

The effects of epilepsy surgery on physical functioning, emotional status and health - related quality of life

Filiz Altug¹, Feridun Acar², Tuba Can³, Goksemin Acar⁴, Ugur Cavlak⁵

ABSTRACT

Objective: The study was conducted to investigate the effects of epilepsy surgery on physical functioning, emotional status and health-related quality of life in patients with epilepsy.

Methodology: Thirty four participants were evaluated in this study. Group I consisted of 17 consecutive patients who underwent epilepsy surgery. Group II included 17 healthy controls. While each patient was evaluated three times: before surgery, after surgery (6th month), and at the end of the first year after surgery, the controls were evaluated just one time. The Nottingham Health Profile (NHP) was used to assess quality of life. Beck Depression Inventory (BDI) was applied to detect depressive symptoms. A 12- meter Walking Test (mobility) and the Barthel Index (Daily Living Activities) were used to evaluate physical functions.

Results: The results showed that the patients' quality of life and their mobility improved after surgery ($p < 0.05$). Most of the patients reported decreased depressive symptoms after surgery ($p < 0.001$). No significant differences in terms of daily living activities were found. The results of this study also showed that the BDI scores were highly correlated with NHP scores ($p < 0.05$). At 6th month after surgery, although the patients' scores in terms of all outcomes measurements were worst compared to the controls, the scores of the two groups were more or less similar after one year ($p > 0.05$).

Conclusion: Epilepsy surgery is an effective treatment improving physical functioning and QOL, and supporting emotional status of the patients with epilepsy, positively.

KEY WORDS: Epilepsy Surgery, Physical Functioning, Health-Related Quality of Life, Emotional Status.

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INTRODUCTION

Epilepsy is a common neurological disorder affecting at least 0.5 to 1% of any population.¹ Epilepsy not only affects patients directly through actual events, but also has major negative effects on physical and psychosocial health areas¹. Epilepsy is associated with high rates of psychiatric co-morbidity and among psychiatric in patients, the association between disease and quality of life (QOL) is greatest for patients with depression.^{2,3} The effect of depressive symptomatology on QOL in epilepsy is very strong.⁴ Depression has significant negative impact on the quality of life in patients with epilepsy.^{5,6} Surgical treatment is considered in patients with epilepsy. It has been estimated that approxi-

mately 70% of patients are seizure free after this procedure at least in the short term. Epilepsy surgery results in different outcomes with respect to the degree of control of epileptic seizures. Lowe at al found that depression is associated with diminished quality of life (QOL) in epilepsy patients, the relative contributions of epilepsy-specific concerns, as well as clinical and cognitive variables of QOL.⁷ The real therapeutic goal of epilepsy surgery is not just to reduce the number of seizures, but to better the patient's quality of life (QOL) by reducing or topping those seizures.¹ To date, many articles have examined quality of life and depressive symptoms after surgery for epilepsy.^{1,5,7-9}

Surgical treatment is considered in patients with epilepsy. It has been estimated that approximately 70% of patients are seizure free after this procedure at least in the short term. Epilepsy surgery results in different outcomes with respect to the degree of control of epileptic seizures.¹⁰ The real therapeutic goal of epilepsy surgery is not just to reduce the number of seizures, but to better the patient's quality of life (QOL) by reducing or topping those seizures.¹ Loring at al, found that depression is associated with diminished quality of life (QOL) in epilepsy patients, the relative contributions of epilepsy-specific concerns, as well as clinical and cognitive variables of QOL.⁸ To date, many articles have examined quality of life and depressive symptoms after surgery for epilepsy.^{1,7,10}

The aim of this study was to describe the effects of surgery treatment on physical functioning, emotional status and health - related quality of life in epilepsy patients.

METHODOLOGY

Sample: Thirty four participants were evaluated at Pamukkale University in departments of neurosurgery. Group I consisted of 20 (11 male, 9 female) consecutive patients who underwent epilepsy sur-

Table-I: Demographics of the sample.

Variables	Group I Mean±SD	Group II Mean±SD	t	P*
Age (yr)	35.70 ± 12.49	35.64 ± 3.51	0.019	0.985
Height (cm)	166 ± 0.07	165 ± 0.08	0.129	0.898
Weight (kg)	72.70 ± 14.21	67.02 ± 11.02	1.301	0.203
BMI (Kg/m ²)	26.40 ± 5.37	26.26 ± 2.54	1.482	0.148

BMI: Body Mass Index

*Independent Samples t Test

gery. Three patients (2 male, 1 female) excluded from the study because of incomplete assessments after surgery. Group II included 17 (9 male, 8 female) healthy persons. Group I had epilepsy surgery in the form of Temporal lobectomy (N=9), Amygdalahippocampectomy (N=5), Vagal Nerve stimulation (N=3). The mean age of the patients and healthy controls were 35.70±12.49, 35.64±3.51 years, respectively. The characteristics of the patients and healthy controls are summarized in Table-I and II.

Outcome Measures: While each patient was evaluated three times: before surgery, after surgery (6th month), and at the end of the first year after surgery, the controls were evaluated just one time. The sample was evaluated using the following items. An experienced physical therapist completed the evaluation process:

I. Physical Functioning

a) The Barthel ADL Index: The Barthel ADL index is a scale used to measure performance in basic Activities of Daily Living. It covers personal toileting, feeding, mobility from bed to chair, transfers, bathing, walking, dressing, incontinence and going upstairs. A total of 10 activities are scored, and the values are then added to give a total score ranging from 0 (totally dependent) to 100 (completely independent).¹¹

b) A 12-meter Walking Test: The subject is standing still and then walks at a comfortable (preferred) speed straight forward. The subject's regular footwear is used. Timing commences after the command "Go" and stops when the subject passes the mark for twelve meters. One trial is performed. Average time required to complete the test time is reported.¹²

II. Emotional Status

Beck Depression Inventory (BDI): Beck Depression Inventory was applied to detect emotional status. It is a 21-item self-report questionnaire on which presence and severity of depressive symptoms are assessed. Each item is scored on a four-point scale ranging from 0 (absent) to 3 (severe). Total scores

Table-II: Characteristics of seizures in Group I.

Variables	Min-Max	Mean±SD
Duration of Epilepsy, yrs	1.50 - 37.00	20.32 ± 9.11
Frequency of Seizures, month	1.00- 30.00	7.70 ± 7.33
Duration of Seizures, min.	0.50- 5.00	5.94 ± 9.20

Table-III: Assessments of seizures and dose of antiepileptic in Group I.

Variables	Pre-surgery (N=17)	After surgery (6 month) (N=17)	After surgery (12 month) (N=17)	Pre – after 6 month	Pre – after 12 month	After 6 –12 month
Frequency of Seizures (month)	7.70 ± 7.33	1.17 ± 1.66	0.41 ± 1.27	0.002*	0.001*	0.033*
Duration of Seizures (min)	5.94 ± 9.20	1.20 ± 2.49	0.64 ± 1.27	0.020*	0.019*	0.089
Equivalent Daily Dose of Antiepileptic (mg)	1291.17±708.92	891.17±555.15	597.05±315.47	0.001*	0.000*	0.007*

*Paired- Samples t Test was used.

may range from 0 to 63. The cut-off point is 17 for in a Turkish adult population. The BDI was adapted into Turkish in 1988 by Hisli with acceptable reliability and validity findings. The BDI have high reliability and internal consistency.¹³ The total score obtained before surgery and six month thereafter was used as an outcome.

III. Health - Related Quality Of Life

Nottingham Health Profile: The Nottingham Health Profile (NHP) was used to assess quality of life. NHP was developed to be used in health and disease. It consists of two parts. Part I contains 38 yes/no items in 6 dimensions: pain, physical mobility, emotional reactions, energy, social isolation and sleep. Part II contains 7 general yes/no questions concerning daily living problems. The two parts may be used independently and part II is not analysed in this study. Part I is scored using weighted values which give a range of possible scores from zero (no problems at all) to 100 (presence of all problems within a dimension).¹⁴

Statistical Analyses: Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS version 13.0). The Independent Samples Test was used to comparisons of groups. The Paired – Samples T- Test was applied to compare before and after surgery results. Pearson Correlations were used to describe relationship between the BDI and QOL scores. A level of p<0.05 was considered significant.

RESULTS

The demographics and clinical characteristics of the patients and healthy controls at baseline are shown in Table I and II. The results of this study showed that with a epileptic patients' frequency of seizures, duration of seizures and antiepileptic equivalent intake decreased at sixth month and twelfth month after surgery significantly (p<0.05). The antiepileptic equivalents intake was reduced from a mean of 1291.17±708.92 to 597.05±315.47 mg/day after twelfth months (Table-III).

Table-IV: Assessments of quality of life, emotional status and mobility in Group I.

Variables	Pre-surgery (N=17)	After surgery (6 month) (N=17)	After surgery (12 month) (N=17)	Pre – after 6 month	Pre – after 12 month	After 6-12 month
Nottingham Health Profile (NHP)	Mean±SD	Mean±SD	Mean±SD	P	P	P
Energy Level (EL)	42.87 ± 36.20	19.34 ± 30.90	9.36 ± 17.33	P=0.021*	P=0.002*	P=0.044*
Pain (P)	23.98 ± 28.56	2.15 ± 4.12	1.26 ± 2.94	P=0.004*	P=0.003*	P=0.174
Emotional Reaction (ER)	45.34 ± 36.74	23.07 ± 24.07	13.31 ± 14.07	P=0.034*	P=0.005*	P=0.070
Social Isolation (SI)	34.93 ± 32.33	15.63 ± 16.61	10.89 ± 15.83	P=0.030*	P=0.019*	P=0.217
Sleep (S)	41.54 ± 31.26	21.62 ± 28.47	16.68 ± 24.08	P=0.069	P=0.026*	P=0.232
Physical Abilities (PA)	14.04 ± 17.09	5.06 ± 10.62	0.65 ± 2.71	P=0.103	P=0.006*	P=0.044*
Total of NHP	202.74 ± 156.92	88.54 ± 64.35	53.42 ± 49.98	P=0.012*	P=0.003*	P=0.011*
Barthel ADL Index	90.88 ± 1.40	91.29 ± 0.98	91.29 ± 0.98	P=0.311	P=0.311	P=0.311
Beck Depression Inventory (BDI)	21.00 ± 11.09	5.52 ± 7.35	4.23 ± 3.73	P=0.000*	P=0.000*	P=0.358
12 Meters Walking Test (sn)	14.08 ± 4.80	11.66 ± 5.07	8.50 ± 1.94	P=0.000*	P=0.000*	P=0.003*

Table-V: Comparison of the two groups.

Variables	Group I (Patients) Mean±SD	Group II (Controls) Mean±SD	t	P *
Nottingham Health Profile (NHP)				
Energy Level (EL)				
Pre-surgery	42.87 ± 36.20	9.60 ± 22.04	3.23	0.003*
After-surgery (6th month)	19.34 ± 30.90	9.60 ± 22.04	1.05	0.298
After-surgery (12th month)	9.36 ± 17.33	9.60 ± 22.04	-0.035	0.973
Pain (P)				
Pre-surgery	23.98 ± 28.56	1.93 ± 4.31	3.14	0.004*
After-surgery (6th month)	2.15 ± 4.12	1.93 ± 4.31	0.153	0.879
After-surgery (12th month)	1.26 ± 2.94	1.93 ± 4.31	-0.528	0.601
Emotional Reaction (ER)				
Pre-surgery	45.34 ± 36.74	8.45 ± 14.51	3.85	0.001*
After-surgery (6th month)	23.07 ± 24.07	8.45 ± 14.51	2.144	0.040*
After-surgery (12th month)	13.31 ± 14.07	8.45 ± 14.51	0.991	0.329
Social Isolation (SI)				
Pre-surgery	34.93 ± 32.33	3.77 ± 11.23	3.75	0.001*
After-surgery (6th month)	15.63 ± 16.61	3.77 ± 11.23	2.43	0.020*
After-surgery (12th month)	10.89 ± 15.83	3.77 ± 11.23	1.51	0.140
Sleep (S)				
Pre-surgery	41.54 ± 31.26	6.24 ± 16.08	4.13	0.000*
After-surgery (6th month)	21.62 ± 28.47	6.24 ± 16.08	1.93	0.061
After-surgery (12th month)	16.68 ± 24.08	6.24 ± 16.08	1.48	0.147
Physical Abilities (PA)				
Pre-surgery	14.04 ± 17.09	2.52 ± 5.93	2.61	0.014*
After-surgery (6th month)	5.06 ± 10.62	2.52 ± 5.93	0.86	0.396
After-surgery (12th month)	0.65 ± 2.71	2.52 ± 5.93	-1.179	0.247
Total of NHP				
Pre-surgery	202.74 ± 156.92	32.53 ± 47.03	4.28	0.000*
After-surgery (6th month)	88.54 ± 64.35	32.53 ± 47.03	2.89	0.007
After-surgery (12th month)	53.42 ± 49.98	32.53 ± 47.03	1.25	0.219
Beck Depression Inventory (BDI)				
Pre-surgery	21.00 ± 11.09	3.58 ± 3.35	6.19	0.000*
After-surgery (6th month)	5.52 ± 7.35	3.58 ± 3.35	0.99	0.330
After-surgery (12th month)	4.23 ± 3.73	3.58 ± 3.35	0.53	0.599
12 m. Walking Test (sn)				
Pre-surgery	14.08 ± 4.80	7.17 ± 0.69	5.86	0.000*
After-surgery (6th month)	11.66 ± 5.07	7.17 ± 0.69	3.61	0.001*
After-surgery (12th month)	8.50 ± 1.94	7.17 ± 0.69	2.63	0.013*
Barthel ADL Index				
Pre-surgery	90.88 ± 1.40	92.47 ± 2.50	-2.28	0.029*
After-surgery (6th month)	91.29 ± 0.98	92.47 ± 2.50	-1.80	0.081
After-surgery (12th month)	91.29 ± 0.98	92.47 ± 2.50	-1.80	0.081

* Independent Samples t Test

The quality of life assessments (NHP) were significantly improved between the three assessments. Post hoc. comparisons (Total of NHP scores) revealed that the comparison between preoperative and sixth month ($p=0.012$), preoperative and twelfth month ($p=0.003$) and sixth month after surgery and twelfth month ($p=0.011$) were significant. All aspects of the NHP, including energy level, pain, emotional reactions, social isolation scores significantly decreased after surgery ($p<0.05$). The total NHP scores and sub tests assessment at base-

line, sixth month and twelfth month are shown in shown in Table IV. The BDI scores of thought disorders significantly decreased with month ($p<0.05$). Post hoc BDI scores comparison revealed that differences were significant between before surgery and sixth month after surgery ($P=0.000$), between before surgery and twelfth month postop ($P=0.000$) and between after surgery sixth month and twelfth month ($P=0.358$). ADL scores of the patients were found to be higher before surgery. That means majority of the patients were independent before and

at twelfth month after surgery. Therefore, no improvements occurred in terms of ADL scores (Table-IV). The 12 meters Walking Test score were significantly improved between the three assessments. Post hoc comparisons revealed that the comparison between preoperative and sixth month (p=0.000), preoperative and twelfth month (p=0.000) and sixth month after surgery and twelfth month (p= 0.003) (Table-IV).

There were significant differences in terms of all measurements between the Group I and Group II. At 6th month after surgery, although the patients' scores in terms of all outcomes measurements were worst compared to the controls, the scores of the two groups were more or less similar after one year (p>0.05). Table-V demonstrates that the NHP, BDI and 12m. Walking Test scores improved after the surgery in the Group I.

The results of this study showed that the BDI scores were not correlated with duration of disease, frequency of seizures and duration of seizures. The same results were also found for NHP scores. The results of this study indicate that the baseline total NHP scores were highly correlated with baseline BDI scores (p=0.000). Total NHP scores at sixth month (p=0.033) and twelfth month (p=0.019) also showed a positive correlation with the BDI scores (Table VI).

DISCUSSION

The patients with epilepsy who were being followed prospectively in this study showed that epilepsy surgery led to significant improvements, such as walking ability, emotional status and quality of life after surgery. The improvements over baseline were sustained twelve month after surgery.

Plenty of studies have been done about quality of life of patients undergoing epilepsy surgery in recent years. Epilepsy surgery is an effective technique to reduce and even cure seizures in a substantial proportion of patients with medically refractory partial epilepsy. Surgery treatment has consistently been shown to attenuate the depressive symptoms of epilepsy and to increase the quality of life according to the related literature.¹ A few studies examined overall Health Related Quality of Life (HRQOL). In the studies, it has shown improvement concerning HRQOL within 1 year of surgery or in longer follow-up (at least 2 years).^{5,7} Spencer et al also investigated the effects of resective epilepsy surgery on quality of life and then they found that a significant improvement according to the Quality of Life in Epilepsy Inventory (QOLIE-89) score

Table-VI: Relationships between quality of life and emotional status in Group I.

Variables	Preop NHP (Total)	Postop NHP (Total)	Postop 12M (Total)
BDI (Preop)	r=0.837 P=0.000*		
BDI (6th month)		r=0.519 P=0.033*	
BDI (12th month)			r=0.561 P=0.019*

BDI: Beck Depression Inventory.

NHP: Nottingham Health Profile

*Pearson (P) Correlation Coefficients was used.

at the first postoperative measurement (within 6 months after surgery) but these effects attenuated after about 2 years.¹² According to some studies; usually only complete seizure freedom after surgery was associated with improvements, but some reports found that substantial reduction in seizure frequency (75-90%) could effect notable (lesser) improvements in HRQOL.^{5,7}

The 12m. Walking Test score of the patients were significantly improved during three assessments after surgery. This results show that the more mobility scores the improved QOL and the decreased depressive symptoms and vice versa.

Current studies show that chances for seizure control following epilepsy surgery are also improved in patients with extratemporal foci. Whether this improvement translates into improvement in QOL and which domains were predominantly affected.¹³ A recent study shows that one year after resective surgery resulted in improved scores for the Subjective Handicap of Epilepsy (SHE) questionnaire and decreased of BDI when patients were evaluated preoperative and postoperative after one year. Furthermore after surgery, seizure frequency was significantly decreased and QOL was significantly increased in this report. The improvements in QOL were detected not only in patients who became completely seizure free, but also in those who continued to have seizures, mostly at a lower frequency, after surgery.¹⁴ These results were supported by the findings of Tanriverdi et al.¹⁵ and Te'llez-Zenteno et al.¹³ In our study, BDI and NHP total scores, including sub domains reduced after surgery at twelve months.

Dodrill and Morris investigated effects of Vagal nerve stimulator (VNS) on QOL and cognition in Epilepsy. They found that the VNS are effective on

QOL.¹⁶ According to our results, QOL improved after surgery. A recent systematic review of studies exploring the association between use of AEDs (Antiepileptic Drug) and seizure freedom after epilepsy surgery in studies with <5 years of follow-up suggests that withdrawal or decrement of AEDs may relate to seizure recurrence.¹⁷ In our results, AED was reduced from a mean of 1291.17 ± 708.92 to 597.05 ± 315.47 mg/day after twelfth months.

As known, the prevalence of depression is higher in epilepsy when compared to patients with other chronic disorders and general population. Previous investigations have reported strong associations between QOL and depressive symptoms in epilepsy.^{18,19} Our results showed that the total NHP scores were highly correlated with BDI scores. Six month after surgery, seizure frequency significantly decreased and QOL significantly increased. Overall, 58.8% of patients were completely seizure free six month after surgery. In addition to this, duration of epilepsy was not found to be correlated with quality of life score. Some recent reports showed that freedom from seizures is not a prerequisite for an improved psychosocial outcome after temporal lobe epilepsy surgery.¹⁵ On the other hand, some studies claim that freedom from seizures is the key to success for good psychosocial outcome in temporal lobe epilepsy.¹⁹ Studies on the short-term efficacy of surgery for temporal lobe epilepsy have found that 60–85% of patients experience no seizures during the first year after surgery.¹⁰ Although recent reports are in conflict on relations between seizure freedom and improvements in psychosocial functioning²⁰, we found that psychosocial well being and improved QOL were seen to be important predictors for these patients just evaluated in this study. Two major results emerged from this study: (1) surgery has significantly positive effects on psychosocial well being, mobility and quality of life; (2) depressive symptoms are important affecting factor for QOL in epileptic patients.

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Authors' Contributions:

FA: Completed the study design, manuscript writing, data collection and statistical analysis.

FA: Completed the study design, editing manuscript, and data collection.

TC: Collected the data.

GA: Completed the study design, editing manuscript, and data collection.

UC: Completed the study design, editing and writing manuscript, and data collection.