



## A classification system for verifying the long-term efficacy of resective surgery for drug-resistant seizures



Tadahiro Mihara, Naotaka Usui\*, Kazumi Matsuda, Takayasu Tottori, Akihiko Kondo, Kiyohito Terada, Yushi Inoue

National Epilepsy Center, Shizuoka Institute of Epilepsy and Neurological Disorders, Shizuoka, Japan

### ARTICLE INFO

#### Keywords:

Epilepsy surgery  
Seizure outcome classification  
Late recurrence  
Running-down phenomenon  
AED (antiepileptic drug) withdrawal

### ABSTRACT

**Objective:** To verify the long-term efficacy of resective surgery, we created a classification system in which strictly defined patterns of postoperative seizure emergence are incorporated as basic components and the seizure states throughout the entire follow-up period are assessed comprehensively.

**Methods:** In our system, Class I has three subclasses (A–C); subclasses A and B are identical to Engel I-A and I-B, respectively. Subclass C comprises patients whose disabling seizures remit within the first 2 years postoperatively. Patients in Class II have only 1–3 days with disabling seizures throughout follow-up after the first 2 years. Patients in Class III have a maximum of 3 seizure days annually, and those in Class IV have  $\geq 4$  seizure days annually after the first 2 years. Classes II–IV each have 2 subclasses (A and B): subclass A, late recurrence (i.e., the first seizure occurs after 2 years postoperatively); and subclass B, early recurrence (i.e., first seizure within 2 years). In 646 patients who underwent resective surgery (temporal lobe resection, 74.6%) and were followed for at least 8 years (mean, 14.6 years), we analyzed three patterns of postoperative seizures: early remission, late recurrence, and occasional seizures. In addition, we investigated the differences between the long-term seizure outcomes of the cohort as determined according to our system and the Engel scale.

**Results:** Overall, 52.9% of the cohort experienced at least one disabling seizure postoperatively throughout the follow-up period; in 1/3 of these patients, the first seizure occurred after 2 years. In 73.8% of the 80 patients who manifested the running-down phenomenon, seizure remission occurred within the first 2 years. In addition, 36.7% of the 283 patients who had disabling seizures after 2 years experienced only 1–3 seizure days. Engel Class I-C included about 30% of the patients who had  $\geq 4$  seizure days after 2 years. The long-term seizure outcomes, determined according to our system, were: Class I, 56.2% (C, 9.1%) of the overall cohort; Class II, 16.1% (A, 11.0%); and Class III/IV, 27.7% (A, 6.6%).

**Conclusion:** Our system clarifies the actual effect of resective surgery more precisely than the Engel scale and thus may be useful for comparing outcomes between different surgical procedures or for identifying potential risk factors predicting unfavorable outcome.

### 1. Introduction

Temporal lobe resection for the treatment of medically refractory seizures that adversely affect daily life is successful in 60%–80% of patients during the first few years after surgery (Engel et al., 2012; McIntosh et al., 2001; Téllez-Zenteno et al., 2005). However, seizures are then likely to recur in 1%–4% of patients annually (Hemb et al., 2013; McIntosh et al., 2004; Schwartz et al., 2006; Sperling et al., 2008). Despite this rate of relapse, the majority of patients have very few relapsing seizures, even over long periods of time. In addition, in some patients, the relapsing seizures remit within a few years after

surgery.

For assessing postoperative seizure outcomes, 2 classification systems—the Engel scale (Engel et al., 1993; Table 1) and one proposed by the International League Against Epilepsy (ILAE) (Wieser et al., 2001; Table 2)—are currently used worldwide. Except for minor modifications of the Engel scale (Buckingham et al., 2010; Fauser et al., 2015; Tanriverdi et al., 2008), no other systems for classifying the seizure outcome after resective surgery are available. The ILAE scheme is useful for grading annual seizure frequency. In contrast, Engel classification is superior for evaluating postoperative seizures in the context of quality of life; this perspective is important because one goal of epilepsy

Abbreviations: AED, antiepileptic drug; DDS, days with disabling seizures; ILAE, International League Against Epilepsy

\* Corresponding author at: National Epilepsy Center, Shizuoka Institute of Epilepsy and Neurological Disorders, Shizuoka 420-8688, Japan.

E-mail address: [n-usui@shizuokamind.org](mailto:n-usui@shizuokamind.org) (N. Usui).

<https://doi.org/10.1016/j.epilepsyres.2018.01.019>

Received 25 November 2017; Received in revised form 12 January 2018; Accepted 17 January 2018

Available online 31 January 2018

0920-1211/ © 2018 Elsevier B.V. All rights reserved.

**Table 1**  
Engel classification.

Class I: Free of disabling seizures <sup>a</sup>
A: Completely seizure-free since surgery
B: Non-disabling simple partial seizures only since surgery
C: Some disabling seizures after surgery, but free of disabling seizures for at least 2 years
D: Generalized convulsion with antiepileptic drug withdrawal only
Class II: Rare disabling seizures ("almost seizure-free")
A: Initially free of disabling seizures but has rare seizures now
B: Rare disabling seizures since surgery
C: More than rare disabling seizures since surgery, but rare seizures for at least 2 years
D: Nocturnal seizures only
Class III: Worthwhile improvement <sup>b</sup>
A: Worthwhile seizure reduction
B: Prolonged seizure-free intervals amounting to greater than half the follow-up period, but not less than 2 years
Class IV: No worthwhile improvement <sup>b</sup>
A: Significant seizure reduction
B: No appropriate change
C: Seizures worse

<sup>a</sup> Excludes early postoperative seizures (first few weeks).

<sup>b</sup> Determination of "worthwhile improvement" will require quantitative analysis of additional data such as percentage seizure reduction, cognitive function, and quality of life.

**Table 2**  
ILAE classification.

Class 1: Completely seizure free; no auras
Class 2: Only auras; no other seizures
Class 3: One to three seizure days per year; $\pm$ auras
Class 4: Four seizure days per year to 50% reduction of baseline seizure days; $\pm$ auras
Class 5: Less than 50% reduction of baseline seizure days to 100% increase of baseline seizure days; $\pm$ auras
Class 6: More than 100% increase of baseline seizure days; $\pm$ auras

surgery is to improve patients' quality of life by freeing them from disabling seizures. Furthermore, another strength of Engel classification is that it considers different patterns of postoperative seizure emergence—namely, (1) early remission of relapsing seizures (the running-down phenomenon), (2) late seizure recurrence, and (3) occasional seizures that occur when antiepileptic drugs (AEDs) are withdrawn. However, when we applied the Engel scheme to patients who were many years past surgery, the ambiguity in the definitions of these appearance patterns became pronounced. In addition, the Engel scale is problematic regarding cross-sectional analysis, in which the overall assessment of long-term seizure outcomes is determined based on the seizure states during the most recent few years of follow-up only.

To verify the long-term efficacy of resective surgery for drug-resistant seizures—that is, to determine whether the surgery itself was actually successful—we modified the Engel scale to create a classification system in which strictly defined patterns of postoperative seizure appearance are incorporated as basic components and the seizure states throughout the entire follow-up period are assessed comprehensively (Table 3). The main points of our classification are: (1) the running-down phenomenon is defined restrictively as the condition in which relapsing seizures remit within the first 2 years postoperatively; (2) late recurrence is defined as the first seizure occurring 2 years or more after surgery; (3) occasional seizures are defined as a maximum of 3 days with disabling seizures beyond 2 postoperative years, regardless of precipitating factors such as AED withdrawal; and (4) the overall outcome of patients with more than a few seizures is determined according to the maximal number of seizure days annually after the first 2 postoperative years.

The purpose of the current study is to verify the validity and usefulness of our classification system. In 646 patients who were followed

**Table 3**  
Our classification.

Class I
A: Completely seizure-free since surgery
B: Non-disabling seizures only
C: Some disabling seizures during the first 2 years after surgery only
Class II
A: No disabling seizures during the first 2 years; later, only 1–3 DDS
B: Some disabling seizures during the first 2 years; later, only 1–3 DDS
Class III
A: No disabling seizures during the first 2 years; later, $\leq 3$ DDS/year
B: Some disabling seizures during the first 2 years; later, $\leq 3$ DDS/year
Class IV
A: No disabling seizures during the first 2 years; later, $\geq 4$ DDS/year
B: Some disabling seizures during the first 2 years; later, $\geq 4$ DDS/year

DDS, days with disabling seizures.

Ancillary conditions: (1) seizures during the first postoperative month are not considered; (2) in Class I-C and Class II/III/IV-B, the number of disabling seizures during the first 2 years is not considered; and (3) this classification should be used with patients who have been followed for at least 5 years after surgery.

for at least 8 years after resective surgery, we analyzed postoperative disabling seizures, paying particular attention to the three patterns of seizure emergence. In addition, we investigated differences between the long-term seizure outcomes of the cohort as determined according our classification system compared with the Engel scale.

## 2. Subjects and methods

### 2.1. Patient selection

From April 1983 through March 2006, resective surgery was performed in 742 patients by the first author or under his direction at the National Epilepsy Center (Shizuoka Institute of Epilepsy and Neurological Disorders, Japan). Postoperative data about these patients were collected from three sources: inpatient medical records, outpatient medical records, and questionnaires. All patients were hospitalized for routine postoperative examinations at 3 months and 2 years after surgery. Patients who did not visit our outpatient clinic were also hospitalized at 1 year and 5 years postoperatively. The questionnaire comprised three domains—seizures, AED treatment, and social activities, and was mailed to all patients every 3 or 4 years, beginning 2 years after surgery. The seizure domain solicits the following information: presence of disabling or non-disabling seizures; the date of the first recurrent seizure; seizure manifestations (auras, focal motor seizures, complex partial seizures, secondarily generalized seizures, or others); whether seizures are diurnal or nocturnal (during sleep); the number of disabling seizure days in each year; the date of the most recent seizure; seizure precipitants (e.g., AED withdrawal, fever, heavy drinking); and the time interval from AED discontinuation to seizure recurrence. The most recent questionnaire was mailed in May 2014, and we received informative responses from 564 patients.

For this study, from the 742 patients with resective surgery, we selected 646 patients who were postoperatively followed for at least 8 years (after the final surgery in patients with more than one operation) as of September 2014 and whose seizure states throughout the entire follow-up period were documented in detail. The remaining 96 patients were excluded from the study for the following reasons: 11 patients died of cancers, accidents, or seizure-related events within 8 postoperative years; 6 patients with multiple operations had less than 8 years of follow-up after the final surgery; in 4 patients, detailed seizure states could not be established conclusively, mainly because of psychiatric problems; and the remaining 75 patients were lost to follow-up within 8 years after surgery. More than half of the cohort (394 patients, 61.0%) had visited our outpatient clinic every 3 or 6 months or yearly for at least 8 years after surgery.

Download English Version:

<https://daneshyari.com/en/article/8684205>

Download Persian Version:

<https://daneshyari.com/article/8684205>

[Daneshyari.com](https://daneshyari.com)