Life Outcomes of Anterior Temporal Lobectomy: Serial Long-term Follow-up Evaluations

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BACKGROUND: At 3 time points, this study examined long-term psychosocial life outcomes of individuals who underwent anterior temporal lobectomy in comparison with individuals with temporal lobe epilepsy who were medically managed.

OBJECTIVE: To examine seizure frequency, employment, driving, independent living, financial independence, mental health, and quality of life at each follow-up assessment, as well as predictors of outcomes.

METHODS: All participants were diagnosed with medically intractable complex partial seizures of temporal lobe origin with or without secondary generalization. A structured clinical interview was used at all 3 time points. Information was obtained regarding seizure frequency, antiepilepsy medications, employment, driving status, financial assistance, and independent living. Additionally, questions regarding quality of life, satisfaction with surgery, and the presence of depression or anxiety were included. Participants were, on average, 17 years postsurgery.

RESULTS: Surgery resulted in significantly improved and sustained seizure outcomes. At the first, second, and third follow-ups, 67%, 72%, and 67% of participants in the surgery group remained seizure-free in the year before the follow-up interview. At each follow-up, 97%, 84%, and 84% reported that they would undergo surgery again. Seizure freedom predicted driving outcomes at all 3 time points, but was not a significant predictor for employment, independent living, or financial independence. Psychosocial life outcomes in the surgical group were improved and maintained over time in comparison with the medically managed group.

CONCLUSION: This systematic long-term investigation provides strong support for the positive impact of anterior temporal lobectomy on psychosocial life outcomes including driving, employment, independent living, and financial independence.

KEY WORDS: Anterior temporal lobectomy, Epilepsy, Psychosocial outcomes, Surgical outcomes

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In a systematic review of the literature, Dodrill et al[1] reported only 1 anterior temporal lobectomy (ATL) study measuring psychosocial functioning that incorporated a control group. Almost 20 years after this review, 15 follow-up studies exist that include a medically managed control group. Téllez-Zenteno et al[2] underscored the need for systematic, long-term controlled studies, because many of the current studies have an absence of control participants. The ability to compare individuals who underwent ATL with controls over a longer follow-up period is essential to observe the trajectory of psychosocial life outcomes in both groups. Hamiwka et al[3] suggested that improvement in social outcomes after surgery might occur slowly over time and may not be observed early on (ie, 1-year follow-up). The trajectory of life outcomes over time is unclear.[3]

Table 1 shows the variable methodology of existing studies with control groups, including inconsistent follow-up intervals and differences in psychosocial outcomes of interest. Many included quality-of-life measures such as the Epilepsy Surgery

ABBREVIATIONS: ATL, anterior temporal lobectomy; **M,** mean; **MMPI,** Minnesota Multiphasic Personality Inventory; **SD,** standard deviation

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TABLE 1. Controlled Investigations of Psychosocial Outcomes in Temporal Lobectomy[a]

Author	Surgical Procedure	Number of Subjects	Outcomes Measures	Seizure Free (SF)/ Not Seizure Free	Follow-up Interval
Rausch & Crandall (1982)[28]	Temporal lobectomy	31 surgery	Dependency	Improvement limited to SF	1-24 mo
		9 no surgery	Work and school	SF increase in IQ	
			Family relationships		
			Nonfamily relationships		
Guldvog et al (1991)[29]	Anterior temporal lobectomy	147 surgery	Employment/ school	Not reported	2-29 y after surgery (mdn, 9 y)
		94 no surgery	Social pensions		2-13 y for no surgery (mdn, 9 y)
			Social status		
			Degree of social support		
			Dependency		
			AEDs		
Vickrey et al (1995)[13]	Anterior temporal lobectomy	202 surgery	ESI-55	Not reported	5.8 y for surgery
		46 no surgery	Employment		5.7 y for no surgery
			KAS		
Baxendale & Thompson (1996)[30]	Temporal lobe surgery	32 surgery	Self-concept	SF/not SF did not differ significantly in item ratings	1 y
		70 no surgery	Preoperative expectations		
Kellett et al (1997)[17]	48% Anterior temporal lobectomy	94 surgery	HRQOL	SF group HRQOL scores better than those with more than 10 seizures per year	1986-1994 (years included in follow-up)
	25% Amygdalohippocampectomy	36 no surgery	Employment		No interval given
	18% Temporal lesionectomy		Driving		
	9% Extratemporal resection				
McLachlan et al (1997)[31]	Temporal lobectomy	56 surgery	ESI-55	SF group better QOL at follow-up	6, 12, 24 mo
		25 no surgery			
Gilliam et al (1999)[32]	Anterior temporal lobectomy	125 surgery	ESI-55	SF status not associated with better HRQOL	12 & 24 mo
		71 wait list control	POMS		
			Driving		
			Employment/ school		
			AEDs		
			Seizure frequency		
			Adverse events profile		
Markand et al (2000)[25]	Anterior temporal lobectomy	53 surgery	QOLIE-89	HRQOL better in seizure-free patients from baseline to 2-year follow up	1 & 2 y

(Continues)

TABLE 1. ***Continued***

Author	Surgical Procedure	Number of Subjects	Outcomes Measures	Seizure Free (SF)/ Not Seizure Free	Follow-up Interval
		37 no surgery			
Wiebe et al (2001)[33]	Anterior temporal lobectomy	40 surgery	LSSS	Not reported	3, 6, 9, 12 mo
		40 wait list control	QOLIE-89		
			GHC		
			CES-D		
Helmstaedter et al (2003)[34]	Temporal lobectomy	147 surgery	VLMT	Seizure-free improvement of nonmemory functions in T1-T2 and improvement of memory in T2-T3; seizure free less impaired QOLIE-10 scores and less depression	1 y & 2-10 y
		120 no surgery	DCS-R		
			Employment/ school		
			BDI		
			QOLIE-10		
Stavem & Guldvog (2005)[35]	Resective surgery for focal epilepsy	139 surgery	Survival rates	Not reported	Average 25 y
		139 no surgery			
Bien et al (2006)[36]	Temporal lobectomy	131 surgery	Seizure questionnaire	QOL scores of SF patients higher than those of patients who were not SF	Minimum 1 y
		105 wait list control	ESI-55		
		194 presurgical candidates no surgery	AEDs		
		49 no surgery			
Mikati et al (2006)[37]	75% Temporal lobectomy	20 surgery	ESI-55	85% of surgery group seizure-free	3 y
	25% Extratemporal resections	17 no surgery			
McGlone et al (2008)[38]	Anterior temporal lobectomy (n = 8)	16 VNS	QOLIE-89	Not reported	1 y
	Amygdalohippocampectomy (n = 1)	10 surgery	GDS		
	Hemispherectomy (n = 1)	9 no surgery	WMS, MOQ		
Stavem et al (2008)[39]	Resective surgery for focal epilepsy	70 surgery	QOLIE-89	Not reported	Average 15 y
		70 matched controls			

[a]AEDs, antiepilepsy drugs; BDI, Beck Depression Inventory; CES-D, Center for Epidemiological Studies Depression Scale; DCS-R, Diagnostikum für Zerebralschädigung revised (visual memory test); ESI-55, Epilepsy Surgery Inventory-55; GDS, Geriatric Depression Scale; GHQ, General Health Questionnaire; HRQOL, Health Related Quality of Life; KAS, Katz Adjustment Scale; LSSS, Liverpool Seizure Severity Scale; MOQ, Memory Observation Questionnaire; POMS, Profile of Mood State; QOL, quality of life; QOLIE-89, QOLIE-10, Quality of Life in Epilepsy; VMLT, Verbaler Lern und Merkfähigkeitstest (verbal learning test); WMS, Wechsler Memory Scale; mdn, median; VNS, vagus nerve stimulator.

Inventory and Quality of Life in Epilepsy Inventory. More practical life changes such as employment and education were measured in only 6 of these studies. Additionally, many of the more recent studies failed to identify epilepsy-specific predictors of good and poor psychosocial life outcomes. Several studies from the past 10 years did not include data on seizure freedom.

The present study examined the long-term psychosocial life outcomes of individuals who underwent ATL compared with medically managed individuals. Participants initially were interviewed as part of a 5-year follow-up.[4] After the initial follow-up, individuals were followed at 2 additional time points, on average, 12 and 17 years postsurgery. This longer-term serial follow-up

study focused on the trajectory of psychosocial life outcomes such as employment, driving, independent living, financial independence, as well as mental health and quality of life. Predictors of good vs poor psychosocial life outcomes were also examined.

PATIENTS AND METHODS

Participants

Participants were candidates for ATL between 1990 and 1997. This study is an observational controlled study. Individuals in this study were not randomly assigned to treatment or control groups. Individuals were diagnosed with medically intractable complex partial seizures of temporal lobe origin. All participants were at least 18 years old and had at least borderline intelligence (Wechsler Adult Intelligence Scale–Revised Verbal or Performance IQ >69). Ninety-one individuals met criteria for this study and 84 (92%) participated in the first follow-up interview with an average follow-up of 5 years postsurgery or surgical evaluation.[4] Of the original cohort, 61 underwent ATL, and 23 were evaluated and served as a medically managed (control) group. Selection for ATL was determined by an established surgical protocol including (a) prolonged electroencephalography monitoring of spontaneous seizures with scalp, epidural, or subdural electrodes; (b) magnetic resonance imaging; (c) positron emission tomography; (d) Wada test; and (e) neuropsychological assessment and independent speech and language evaluation.[4] Participants in the medical management group either did not meet criteria for surgery or declined surgery and continued to receive antiepileptic drug treatment. At baseline (Table 2), the surgery and medical management groups did not differ in chronologic age, age at seizure onset, IQ, Memory Quotient, Minnesota Multiphasic Personality Inventory (MMPI) clinical scale elevations, education, or number of medications.

TABLE 2. Baseline Characteristics: Surgery and Medical Management Groups[a]

Characteristic	Surgery Group (n = 57)	Medical Management Group (n = 18)
Age at baseline, y, M (SD)	37.9 (9.3)	37.9 (10.0)
Age at onset, y, M (SD)	11.4 (10.3)	15.7 (12.9)
Sex, n (%)		
Female	28 (49.1)	13 (72.2)
Male	29 (50.9)	5 (27.8)
Full-scale IQ, M (SD)	86.05 (20.23)	79.19 (22.78)
Memory quotient, M (SD)	95.95 (14.19)	90.47 (14.30)
MMPI	1.95 (1.90)	2.55 (2.02)
Education, n (%)		
Special education/less than high school	9 (15.8)	2 (11.1)
GED/high school diploma	30 (52.7)	9 (50.0)
Some college/trade certification	10 (17.6)	6 (33.4)
College graduate	5 (8.8)	0 (0.0)
Graduate degree	3 (5.3)	1 (5.6)
Medications, n (%)		
Monotherapy	29 (50.9)	8 (44.4)
Polytherapy	28 (49.1)	10 (55.6)

[a]M, mean; SD, standard deviation; MMPI, Minnesota Multiphasic Personality Inventory; GED, General Educational Development.

The present study focuses on the second and third follow-up results. Approximately 12 years postsurgery or surgical evaluation and 7 years after the initial follow-up, 75 individuals (89% of the original cohort), 57 ATL and 18 controls, participated in the second follow-up. A third follow-up was conducted an average of 17 years postsurgery or surgical evaluation and 5 years after the second evaluation; 61% (42 ATL and 9 controls) from the original cohort participated in the third follow-up. Surgery group participants were not included in the second and third follow-up interviews for the following reasons: unable to locate (3 at second follow-up, 9 at third follow-up), declined participation (0 and 3), or were deceased (1 and 3). Within the medical management group, reasons for nonparticipation included: unable to locate (3 at second follow-up, 6 at third follow-up), declined participation (1 and 3), or were deceased (0 and 2). Attrition was greatest at the third follow-up. There were no significant differences in age, sex, or seizure frequency among individuals who participated and did not participate in the third follow-up.

Additionally, there were no differences in time between assessments for the 2 groups. The average time between presurgical assessment and second follow-up was 11.92 years (standard deviation [SD] = 2.09) for the surgery group and 11.66 years (SD = 2.07) for the medical management group. Average time to third follow-up was 17.44 years (SD = 2.14) for the surgery group and 18.23 years (SD = 1.55) for the medical management group.

Procedures

All participants underwent a 20- to 60-minute semistructured telephone interview at each follow-up. Medical records were reviewed to obtain baseline information regarding seizure frequency and psychosocial life outcome status,[4] but were not used at subsequent follow-ups, because the majority of individuals were no longer followed at the surgical center. Additionally, whenever difficulty recalling information was demonstrated, corroboration by a family member or significant other was used. Assessment of psychosocial outcomes focused on employment, education, driving status, financial assistance, and independent living. Information was obtained for the month before the initial surgical evaluation, and long-term outcome information was garnered for the previous year before each follow-up interview. Two questions regarding quality of life were included. Three questions regarding depression and anxiety were included in the second and third follow-up interviews (See **Questionnaire**, **Supplemental Digital Content 1**, http://links.lww.com/NEU/A584, Psychosocial Outcomes Questionnaire to review items included in each interview). All participants gave informed consent via telephone. A waiver of Health Insurance Portability and Accountability Act authorization was obtained. The Health Sciences Institutional Review Board at the University of Wisconsin School of Medicine and Public Health approved this study.

Employment, Independent Living, Financial Independence, and Driving

Full-time employment was defined as earning at least minimum wage and working >35 h/wk.[5] Independent living was defined as not requiring assistance in any of 3 activities of daily living (eg, organizing and taking medications, keeping appointments, and showering) and as living alone, with a roommate(s), or with significant other(s) (not if living with parents or in an assisted-living arrangement).[6] Financial independence was defined as receiving no financial assistance from any of 3 types of governmental assistance: Supplemental Security Income, Social Security Disability, and W-2 (Wisconsin's Aid to Families with Dependent Children replacement program). Driving was defined as holding an active (nonsuspended) driver's license.

Quality of Life and Mental Health

Two 1-item scales measuring quality of life were included.[4] The first solicited a rating of overall quality of life on a 10-point scale.[7,8] The second solicited ratings on a 5-point scale; an adaptation of the Dartmouth Primary Care Cooperative quality-of-life chart was used, and the reliability and validity of this measure has been demonstrated in a number of patient populations.[7,9] Individuals in the surgery group were also asked to rate their overall satisfaction with the surgery and if they would have the surgery again. Additionally, participants were asked 3 questions regarding mental health: (1) Are you currently seeing a therapist, counselor, psychologist, or psychiatrist? (2) Have you seen anyone regularly for mood, anxiety, etc in the past year? and (3) Have you been diagnosed with depression, anxiety, etc in the past year? In the surgery group, baseline and postsurgery MMPI clinical scale elevations (ie, T-scores >70) were used to indicate psychopathology.

Seizure Frequency

Because concerns about the reliability of self-reported seizure frequency,[10,11] report of seizure frequency was limited to the year before each evaluation. Seizure frequency was categorized as none, daily, weekly, monthly, or yearly.[12] In addition, seizure frequency at follow-up was classified as follows: (a) seizure-free, (b) auras with or without 1 seizure, (c) 2 to 12 seizures, and (d) more than 12 seizures. This system was recommended for assessing surgery outcomes as related to quality-of-life outcomes.[13] This system was used in the first follow-up interview, and, as a result, the classification system recommended by Engel et al[14] was not used. An additional question regarding seizure freedom since surgery was added.

Data Analyses

A modest sample size precluded the use of regression techniques; therefore, *t* tests and χ^2 tests were used to compare groups on demographic and psychosocial outcome variables, and nonparametric Mann-Whitney *U* tests were used to compare Likert scale data (quality of life and satisfaction with surgery).

RESULTS

Seizure Status

Seizure frequency is presented in Table 3. At the first follow-up, surgery group participants were less likely than medical management group participants ($P < .001$) to have experienced seizures in the past year, with 67% vs 6% being seizure-free. Similar results were seen at the second (72% vs 28%, $P < .001$) and third follow-ups (67% vs 11%, $P < .001$). In the surgery group, 51% remained completely seizure-free after surgery. At the first follow-up, 63% of the surgery group vs 100% of the medical management group were taking at least 1 antiepileptic drug ($P < .001$); these numbers were similar at the second (66% vs 88%, $P = .112$) and third follow-ups (62% vs 89%, $P < .001$), although this difference was not significant at the second follow-up. At the second follow-up, only 1 surgery group participant had undergone another ATL within the past 5 years, and no surgery group participants had received a Vagus Nerve Stimulator. At the third follow-up, no surgery group participants had undergone another ATL or Vagus Nerve Stimulator.

Psychosocial Outcomes: Status of Surgery and Medical Management Groups

Table 4 contains psychosocial outcome data by group (surgery vs medical management) at each time point. Both groups showed comparably poor psychosocial status at baseline. There were no significant differences between groups in full-time employment, independent living, financial independence, and driving status at baseline, as reported previously.[4]

As shown in Table 4, there were significant group differences for every psychosocial outcome measure at the initial, 5-year follow-up. Participants in the surgery group were more likely than those in the medical management group to be employed full-time (68% vs 39%, $P = .025$) and living independently (84% vs 39%, $P < .001$). Likewise, surgery group participants were more likely to be financially independent (81% vs 56%, $P = .032$) and have a valid driver's license (67% vs 28%, $P = .004$).

At the second follow-up, these favorable outcomes were maintained. ATL participants continued to show better psychosocial outcomes than their medically managed counterparts in all 4 categories: full-time employment (61% vs 33%, $P = .037$), independent living (74% vs 44%, $P = .022$), financial independence (81% vs 44%, $P = .003$), and driving status (72% vs 33%, $P = .003$).

At the third follow-up, a similar pattern was seen for independent living (76% vs 33%, $P = .012$) and driving status (74% vs 33%, $P = .019$), with the surgery group indicating better outcomes than the medical management group. Although surgery participants also showed better outcomes for full-time

TABLE 3. Seizure Frequency at Each Follow-up[a]

	First Follow-up[b]		Second Follow-up[b]		Third Follow-up[b]	
Seizure Frequency (Past Year)	Surgery (n = 57), n (%)	MM (n = 18), n (%)	Surgery (n = 57), n (%)	MM (n = 18), n (%)	Surgery (n = 42), n (%)	MM (n = 9), n (%)
Seizure free	38 (66.7)	1 (5.6)	41 (71.9)	5 (27.8)	28 (66.7)	1 (11.1)
Auras with/without 1 seizure	7 (12.3)	0 (0)	10 (17.5)	1 (5.6)	9 (21.4)	2 (22.2)
Two to 12 seizures	6 (10.5)	6 (33.3)	4 (7.0)	4 (22.2)	2 (4.8)	1 (11.1)
More than 12 seizures	6 (10.5)	11 (61.1)	2 (3.5)	8 (44.4)	3 (7.1)	4 (55.6)

[a]Surgery, Surgical group; MM, medical management group.
[b]Surgery group participants experienced fewer seizures at all follow-up time points compared with medical management group participants; $P \leq .05$.

employment (43% vs 22%) and financial independence (76% vs 44%), there was no longer a significant difference between the groups (*P* values = .250 and .058, respectively). Notably, when individuals over the age of 60 were excluded from the analyses at the third follow-up (surgery group = 8; medical management group = 1), the employment rate rose from 43% to 50% in the surgery group and declined from 22% to 13% in the medical management group, suggesting that retirement age may play a role in the decrease in employment rates in the surgery group.

Epilepsy Factors as Predictors

At the first, second, and third follow-up assessments, freedom from seizures was associated with holding an active driver's license in surgery group participants (first follow-up: $r = 0.368$, $P = .005$; second follow-up: $r = 0.290$, $P = .029$; third follow-up: $r = 0.318$, $P = .046$). No other psychosocial outcome variables were predicted by seizure freedom. Additionally, there were no statistically significant associations between number of seizure medications and any psychosocial outcome variables (all r values < 0.25).

Psychopathology

A history of anxiety, depression, and treatment of these problems was investigated at the second and third follow-up interviews. There was no difference between groups in diagnosis (second follow-up: surgery group = 16%; medical management group = 18%) or treatment (both groups = 18% at the second follow-up) of anxiety or depressive disorders in the previous 12 months (*P* values $> .850$). These numbers changed only slightly at the third follow-up (surgery group: 17% received both diagnosis and treatment; medical management group: 11%; *P* values $> .65$). The number of elevated MMPI clinical scales at baseline was not associated with presence of seizures following surgery. However, surgery group participants with elevated MMPI clinical scales postsurgery were significantly more likely to experience seizures at each follow-up assessment (first follow-up: $r = 0.321$, $P = .044$; second follow-up: $r = 0.443$, $P = .004$; third follow-up: $r = 0.515$, $P = .004$).

Quality of Life and Satisfaction With Surgery

At the initial follow-up assessment, the surgery group endorsed better quality of life (mean [M] = 8.00, SD = 1.88) than the medical management group (M = 6.65, SD = 2.12; $P = .015$). The groups did not differ significantly in their assessment of quality of life at subsequent follow-up assessments, although surgery group participants continued to report better quality of life (second follow-up: M = 8.18, SD = 1.90; third follow-up: M = 8.24, SD = 1.75) relative to their medically managed counterparts (second follow-up: M = 7.71, SD = 1.90; third follow-up: M = 7.33, SD = 2.06). Notably, in the surgery group at first follow-up, those individuals who were free from seizures reported significantly higher quality of life (M = 8.37, SD = 1.79) than did individuals still experiencing seizures (M = 7.26, SD = 1.88; $t(55) = 2.159$, $P = .035$). At subsequent follow-ups, quality-of-life ratings did not differ between seizure-free and non-seizure-free participants in the surgery group.

TABLE 4. Surgery and Medical Management Groups Psychosocial Life Outcomes at Each Follow-up[a]

Psychosocial Outcomes	Baseline			First Follow-up			Second Follow-up			Third Follow-up		
	Surgery (n = 57), n (%)	MM (n = 18), n (%)	*P* Value	Surgery (n = 57), n (%)	MM (n = 18), n (%)	*P* Value	Surgery (n = 57), n (%)	MM (n = 18), n (%)	*P* Value	Surgery (n = 42), n (%)	MM (n = 9), n (%)	*P* Value
Full-time employment	56	44	ns	**68**	**39**	**.025**	**61**	**33**	**.037**	43	22	ns
Independent living	56	33	ns	**84**	**39**	**<.001**	**74**	**44**	**.022**	**76**	**33**	**.012**
Financial independence	72	61	ns	**81**	**56**	**.032**	**81**	**44**	**.003**	76	44	ns
Driving status	12	28	ns	**67**	**28**	**.004**	**72**	**33**	**.003**	**74**	**33**	**.019**

[a]Surgery, surgical group; MM, medical management group; ns, $P > .05$.

The surgery group participants reported satisfaction with the results of surgery at the first (M = 9.40, SD = 1.36), second (M = 9.02, SD = 1.93) and third (M = 8.98, SD = 2.09) follow-up assessments. Additionally, 97% of participants at the first follow-up, 84% at second follow-up, and 84% at third follow-up reported that they "would have the surgery again." At all 3 follow-up assessments, these percentages are significantly higher than would be expected to occur by chance (all P values $< .05$).

DISCUSSION

As reported previously,[4] the surgery and medical management groups had similar psychosocial characteristics at baseline. At all 3 evaluations, psychosocial life outcome differences between the surgery group and the medical management group were reported (Table 4). In the surgery group across the 3 evaluations, more individuals were working full-time compared with the medical management group. Similar employment outcomes have been reported in a study that followed individuals 4 years postsurgery.[15]

Seizure-related Outcomes

Surgery clearly resulted in significantly improved and sustained seizure outcomes (Table 4). These rates are similar to those reported by Téllez-Zenteno et al.[16] Driving status was the only psychosocial outcome found to correlate with seizure freedom. This finding is in contrast to Kellett et al[17] and Wheelock et al[18] who reported improved psychosocial outcomes with seizure freedom.

Psychopathology

There are a number of studies reporting a significant relationship between psychiatric history and seizure outcomes following surgery.[19-22] Baseline MMPI clinical scale elevations were not associated with poorer seizure outcomes. This finding is similar to a recent study by Adams et al[23] that reported no relationship between psychiatric history and seizure outcome among individuals with mesial temporal sclerosis at postsurgical follow-up. However, we found that individuals with elevated MMPI clinical scales postsurgery were significantly more likely to continue experiencing seizures at each follow-up assessment. Devinsky et al[24] reported a similar finding in which there was a significant relationship between postsurgical depressive symptoms and ongoing seizures at a 24-month follow-up. In terms of psychiatric comorbidity at follow-up, there were no differences in rates of depression, anxiety, or treatment related to these conditions between the surgery group and medical management group at the second and third follow-up. Devinsky et al[24] also reported similar rates of depressive symptoms in their sample 24 months postsurgery.

Quality of Life and Satisfaction With Surgery

At the initial follow-up, the surgery group endorsed higher quality of life than the medical management group. A similar finding was reported by Markand et al.[25] This significant difference disappeared at the second and third follow-up interviews. As reported by Wilson et al,[26,27] this finding may reflect the difficulties discarding the sick role and the "burden of normality" particularly among individuals who are seizure free. Interestingly, seizure freedom did not correlate with better quality-of-life ratings at the second and third follow-up. Additionally, individuals in the surgery group were very satisfied with the results of their surgery at all follow-up interviews.

Limitations

The sample size is modest, limiting the data analyses, and individuals were not randomly assigned to the surgical or medical management groups.[4] Controls were individuals with TLE who were considered for surgery but did not have surgical intervention. Both groups were comparable in baseline cognitive and psychosocial characteristics. Because of the difficulty of scheduling follow-up in-person interviews, data were gathered by telephone with the use of structured interviews via self-report with confirmation from significant others when appropriate. It was not possible to use longer standardized measures of quality of life in the current study design. When possible, information was cross-checked with medical records at the initial follow-up (5-year), but, at the subsequent follow-up interviews, most participants were no longer receiving medical treatment at the surgical center. At the third follow-up, the surgical and medical management group demonstrated attrition. The majority of individuals were not located or lost at follow-up. Finally, we neglected to take into account the fact that our sample was aging and may be of retirement age, and these individuals were excluded from analyses when appropriate.

CONCLUSION

This systematic long-term investigation provides support for the positive impact of ATL on long-term psychosocial real-life outcomes. Seizure freedom was achieved in two-thirds of the sample at all time points, reflecting previous shorter-term follow-up studies and providing support for the long-term seizure freedom of this surgical procedure. Driving was predicted by seizure freedom at all 3 evaluations; however, seizure freedom did not predict additional psychosocial outcomes. The vast majority of surgical participants had significantly reduced seizure frequency across all follow-up evaluations. Seizure reduction, not only seizure freedom, may play a significant role in improved psychosocial outcomes over time, reflecting the complex nature of the relationship between seizures, seizure freedom, and psychosocial outcomes.

Disclosures

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CME QUESTIONS:

1. A 37-year-old female with a long-standing history of epilepsy and seizures underwent anterior temporal lobectomy 17 years ago. She reports that in the past 12 months she has been seizure free. What is the most likely psychosocial outcome of seizure freedom in the prior 12 months?
   A. Full-time employment
   B. Holding an active driver's license
   C. Living independently
   D. Financial independence

2. Elevated Minnesota Multiphasic Personality Inventory (MMPI) following anterior temporal lobectomy predicts which of the following outcomes?
   A. A higher rate of clinical depression
   B. A lower rate of clinical depression
   C. A higher likelihood of continued seizures
   D. A lower likelihood of continued seizures

3. What is the percentage of patients that remain on antiepileptic drug therapy 5 years after anterior temporal lobectomy?
   A. 60-65%
   B. 50-55%
   C. 40-45%
   D. 30-35%
   E. 20-25%