



Long-term seizure and psychosocial outcomes after resective surgery for intractable epilepsy



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ABSTRACT

Resective surgery is considered an effective treatment for refractory localization-related epilepsy. Most studies have reported seizure and psychosocial outcomes of 2–5 years postsurgery and a few up to 10 years. Our study aimed to assess long-term (up to 15 years) postsurgical seizure and psychosocial outcomes at our epilepsy center. The Henry Ford Health System Corporate Data Store was accessed to identify patients who had undergone surgical resection for localization-related epilepsy from 1993 to 2011. Demographics including age at epilepsy onset and surgery, seizure frequency before surgery, and pathology were gathered from electronic medical records. Phone surveys were conducted from May 2012 to January 2013 to determine patients' current seizure frequency and psychosocial metrics including driving and employment status and use of antidepressants. Surgical outcomes were based on Engel's classification (classes I and II = favorable outcomes). McNemar's tests, chi-square tests, two sample t-tests, and Wilcoxon two sample tests were used to analyze the relationships of psychosocial and surgical outcomes with demographic and surgical characteristics. A total of 470 patients had resective epilepsy surgery, and of those, 50 (11%) had died since surgery. Of the remaining, 253 (60%) were contacted with mean follow-up of 10.6 ± 5.0 years (27% of patients had follow-up of 15 years or longer). Of the patients surveyed, 32% were seizure-free and 75% had a favorable outcome (classes I and II). Favorable outcomes had significant associations with temporal resection (78% temporal vs 58% extratemporal, $p = 0.01$) and when surgery was performed after scalp EEG only (85% vs 65%, $p < 0.001$). Most importantly, favorable and seizure-free outcome rates remained stable after surgery over long-term follow-up [i.e., <5 years (77%, 41%), 5–10 years (67%, 29%), 10–15 years (78%, 38%), and >15 years (78%, 26%)]. Compared to before surgery, patients at the time of the survey were more likely to be driving (51% vs 35%, $p < 0.001$) and using antidepressants (30% vs 22%, $p = 0.013$) but less likely to be working full-time (23% vs 42%, $p < 0.001$). A large majority of patients (92%) considered epilepsy surgery worthwhile regardless of the resection site, and this was associated with favorable outcomes (favorable = 98% vs unfavorable = 74%, $p < 0.001$). The findings suggest that resective epilepsy surgery yields favorable long-term postoperative seizure and psychosocial outcomes.

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1. Introduction

Resective brain surgery is an effective treatment option for intractable partial epilepsy [1–3], and short-term efficacy has been established through a well-known, randomized controlled trial [4]. A multicenter study group showed initial seizure and quality-of-life (QOL) outcomes

for up to 2 years [5] and defined long-term follow-up as >2 years [6]. Relatively few studies have reported a long-term outcome of over 10 years [7–10] and some up to 18 years (mean = 11 years, 9 months) [11] or up to 24 years (mean = 7 years) [12]. Some studies have also shown that postsurgery seizure control remains sustained over the years [9,13,14]. In addition, the psychosocial outcomes are noted to indicate long-term benefits [15] as well.

The aim of our surgical cohort study was to assess long-term postsurgical seizure and psychosocial outcomes in all patients evaluated and operated on at our tertiary epilepsy center by conducting follow-up phone surveys.

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Table 1

Engel's classification.

Source: Engel J Jr, Van Ness PC, Rasmussen TB, Ojemann LM. Outcome with respect to epileptic seizures. In: Engel J Jr (Ed). Surgical treatment of the epilepsies. 2nd ed. Raven Press, New York, NY. 1993, pp. 609–621.

I. Free of disabling seizures

- A — Completely seizure-free since surgery
- B — Nondisabling simple partial seizures only since surgery
- C — Some disabling seizures after surgery but free of disabling seizures for at least 2 years
- D — Generalized convulsions with antiepileptic drug withdrawal only

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 after surgery but rare seizures for at least 2 years
- D — Nocturnal seizures only

III. Worthwhile improvement

- A — Worthwhile seizure reduction
- B — Prolonged seizure-free intervals amounting to greater than half the follow-up period but not less than 2 years

IV. No worthwhile improvement

- A — Significant seizure reduction
- B — No appreciable change
- C — Seizures are worse

2. Materials and methods**2.1. Study description, approvals, and consents**

This was a retrospective study to gather preoperative and surgical information and a cross-sectional study to assess postsurgical seizure

and psychosocial outcomes. Patients were retrospectively identified using the Henry Ford Health System Corporate Data Store as having had a surgical resection for intractable localization-related epilepsy between July 1993 and September 2011. Data were collected using medical record chart review along with phone surveys. This study was approved by the Henry Ford Health System Institutional Review Board (IRB # 7531). Written consents were waived because of the low-risk, retrospective methodologies of the chart review. Verbal consents were obtained prior to starting every phone survey.

2.2. Data collection

Retrospective chart reviews using the electronic medical record (EMR) were performed to collect demographic information on gender and race, age at epilepsy onset and surgery, seizure frequency before surgery, presurgical evaluation by scalp EEG (sEEG) or the necessity for extraoperative electrocorticography (eCoG), side and site of resection, and pathology. Information on more recent seizure frequency status was obtained from clinic notes at the last office visit found in the EMR. Subject contact information was obtained from the EMR or through the public search database of the Department of Public Health Sciences. Follow-up phone surveys were attempted for all the patients by the research assistant (RT) between May 2012 and January 2013. Phone surveys were chosen over mailed or in-person surveys because of the potential for a better response rate, especially given that a number of the patients may have moved out of the area and/or were not receiving their care at our institution. This data collection method may have been more time- and cost-efficient. The research assistant was given a script which included confidentiality statements along with questions about the patients' current seizure frequency and the current number of antiepilepsy drugs being taken and to assess psychosocial metrics.

Table 2

Data from electronic medical records of patients who had epilepsy surgery and comparisons between patients who did and did not complete surveys.

Variable	Response	Survey completed (n = 253)	No survey (n = 167)	p-Value
Age at the time of the study for those alive (n = 420)	Mean ± S.D.	46.2 ± 13.3	44.1 ± 12.1	0.096
	Median (range)	47 (15 to 80)	45 (16 to 78)	
Gender	F	137 (54%)	84 (50%)	0.439
	M	116 (46%)	83 (50%)	
Race	Caucasian	202 (88%)	132 (90%)	0.835
	African-American	20 (9%)	11 (7%)	
	Others	8 (3%)	4 (3%)	
Presurgical evaluation	Scalp EEG	120 (47%)	89 (53%)	0.240
	Scalp EEG and eCoG	133 (53%)	78 (47%)	
Age at epilepsy onset, years	Mean ± S.D.	15.7 ± 13.9	14.4 ± 11.9	0.318
	Median (range)	12 (0 to 63)	12 (0.25 to 55)	
Age at epilepsy surgery, years	Mean ± S.D.	35.7 ± 13.3	33.0 ± 11.6	0.032
	Median (range)	35 (5 months to 67)	32 (3 to 67)	
Epilepsy duration until surgery, years	Mean ± S.D.	20.5 ± 13.2	18.7 ± 13.0	0.183
	Median (range)	20 (0 to 59.5)	17 (0 to 52)	
Location of epilepsy surgery	Temporal resection	215 (85%)	140 (84%)	0.750
	Extratemporal resection	38 (15%)	27 (16%)	
Side of epilepsy surgery	Right	132 (52%)	79 (47%)	0.428
	Left	120 (47%)	88 (53%)	
	Bilateral	1 (0%)	0 (0%)	
Number of AEDs before surgery	Mean ± S.D.	2.1 ± 0.8	2.0 ± 0.9	0.375
	Median (range)	2 (0 to 5)	2 (0 to 6)	
Number of AEDs after surgery	Mean ± S.D.	2.0 ± 0.8	2.0 ± 0.9	0.690
	Median (range)	2 (0 to 6)	2 (1 to 6)	
Seizure frequency at the last clinic visit ^a	None	101 (66%)	88 (81%)	0.036
	Daily	16 (10%)	6 (6%)	
	Weekly	8 (5%)	6 (6%)	
	Monthly	24 (16%)	8 (7%)	
	Yearly	4 (3%)	0 (0%)	
AEDs tapered or discontinued	Yes	122 (50%)	87 (56%)	0.243
Discontinuation leads to seizures ^b	Yes	47 (39%)	31 (36%)	0.695

^a n = 288 for all patients, n = 153 for patients with survey and n = 108 for patients without survey.

^b Any therapy with an AED tapered or discontinued.

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