Quality of Life of Pre- And Post-Surgical Patients with Drug-Resistance Epilepsy Due to Lesional Temporal Lobe

Bac Thanh Nguyen[1], He Van Dong[2], Hoe Van Vu[1], Son Dinh Nhu[3], Tien Ngoc Bui[4], Phuong Xuan Nguyen[1], Tuan Anh Nguyen[2], Manh Huy Bui[2], Nga Thi Nguyen[5], Duy Pham[2], Le Quyen Nguyen[6], Van Dinh Tran[1,2]*

1. Department of Neurosurgery, Vietnam Military Medical University
2. Neurosurgery Center, Viet Duc University Hospital
3. Department of Neurology, Vietnam Military Medical University
4. Faculty of Medicine, Hoa Binh University
5. Department of Neurology, Thai Binh Hospital
6. Hanoi Medical University

Abstract

The study evaluated changes in quality of life in 35 cases who underwent surgical treatment for drug-resistant epilepsy caused by temporal lobe lesions at Viet Duc Hospital between May 2018 and September 2022.

Quasi-experimental research without a control group, longitudinal study followed 35 patients diagnosed with drug-resistant epilepsy caused by temporal lobe lesions who underwent surgery at Viet Duc University Hospital from May 2018 to September 2022. Quality of life was assessed using the SF-36 questionnaire before surgery and 1 month postoperatively.

The number of monthly seizures after surgery decreased significantly, with a p-value < 0,05. Seizures occurring within one month after surgery (Engel I) accounted for 74,3% of cases, while the remaining 25,7% showed improved seizure outcomes (Engel II, III). The surgery also led to an improvement in both physical and mental health, as reflected by a statistically significant increase with a p-value < 0,05.

The surgical treatment of drug-resistant epilepsy resulting from temporal lobe damage has been shown to be a highly efficacious intervention in reducing seizures and improving overall quality of life.

Clinical article (J Int Dent Med Res 2023; 16(3): 1383-1388)

Keywords: Quality of life, SF-36, epilepsy surgery, temporal lobe, amygdalohippocampectomy selective.

Received date: 16 May 2023 **Accept date:** 17 June 2023

Introduction

Epilepsy is a chronic neurological disorder that has a significant impact on the mental and physical well-being of patients. Factors such as cognitive ability, emotional and behavioral functioning, work capacity, social activities, self-esteem, social stigma, and the body's ability to adapt to seizures are particularly relevant to the patient's overall quality of life. Psychosocial problems and negative effects of antiepileptic drugs may persist for many years, particularly among patients with drug-resistant conditions, potentially increasing the risk of mental illness and reducing quality of life[1]. The prevalence of epilepsy in Vietnam is 44,8 per 100 000 people (95% CI 30,6-59) [2]. The rate of drug-resistant epilepsy accounts for 20% - 30% of the total number of epilepsy patients[3],[4]. Temporal lobe epilepsy is the most common type of epilepsy, representing 80%[5,6,7] and demonstrating the highest level of drug resistance[8,9,10]. The common lesions in the temporal lobe that cause drug-resistant epilepsy include hippocampal sclerosis, focal cortical dysplasia, and low-grade brain tumors. Hippocampal sclerosis is the primary cause of medial temporal lobe lesions that result in drug-resistant epilepsy[6,10]. Surgical intervention for temporal lobe epilepsy is a highly effective and safe treatment option, with reported seizure

Corresponding author:
Van Dinh Tran
Department of Neurosurgery, Military Medical Academy. Vietnam.
E-mail: tranvanpttk@gmail.com

cessation rates ranging from 69% to 90% after surgery and long-term follow-up periods of up to 12 years demonstrating seizure cessation rates of 76,2% and 70,8%, respectively[11,12]. In addition, approximately 70% of patients have been shown to reduce or discontinue antiepileptic drugs after surgery [13]. Both short-term and long-term studies indicate that surgical intervention plays a crucial role in improving the quality of life of epilepsy patients, reducing depression levels postoperatively[14], and improving quality of life to a degree that is closely related to the extent of postoperative resolution[15].

Assessment of quality of life was conducted before and after surgical intervention for epilepsy resulting from temporal lobe damage, potentially utilizing one of several assessment tools, such as the SF-36 questionnaire or QOLIE-89/QOLIE-31 scales. SF-36 is widely utilized in many treatment centers worldwide, encompassing 36 questions divided into eight domains, including physical health, mental health, social functioning, pain, energy, and general health[1,16]. Research has been conducted on the impact of epilepsy on quality of life at numerous epilepsy treatment centers globally. Factors such as seizure frequency, antiepileptic drugs, and comorbidities have been identified as negatively impacting quality of life. Conversely, surgical intervention for drug-resistant epilepsy has been shown to improve quality of life, with patient independence being of utmost importance[1,17].

Materials and methods

Patients and Methods

The study was designed as a quasi-experimental research without a control group. It was conducted at the neurosurgery center of Viet Duc University Hospital from May 2018 to September 2022.

Thirty-five patients who met the inclusion criteria were invited to participate in the study.

These patients failed of adequate trials of at least two tolerated, appropriately chosen, and used antiepileptic drug schedules (as monotherapies or in combination) to achieve sustained seizure freedom and were diagnosed with drug-resistant epilepsy, as per the definition of ILAE (International League Against Epilepsy)[18].

These patients were also found a lesional temporal lobe in IRM, and/or interictal epileptic waves concordant on the same side in EEG. Written informed consent was obtained from all participants who agreed to be interviewed and enrolled in the study.

Before surgery, each patient received a 3 Tesla cranial magnetic resonance imaging scan according to the ILAE protocol12, a 32-channel scalp EEG with a minimum of 30 minutes of electroencephalogram recording, memory assessment using the Weschler scale, and a quality-of-life assessment using the short set of questions from the SF-36.

The patient underwent surgery after the clinical data, electroencephalogram, and imaging were consistent, and the location of the lesion was identified in the temporal lobe.

One month after the surgery, patients received a clinical examination, quality-of-life assessment using the short set of questions from the SF-36, electroencephalography, and postoperative cranial magnetic resonance imaging. Surgical outcomes were classified according to the Engel classification (Engel, 1993).

Measuring instrument

The Medical Outcomes Study Short Form-36 (SF-36) was used to assess various domains of Health-related quality of life (HRQOL) through eight subscales: (1) physical functioning (PF), (2) role limitations due to physical health issues (RP), (3) bodily pain (BP), (4) social functioning (SF), (5) general mental health, which includes psychological well-being and psychological distress (MH), (6) role limitations due to emotional issues (RE), (7) vitality, which includes energy and fatigue (VT), and (8) general health perception (GH). The SF-36 score ranges from 0 to 100, with higher scores indicating better QOL. Despite being a generic QOL measure, SF-36 has been utilized in previous epilepsy QOL research. The reliability and validity of SF-36 for the Vietnamese population have also been demonstrated by R E Watkins[19].

Statisical Analysis

Data was analysed using Stata version 15. As the numbers in the groups are small, both mean, standard deviation, median scores and quartile ranges are quoted. To compare the quality of life and seizure frequency before and after surgery, a T-test was used for continuous variables with normal distribution, and the Mann-Whitney U test was used for continuous variables with non-normal distribution. A probability value

less than 0.05 was considered statistically significant for all analyses.

Research ethics

The research was approved by the medical ethics committee, and the research subjects were clearly informed about the purpose and significance of the study. Study subjects were given the option to voluntarily participate in the study or not. The information collected was solely for research purposes and kept confidential, not to be used for any other purposes.

Results

Characteristics of the patients

During the study period, 35 patients underwent surgery, with a male/female ratio of 1,5:1, or approximately 1,5 times more male patients than female patients. All patients were young people under 40 years old, with the age group of 10-29 years old accounting for the majority at 65,7%. Patients with first seizure onset were mostly under 10 years old, accounting for 57,1%. Right or left-sided epileptic lesions were encountered with equal frequency. The average hospital stay was 1-2 weeks, representing 65,7% of patients, while only one patient (2,9%) had a hospital stay of 31 days for post-op meningitis treatment and fully recovered after treatment. The average number of seizures per month before surgery was 12. 51,4% undergoing selective amygdalohippocampectomy and 48,6% undergoing lesionectomy. There were no patients who required blood transfusions during the surgery.

Health-related quality of life pre- and post-surgery

The results revealed significant improvements in quality of life across most (7/8) sub-scales of SF-36, except for the body pain sub-scale. The most substantial improvement was observed in the limitations in daily activities due to mental health problems sub-scale. The mean score for this sub-scale increased significantly from 33,3 (IQR: 0 – 66,7) before surgery to 100 (IQR: 3 - 100) after surgery, with a p-value of 0,01.

The table showed a statistically significant improvement in the quality of life score, including physical health, mental health, and total, after surgery compared to before surgery (p-values of 0,02, <0,0001, and 0,001, respectively). The mean score for the quality of life increased from 50 to 66, indicating a substantial improvement. Furthermore, the surgery was highly effective in reducing seizure frequency, with the number of seizures per month significantly decreasing from 12 to 0.

Association between quality of life and seizure frequency:

Through the above table analysis, it was observed that all patients with post-operative seizures (Engel I) accounted for 74,3% while the remaining cases showed a decrease in seizure frequency after surgery (25,7%). None of the cases showed an increase or no improvement in seizure frequency after surgery. There were 6 postoperative complications (17,1%): meningitis (8,5%). trainset focal paralysis (2,9%). and soft tissue infection (5,7%). There were no mortalities.

This study presents a cohort of 35 patients who underwent selective amygdalohippocampectomy or temporal lesion resection with significantly improved post-operative seizure control, and minimal complications, despite being in a low-resource environment. The results of postoperative seizure control – 74,3% – are entirely consistent with similar temporal lobe surgery cohorts reported in the literature in high-income countries, that's similar to Yaşargil (2010) and Wei Li. (2019).

Our overall complication rate of 17,1% was similar to other published series after drug-resistant TLE surgery [21]. However, there were a notable number of infections. Approximately 15% infection rate: three cases of meningitis and two soft tissue infections which all recovered well with conservative antibiotic treatment. The infection rate may represent difficulty with maintaining sterility in an OR with drapes and surgical gowns that are repeatedly reused. This may explain why our infection rate was higher than typical high-income countries for which postoperative meningitis accounted for 6,6% of cases, and superficial incisional infections accounted for 1%[22].

Discussion

Our study indicates that surgery significantly improves the quality of life of patients in both physical and mental health aspects, which is consistent with findings from other studies worldwide. For instance, a retrospective

long-term follow-up study of more than 2 years in 50 patients with internal temporal lobe facial fibrosis who underwent surgery at the Royal Melbourne Hospital, Australia, showed a statistically significant improvement in quality of life[23]. In addition, a prospective long-term follow-up study conducted in Sweden over a period of 2 to 14 years in 68 patients with drug-resistant epilepsy, of which 58 underwent temporal lobe surgery, demonstrated a clear improvement in quality of life, as assessed on the SF-36 scale, which remained stable throughout the follow-up period [24]. Different studies have demonstrated improvement in various domains of quality of life after epilepsy surgery, such as overall quality of life, cognitive and psychological aspects, and those related to epilepsy[25]. In our study, the psychological state of patients, particularly anxiety related to epilepsy, showed the most significant improvement, consistent with many other studies that have shown this aspect to be a strong predictor of recovery after surgery[26]. This may be due to the high expectations of patients towards surgical outcomes. Our study also found no new cases of depression after surgery, which is an important predictor of quality of life, and is known to have a strong relationship with depression, especially in patients with hippocampal fibrosis [27]. It has been hypothesized that altered hippocampal structure and function may lead to limbic-cortical dysfunction, which contributes to depressive symptoms that may not be completely resolved through surgery [28]. The results of Benevides' study support this hypothesis, as it found that the preoperative and postoperative depression rates were similar in the same patient population[14].

Similar to previous studies, our research showed that surgery improves seizure control and is a predictor of quality of life[26]. However, we did not find a statistically significant association between seizure control and quality of life before surgery, possibly due to the limited sample size. Multivariate analysis studies have shown that seizure control after surgery strongly correlates with improved quality of life[29,30,31]. Complete seizure cessation after surgery (Engel I) is a better prognostic factor for quality of life improvement compared to surgical seizure reduction (Engel II, III, IV)[14]. Complete seizure cessation after surgery can facilitate the reduction or discontinuation of epilepsy drugs, reducing their side effects over time and leading to better long-term quality of life.

Conclusions

Drug-resistant temporal lobe epilepsy is more prevalent in men, especially in adolescents. Surgery has been found to provide effective seizure control and significantly improve the quality of life, including both physical and mental aspects. Various dimensions of quality of life have shown significant improvement after surgery. However, none of the preoperative variables have been identified as predictors of improved quality of life after surgery.

Declaration of Interest

The authors report no conflict of interest.

Characteristics		n	%
Gender			
	Male	22	62,9
	Female	13	37,1
Age of seizure onset			
	<10	20	57,1
	10 - 19	11	31,4
	20 - 29	3	8,6
	30 - 39	1	2,9
	>40	0	
Injured side			
	Right	18	51,4
	Left	17	48,6
Duration of hospitalization			
	< 7 days	6	17,1
	7-14 days	23	65,7
	15 - 30 days	5	14,3
	>30 days	1	2,9
Number of seizures/month before surgery (Intermediate, IQR)		12	2-150
Surgical methods			
	Selective amygdalohippocampectomy (SAH)	18	51,4
	Lesionectomy	17	48,6
The amount of blood transfusion during surgery			
	0 units	35	100
	1 – 2 units	0	0

Table 1. Characteristics of the patients.

	Pre-surgery (n=35)		*Post-surgery (n=35)*		*P-value*
	Mean (SD)	*Median (IQR)*	*Mean (SD)*	*Median (IQR)*	
Physical activity	61,6 (30,5)	60 (35 - 95)	72,4 (20,8)	70,4 (60 - 90)	0,01
Limitations in daily activities due to physical health	33,9 (37,7)	25 (0 - 75)	49,5 (41,5)	50 (0 - 100)	0,05
Pain	70,5 (22,4)	70 (57.5 - 90)	71,8 (24,1)	77,5 (57,5 - 100)	0,41
General health condition	41,3 (17,8)	37,5 (25 - 50)	57,1 (19,5)	54,2 (45,8 – 70,8)	<0,0001
Limitations in daily activities due to mental health problems	33,3 (37,1)	33,3 (0 – 66,7)	64,9 (42,5)	100 (3 - 100)	0,01
Fatigue/energy levels	56,1 (21,8)	55 (45 - 70)	71,3 (20,9)	70 (50 - 90)	<0,0001
Mental state	56 (20,6)	56 (36 - 76)	72,8 (18,4)	76 (56 - 88)	<0,0001
Social interaction	52,1 (25,6)	50 (25 - 75)	69,3 (22,1)	75 (62,5 – 87,5)	<0,0001

Table 2. The subscales of SF-36 before and after surgery.

	Pre-surgery (n=35)		*Post-surgery (n=35)*		*P-value*
	Mean (SD)	*Median (IQR)*	*Mean (SD)*	*Median (IQR)*	
Quality of life					
Physical health	51,8 (20)	44.38 (36,7 – 74,8)	62,7 (19,8)	63,7 (50,8 – 74,8)	0,02
Mental health	49.4 (20,6)	46.5 (29,6 – 66,7)	69,6 (20,6)	70,7 (62 – 85,6)	<0,0001
Total	50,6 (18,9)	43.83 (35,7 – 70,8)	66,1 (18,9)	66,8 (54,2 – 76,5)	<0,0001
Number of seizures/month	65,1 (94,3)	12 (5 - 120)	7,3 (35,6)	0 (0 - 1)	0,001

Table 3. Changes in Quality of Life and Seizure Frequency Before and After Surgery.

Postoperative outcomes	**n**	**%**
Engel classification		
Seizure cessation (Class I)	26	74,3
Fewer seizures (Class II)	8	22,9
Amelioration of seizures (Class III)	1	2,8
No improvement (Class IV)	0	0
Postoperative complications		
Meningitis	3	8,5
Soft tissue infections	2	5,7
Focal paralysis	1	2,9
Death	0	0

Table 4. Postoperative outcomes.

Authors	**Number of patient**	**Surgical aproach**	**Engel I (Free of disabling seizures)**
Van Dinh Tran (2023)	35	SAH (18) Lesionectomy (17)	74,3%
Wei Li. (2019)[20]	131	Temporal lobe surgery	78,6%
Mario A. Alonso Vanegas (2017) [11]	Review from series articles	SAH Cortico-amygdalohippocampectomy	65%-69%
M.Gazi Yasargil (2010) [12]	73	SAH	75,3%

Table 5. Engel outcome scale.

References

1. Aydemir N, Özkara Ç, Canbeyli R, Tekcan A. Changes in quality of life and self-perspective related to surgery in patients with temporal lobe epilepsy. *Epilepsy & Behavior*. 2004;5(5):735-742. doi:10.1016/j.yebeh.2004.06.022
2. Tuan NA, Cuong LQ, Allebeck P, Chuc NTK, Persson HE, Tomson T. The incidence of epilepsy in a rural district of Vietnam: a community-based epidemiologic study. *Epilepsia*. 2010;51(12):2377-2383. doi:10.1111/j.1528-1167.2010.02699.x
3. Kwan P, Brodie MJ. Early Identification of Refractory Epilepsy. *N Engl J Med*. 2000;342(5):314-319. doi:10.1056/NEJM200002033420503
4. Pati S, Alexopoulos A v. Pharmacoresistant epilepsy: From pathogenesis to current and emerging therapies. *CCJM*. 2010;77(7):457-467. doi:10.3949/ccjm.77a.09061
5. Al-Otaibi F, Baeesa SS, Parrent AG, Girvin JP, Steven D. Surgical Techniques for the Treatment of Temporal Lobe Epilepsy. *Epilepsy Research and Treatment*. 2012;2012:1-13. doi:10.1155/2012/374848
6. Luan L, Sun Y, Yang K. Surgical strategy for temporal lobe epilepsy with dual pathology and incomplete evidence from EEG and neuroimaging. *Experimental and Therapeutic Medicine*. 2018;16(6):4886-4892. doi:10.3892/etm.2018.6774
7. Gleissner U, Helmstaedter C, Schramm J, Elger CE. Memory Outcome after Selective Amygdalohippocampectomy: A Study in 140 Patients with Temporal Lobe Epilepsy. *Epilepsia*. 2002;43(1):87-95. doi:10.1046/j.1528-1157.2002.24101.x
8. Epilepsy Surgery for Pharmacoresistant Temporal Lobe Epilepsy: A Decision Analysis | Epilepsy and Seizures | JAMA | JAMA Network. Accessed December 1, 2020. https://jamanetwork.com/journals/jama/fullarticle/10.1001/jama.2008.771
9. Semah F, Picot MC, Adam C, et al. Is the underlying cause of epilepsy a major prognostic factor for recurrence? *Neurology*. 1998;51(5):1256-1262. doi:10.1212/wnl.51.5.1256
10. Falconer MurrayA, Hill D, Meyer A, et al. TREATMENT OF TEMPORAL-LOBE EPILEPSY BY TEMPORAL LOBECTOMY A SURVEY OF FINDINGS AND RESULTS. *The Lancet*. 1955;265(6869):827-835. doi:10.1016/S0140-6736(55)90421-9
11. Alonso Vanegas MA, Lew SM, Morino M, Sarmento SA. Microsurgical techniques in temporal lobe epilepsy. *Epilepsia*. 2017;58(S1):10-18. doi:10.1111/epi.13684
12. Yaşargil MG, Krayenbühl N, Roth P, Hsu SPC, Yaşargil DCH. The selective amygdalohippocampectomy for intractable temporal limbic seizures. *J Neurosurg*. 2010;112(1):168-185. doi:10.3171/2008.12.JNS081112
13. Yardi R, Irwin A, Kayyali H, et al. Reducing versus stopping antiepileptic medications after temporal lobe surgery. *Ann Clin Transl Neurol*. 2014;1(2):115-123. doi:10.1002/acn3.35
14. Benevides ML, Costa Nunes J, Guarnieri R, et al. Quality of life long after temporal lobe epilepsy surgery. *Acta Neurol Scand*. 2021;143(6):629-636. doi:10.1111/ane.13406
15. Kellett MW, Smith DF, Baker GA, Chadwick DW. Quality of life after epilepsy surgery. *J Neurol Neurosurg Psychiatry*. 1997;63(1):52-58. doi:10.1136/jnnp.63.1.52
16. Malmgren K, Sullivan M, Ekstedt G, Kullberg G, Kumlien E. Health-related quality of life after epilepsy surgery: a Swedish multicenter study. *Epilepsia*. 1997;38(7):830-838. doi:10.1111/j.1528-1157.1997.tb01471.x
17. Tanriverdi T, Olivier A, Poulin N, Andermann F, Dubeau F. Long-term seizure outcome after mesial temporal lobe epilepsy surgery: corticalamygdalohippocampectomy versus selective amygdalohippocampectomy. *J Neurosurg*. 2008;108(3):517-524. doi:10.3171/JNS/2008/108/3/0517
18. Kwan P, Arzimanoglou A, Berg AT, et al. Definition of drug resistant epilepsy: Consensus proposal by the ad hoc Task Force of the ILAE Commission on Therapeutic Strategies. *Epilepsia*. 2010;51(6):1069-1077. doi:10.1111/j.1528-1167.2009.02397.x
19. Watkins RE, Plant AJ, Sang D, O'Rourke T, Gushulak B. Development of a Vietnamese version of the Short form-36 Health Survey. *Asia Pac J Public Health*. 2000;12(2):118-123. doi:10.1177/101053950001200211
20. The experience of the multidisciplinary team in epilepsy management from a resource-limited country - PMC. Accessed April 26, 2023. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6398094/
21. Mathon B, Navarro V, Bielle F, et al. Complications After Surgery for Mesial Temporal Lobe Epilepsy Associated with Hippocampal Sclerosis. *World Neurosurg*. 2017;102:639-650.e2. doi:10.1016/j.wneu.2017.03.128
22. Hader WJ, Tellez-Zenteno J, Metcalfe A, et al. Complications of epilepsy surgery—A systematic review of focal surgical resections and invasive EEG monitoring. *Epilepsia*. 2013;54(5):840-847. doi:10.1111/epi.12161
23. Lowe AJ, David E, Kilpatrick CJ, et al. Epilepsy Surgery for Pathologically Proven Hippocampal Sclerosis Provides Long-term Seizure Control and Improved Quality of Life. *Epilepsia*. 2004;45(3):237-242. doi:10.1111/j.0013-9580.2004.35903.x
24. Edelvik A, Taft C, Ekstedt G, Malmgren K. Health-related quality of life and emotional well-being after epilepsy surgery: A prospective, controlled, long-term follow-up. *Epilepsia*. 2017;58(10):1706-1715. doi:10.1111/epi.13874
25. Wiebe S, Eliasziw M, Matijevic S. Changes in quality of life in epilepsy: how large must they be to be real? *Epilepsia*. 2001;42(1):113-118. doi:10.1046/j.1528-1157.2001.081425.x
26. Pauli C, Thais ME de O, Claudino LS, et al. Predictors of quality of life in patients with refractory mesial temporal lobe epilepsy. *Epilepsy Behav*. 2012;25(2):208-213. doi:10.1016/j.yebeh.2012.06.037
27. Agrawal N, Bird J, Oertzen T, Cock H, Mitchell A, Mula M. Depression correlates with quality of life in people with epilepsy independent of the measures used. *Epilepsy & behavior : E&B*. 2016;62:246-250. doi:10.1016/j.yebeh.2016.07.020
28. Kandratavicius L, Ruggiero RN, Hallak JE, Garcia-Cairasco N, Leite JP. Pathophysiology of mood disorders in temporal lobe epilepsy. *Braz J Psychiatry*. 2012;34 Suppl 2:S233-245. doi:10.1016/j.rbp.2012.08.003
29. Pauli C, Schwarzbold ML, Diaz AP, et al. Predictors of meaningful improvement in quality of life after temporal lobe epilepsy surgery: A prospective study. *Epilepsia*. 2017;58(5):755-763. doi:10.1111/epi.13721
30. Dias LA, Angelis G de, Teixeira WA, Casulari LA. Long-Term Seizure, Quality of Life, Depression, and Verbal Memory Outcomes in a Controlled Mesial Temporal Lobe Epilepsy Surgical Series Using Portuguese-Validated Instruments. *World Neurosurg*. 2017;104:411-417. doi:10.1016/j.wneu.2017.05.004
31. Seiam AHR, Dhaliwal H, Wiebe S. Determinants of quality of life after epilepsy surgery: systematic review and evidence summary. *Epilepsy Behav*. 2011;21(4):441-445. doi:10.1016/j.yebeh.2011.05.005