analysis applied logistic regression models (ENTER method) to determine which factors were independently associated with the outcome measure of employment or QOL. All hypothesis testing was two-tailed, and *p*-values of < 0.05 were considered as significant.

3. Results

3.1. Patient characteristics

Of the 103 eligible patients, nine patients were deceased, 23 patients could not be contacted by phone, and six patients had no interest or did not return the questionnaire after several phone calls. These 38 patients not participating in the study were significantly older at follow-up compared with patients completing the questionnaire (51.3 vs. 42.2 years, $p < .001$), and duration between surgery and follow-up was significantly longer (14.4 years vs. 9.2 years, $p < .001$). No significant differences were found for gender, age at seizure onset, age at surgery, time between seizure onset, and surgery.

The patient group returning the questionnaire consisted of 65 subjects (62% males) with a mean age at follow-up of 42.2 years (standard deviation (SD): 12.5) and a mean seizure onset of 19.5 years (SD: 15.9). The mean age at surgery was 33.0 years (SD: 11.8; range: 12–63 years). The duration between surgery and follow-up was on average 9.2 years (SD: 7.6 years; range 1–26 years).

Surgical procedures were mostly performed in the frontal lobe ($n = 49$; 75%) followed by parietal resections ($n = 5$; 8%), occipital resections ($n = 3$; 5%), and frontoparietal ($n = 4$; 6%) or parietooccipital resections ($n = 4$; 6%). Histopathological findings were as follows: benign tumors (e.g., meningioma, ganglioglioma, dysembryoplastic neuroepithelial tumor; $n = 14$; 22%), malformation of the cortical development (focal cortical dysplasia; $n = 20$; 31%), vascular tumors (e.g., cavernoma, hemangioma; $n = 17$; 26%), malignant tumors (anaplastic oligoastrocytoma; $n = 2$; 3%), unspecific (gliosis; $n = 7$; 11%), without pathology ($n = 1$; 2%), and others (e.g., callosotomy, multiple subpial transection; $n = 4$; 6%).

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