Psychiatria Danubina, 2021; Vol. 33, Suppl. 13, pp 288-296
Medicina Academica Mostariensia, 2021; Vol. 9, No. 2, pp 288-296 *Original paper*

PREDICTORS OF QUALITY OF LIFE IN PATIENTS WITH DRUG RESISTANT EPILEPSY AFTER NEUROSURGICAL TREATMENT: ONE-YEAR FOLLOW-UP

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received: 15.9.2021; revised: 5.11.2021; accepted: 2.12.2021

SUMMARY

Background: *Invasive neurosurgical treatment or minimally invasive neurosurgical treatment are methods of choice for the treatment of patients with drug resistant epilepsy. The aim of this study was to evaluate the impact of neurosurgical treatment and the quality of life of patients with drug resistant epilepsy and to determine what are the potential predictors of quality of life of patients with drug resistant epilepsy one year after neurosurgical treatment.*

Subjects and methods: *The research was performed at the Referral Centre for Epilepsy, Department of Neurology, University Hospital Centre Zagreb from February 2015 to February 2020 with Ethics commitee approval. The study included 96 patients with drug resistant epilepsy who were examined for the quality of life before and one year after neurosurgical treatment using the form questionnaire "Quality of life in epilepsy" (QOILE-31) validated Croatian 1.0 version and the questionnaire to assess the degree of depression "Beck Depression Inventory I" (BDI-I) validated Croatian version.*

Results: *Of 96 patients with drug resistant epilepsy one year after neurosurgical treatment 46 (47.9%) patients remained completely free from epileptis seizures. Wilcoxon equivalent pair test showed that the number of epileptic seizures one year after neurosurgical treatment was significantly lower (median before neurosurgical treatment is 10; and after neurosurgical treatment is 1, $p<0.001$). The most informative potential statistically significant predictor variables of quality of life based on the criterion variables QOLIE-31 and BDI-I are: total disease duration in years ($p=0.034$), patient age ($p=0.042$), number of antiepileptics one year after neurosurgical treatment ($p=0.001$), the number of epileptic seizures per month ($p=0,016$), and social welfare rights ($p=0.045$).*

Conclusion: *Neurosurgical treatment of patients with drug resistant epilepsy significantly reduces the number of epileptic seizures which significantly improves their overall quality of life one year after neurosurgical treatment.*

Key words: *drug resistant epilepsy - neurosurgical treatment*

Abbreviations: *BDI-I - Beck Depression Inventory I; DNET - dysembryoplastic neuroepithelial tumor; ILAE - International League Against Epilepsy; QOILE-31 - Quality of life in epilepsy; VNS - vagus nerve stimulator; WHO - World Health Organization*

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INTRODUCTION

Drug resistant epilepsy is a form of epilepsy in which with at least two optimally selected and regularly taken antiepileptics, at an appropriate dose, the complete release of epileptic seizures has not occurred (Callaghan et al. 2007, Kwan et al. 2010). It is estimated that 30-40% of epilepsy patients have been resistant to pharmacotherapy and are unsatisfactorily treated, for which the quality of life in these patients is significantly impaired (Luciano & Shorvon 2007, Bedetti et al. 2018).

According to the World Health Organization (WHO), quality of life is defined as a way of perceiving an individual's position in a specific cultural, social, and environmental context (Guekht et al. 2007, Jacoby et al. 2009, Mahrer-Imhof et al. 2013). In assessing the quality of life of patients with epilepsy, emphasis is placed on the factors that have the greatest impact on the quality of life of patients with epilepsy such as: time of first seizure, frequency of seizures, type of seizure, effectiveness of antiepileptic drugs and side effects of antiepileptic drugs and heightened anxiety and depression (Baker et al. 1999, Bielen et al. 2014).

In order to relive patients from epileptic seizures, and to reduce the side effects of antiepileptic therapy and improve the quality of life in patients with drug resistant epilepsy, neurosurgical treatment is indicated. Neurosurgical treatment of patients with drug resistant epilepsy may be minimally invasive or invasive.

Methods of invasive or resective neurosurgical treatment include: anteromesial temporal resection, selective amygdalohypocampectomy, hemispherectomy, neocortical resection, callosotomy, lesionectomy and multiple subpial resections (Lüders et al. 1993, Rosenow & Lüders 2001, Petelin et al. 2010).

Methods of minimally invasive neurosurgical treatment include: stereotactic ablative methods (termoablative tests or gamma knife radiotherapy) and stimulation methods (deep brain stimulation and anterior thalamic nuclei and implantation of vagus nerve stimulator (VNS) (Velasco et al. 2007, Irislimane et al. 2013, Yamamoto 2015). Structural drug resistant epilepsy whose patological substrate may be hippocampal sclerosis, congenital cortical developmental disorder, benign brain tumor (dysembryoplastic neuroepithelial tumor (DNET), gangliоglioma, cavernoma) or encephalomyelitis due to the possibillity of performing some of the methods of resective neurosurgical treatment (Lüders et al. 1993, Rosenow & Lüders 2001, Petelin et al. 2010). The implantation of VNS is used in patients with multiple bilateral epileptic foci, and in patients in whome resective neurosurgical treatment has not been succsesful (Hajnšek et al. 2011). Due to preoperative treatment and neurosurgical treatment of patients with drug resistant epilepsy, sometimes complications can occur in the form of damage or infection of the brain parenchyma, cerebral hemorrhage, which can further worsen the quality of life (Hader et al. 2013, Sheng 2018, Mijatović et al. 2019). One way to evaluate the impact of epilepsy and treatment outcomes on the overall quality of life of patients with drug resistant epilepsy is to use questionnaires and self-assessment scales and based on self-assessment of physical and mental measurements through questionnaires and self-assessment scales it is possible to assess new medical interventions (Tedman et al. 1995, Malmgren et al. 1997). Quality of life in epilepsy (QOLIE-31) questionnaire is intended to examine the quality of life of epilepsy patients over 18 years of age. The original version of QOLIE-31 originated from Cramer and co-workers in 1992, and was derived from a longer version of QOLIE-89, then revised and standardized in 1998 by the QOLIE Development Group (Cramer et al. 1998, Birbeck et a. 2000, Kim et al. 2003, Spencer et al. 2007, Bautista et al. 2009). Translation into Croatian and psychometric validation of QOLIE-31 in Croatia was performed by neurologists and psychologists at the University of Medicine, Faculty of Medicine in Split and the Clinic of Neurology, University Hospital Center Split in 2011 (Lusic et al. 2011). The domains examined in QOLIE-31 are: seizure worry (5 questions), overall quality of life (2 questions), emotional well-being (5 questions), energy/fatigue (4 questions), cognitive functioning (6 questions), medication effects (3 questions), social functioning (5 questions), and patients health status (1 question). The patient answers by circling the appropriate number (1, 2, 3…) in response to the question, and if he is not sure he can write a comment or explanation next to the question asked. Due to the different meaning of the answers to the questions asked, a scoring system has been developped which implies the conversion of numerical answers to a scale of 0-100 points. The Beck Depression Inventory I (BDI-I) is a self-assessment scale developed by Aron Beck in 1961, and is used to assess the severity of depressive symptoms in adults and adolescents over the age of 13 (Beck et al. 1961, Steer et al. 1999, Filipčić et al. 2008). BDI-I can be used to assess the degree of depression in patients with drug resistant epilepsy. It consists of 21 questions, and examines: mood disorder, loss of hope, feelings of rejection, inability to enjoy, guilt, need for punishment, self-hatred, self-condemnation, suicidal tendencies, crying, irritability, relationship disorders, indecision, negative self-image, inability to work, sleep disturbance, fatigue, lack of appetite, weight loss, hypochondria and loss of libido. Each question can be answered with four answers that are rated from 0 to 3. The minimum score is 0 and the maximum 63. The frequency of depressive disorders in patients with epilepsy depends on the clinical phenotype of epilepsy and the localization of the epileptogenic focus (Khalid et al. 2017, Petelin Gadže et al. 2021). Patients with epileptogenic foci in the temporal lobe are refractory to therapy, often respond with side effects to antidepressant treatment, and the incidence of mood disorders and depression in these patients is greater than 50% (Forsgren & Nystrom 1990, Steer et al. 1999, Carson et al. 2003, Filipčić 2008, Wiglusz et al. 2012, Taghipour et al. 2019, Tudor et al. 2021).

SUBJECTS AND METHODS

The study was conducted at the Referral Center of the Ministry of Health of the Republic of Croatia for Epilepsy of the Clinic of Neurology, University Hospital Center Zagreb from February 2015 to February 2020 and included 96 patients with drug resistant epilepsy who met the study criteria, and whose quality of life was examined before and one year after neurosurgical treatment. Each patient signed informed consent to participate in the study. The study was approved by the Ethics Committee of the University Hospital Centre Zagreb.

Subjects

Including criteria

Patients older than 18 years who were diagnosed with drug resistant epilepsy according to the criteria of the International League Against Epilepsy (ILAE), and who underwent indicated invasive (resective) or mini-

mally invasive (implantation of VNS) neurosurgical treatment at the Clinic for Neurosurgery, University Hospital Center Zagreb after preoperative treatment at the Clinic of Neurology University Hospital Center Zagreb.

Excluding criteria

Malignant disease as a comorbidity determined in the preoperative treatment, and thus in the postoperative course, severe mental and cognitive disorders identified in the preoperative treatment.

Methods

The paper used the questionnaire for quality of life - QOLIE-31 validated Croatian version and the questionnaire for assessing the degree of depression - BDI-I validated Croatian version.

Statistical analyses

The data were recorded in Excel (Microsoft Office Excel 2007, USA), and the statistical application program Statistica version 13.5.0.17 (TIBCO Software Inc. USA) was used for statistical data processing. Statistical significance was estimated at the level of statistical significance $p \leq 0.05$, ie with 95% confidence limits. We used the nonparametric Wilcoxon equivalent pair test for dependent samples, and the Mann-Whitney U test for independent samples. For categorical variables we used Chi-Square test. In order to single out the most informative variables of potential predictors of quality of life in patients with drug resistant epilepsy, we made a multivariate analysis - multiple regression.

RESULTS

The study was conducted at the Clinic of Neurology, University Hospital Center Zagreb, Referral Center of the Ministry of Health of the Republic of Croatia for epilepsy from February 2015 to February 2020, and the study included 96 patients with drug resistant epilepsy. Table 1 shows basic data in 96 patients with drug resistant epilepsy. We have an equal number of women and men 48 (50%) suffering from drug resistant epilepsy. Invasive (resective) neurosurgical treatment was performed in 59 (61.0%) patients, and minimally invasive (implantation of VNS) neurosurgical treatment in 37 (39.0%) patients. The average age of subjects who underwent neurosurgical treatment was 42.46 (±12.53) years.

Table 1 shows that the average age at which epilepsy began in the patients was 9.75 (±10.10) years, and the total duration of the disease in the years before neurosurgical treatment was 25.5 years (±13.2).

Table 2 shows the categorization of the success of neurosurgical treatment depending on the type of neurosurgical treatment in the incidence of epileptic seizures,

Table 1. Basic data in patients with drug resistant epilepsy (N=96)

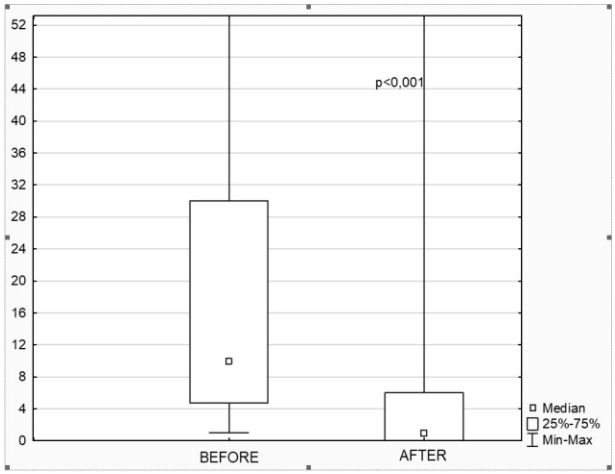
Basic data	Number (N=96)	Percentage (%)
Gender		
Women	48	50
Men	48	50
Types of neurosurgical treatment		
Invasive	59	61
Minimally invasive	37	39
Total	96	100
	Mean	SD
Age	42.46	12.53
Age of onset of disease	9.75	10.10
Total disease duration in years before neurosurgical treatment	25.50	13.20

Legend: N- total; SD - Standard deviation

and there is a statistically significant difference between invasive (41) and minimally invasive methods of neurosurgical treatment (5) in the incidence of epileptic seizures ($p<0.001$).

In addition, Table 2 also shows that according to the categorization of the success of neurosurgical treatment in 46 (47.9%) patients the success was complete, in 11 (11.5%) patients there was a reduction in seizures ≥ 70%, in 29 (30.2%) patients had a reduction in epileptic seizures of 50-70%, and in 10 (10.4%) patients there was a reduction in epileptic seizures by less than 50%, but in none of the patients there was a worsening.

Neurosurgical treatment significantly affected the incidence of epileptic seizures as seen in Figure 1. Wilcoxon equivalent pair test shows that the number of seizures one year after neurosurgical treatment is significantly lower (median before = 10, median after = 1, $p<0.001$).



Legend: p - statistical significance

Figure 1. Overview of the incidence of epileptic seizures before and one year after neurosurgical treatment in patients with drug resistant epilepsy

Table 2. Overview of the categorization of the success of neurosurgical treatment depending on the type of neurosurgical treatment in the incidence of epileptic seizures (N=96)

	Success of neurosurgical treatment					
Types of neurosurgical treatment	Seizure free	Seizure reduction ≥70%	Seizure reduction from 50% to 70%	Seizure reduction <50%	Chi-square	p
Invasive	41	4	9	5	29.68	<0.001
Minimally invasive	5	7	20	5		
Total	46	11	29	10		
%	47.9	11.5	30.2	10.4		

Legend: N – total; p - statistical significance

Table 3. Overview of the impact of reducing the frequency of epileptic seizures on the quality of life of patients with drug resistant epilepsy one year after neurosurgical treatment using the QOLIE-31 and BDI-I questionnaires (N=96)

	Median decreased seizure frequency (50% and more)	Median decreased seizure frequency (<50%)	1st-3rd quartile Decreased seizure frequency (>50%)	1st-3rd quartile Decreased seizure frequency (<50%)	p
Number of patients	71	25	71	25	
QOLIE-31					
Seizure worry	5.60	3.30	3.89-7.6	1.6-5.54	0.002
Overal quality of life	9.45	7	7-11.5	7-9.1	0.005
Emotional well-being	10.20	8.40	7.8-12.36	7.2-10.2	0.051
Energy/Fatigue	6.60	6	5.4-8.4	4.8-7.8	0.201
Cognitive functioning	17.20	12	11.6-23.7	6.2-16.3	0.006
Medication effects	2	1.30	1.1-3	0.8-2	0.025
Social functioning	13.70	7.35	8-18.9	3.8-10.1	0.003
Overall score	62	41.80	49.4-83.6	35.8-59.4	0.002
BDI-I questionnaire					
Points	5	9	0-10	5-16	0.003

Legend: p - statistical significance

To be able to analyze the impact of reducing the frequency of seizures on quality of life, we subtracted the total number of seizures per month before neurosurgical treatment and the total number of epileptic seizures one year after neurosurgical treatment. For the QOLIE-31 analysis, the total points obtained by multiplying the total results of all QOLIE-31 domains and the corresponding coefficients of all questionnaire domains, and the total BDI-I points were used. The same is shown in Table 3.

Table 3 shows that in 71 patients there was a decrease in the total number of epileptic seizures by ≥50%, and in 25 patients there was a decrease in the total number of epileptic seizures by <50%. We compared the scores on the QOLIE-31 and BDI-I questionnaires one year after neurosurgical treatment in these two groups of subjects in 71 patients with a reduced number of epileptic seizures ≥50% and 25 patients with a reduced number of epileptic seizures by <50%. In comparison, we used the nonparametric Mann-Whitney U test. Table 3 also shows that there is a statistically significant difference in the 5 domains of QOLIE-31 in: seizure worry (0.002), overall quality of life (0.005), cognitive functioning (0.006), medication effects (0.025), social functioning (0.003), and overall score (0.002), as well as in BDI-I (0.003).

In order to single out potential predictors of quality of life in patients with drug resistant epilepsy, we performed a multivariate analysis which includes multiple regression where we used one criterion variable (QOLIE-31 score and BDI-I score after neurosurgical treatment) and a set of predictor variables (age, gender, education, social status, disease onset age, disease etiology, clinical phenotype, disease duration before surgery, number of seizures after neurosurgical treatment, categorization of neurosurgical treatment success, and number of antiepileptics after neurosurgical treatment). We did the so-called a step-by-step backward stepwise procedure in which one by one independent variables are subtracted until the significance of R changes. In this way, we singled out the most informative variables, ie potential predictors of quality of life. In six steps, we excluded gender, clinical phenotype, disease etiology, neurosurgical treatment success categorization, education, and social status in QOLIE-31, and the same is shown in Table 4.

Table 4 lists the predictors in order of beta weight significance (β). These beta coefficients evaluate the relative contribution of each predictor to the overall prediction of the dependent (criterion) variable. R is the multiple correlation coefficient and tells how related the predictors and criterion are, and can take values from 0 to 1. The multiple correlation coefficient, i.e. R shows the degree of correlation between the optimal combination of predictor variables and the QOLIE-31 criterion variable.

Table 4. Relationship between combinations of predictor variables and QOLIE-31 criterion variables in patients with drug resistant epilepsy

	Multiple correlation coefficient	R=0.541 R^2=0.293, p<0.001	
Ordinal number	Predictor variables	β	p
1	Total disease duration in years	0.498	0.034
2	Age of patients	-0.462	0.042
3	Number of antiepileptics one year after neurosurgical treatment	-0.394	0.001
4	Number of epileptic seizure per month	-0.243	0.016
5	Age of disease onset	0.366	0.057

Legend: p - statistical significance; R - multiple correlation coefficient; β - beta weight significance

Table 5. Relationship between combinations of predictor variables and BDI-I criterion variables in patients with drug resistant epilepsy

	Multiple correlation coefficient	R=0.397 R^2=0.158 p=0.003	
Ordinal number	Predictor variables	β	p
1	Social status	-0.225	0.045
2	Number of antiepileptics one year after surgery	0.185	0.091
3	Gender	0.159	0.121
4	Education	0.157	0.123

Legend: p - statistical significance; R - multiple correlation coefficient; β - beta weight significance

Table 4 also shows that in the case of QOLIE-31 trials in subjects the most informative and statistically significant predictor variables were: total disease duration in years (0.034), patient age (0.042), number of antiepileptics one year after neurosurgical treatment (p=0.001) and the number of epileptic seizures per month (p=0.016).

Table 5 shows the relationship between combinations of predictor variables and BDI-I criterion variables in patients with drug resistant epilepsy. The most informative potential predictor variables of quality of life based on BDI-I criteria variables are: social status, number of antiepileptics one year after neurosurgical treatment, gender, and education. The same is shown in Table 5.

Table 5 also shows that in the case of BDI-I testing, only the predictor variable of social welfare rights significantly affects (p=0.045) the number of points in the BDI-I questionnaire after neurosurgical treatment.

DISCUSSION

The quality of life can be observed from the psychological aspect, the social aspect, work and physical aspect, and in patients with epilepsy it includes the presence or absence of epileptic seizures (Bishop & Allen 2003, Nickel et al. 2012, Halauk 2013). The most important factors influencing the quality of life of epilepsy patients are: the age at which epilepsy is diagnosed, the frequency of epileptic seizures, the effectiveness of antiepileptic therapy, drug side effects, cognitive difficulties, behavioral disorders and low self-esteem. The concept of assessing the quality of life of patients with drug resistant epilepsy is based on a multidimensional approach that can understand the current condition of patients and the effectiveness of applied therapy, as shown by numerous studies to date (Wiebe et al. 2002, Meneses et al. 2009, Luoni et al. 2011, Pauli et al. 2012). From 2001 onwards, numerous randomized controlled trials around the world have shown that invasive as well as minimally invasive neurosurgical treatment of epilepsy is extremely effective and widely accepted as a therapeutic option for selected patients with drug resistant epilepsy, significantly improving their quality of life (Siegel 2004, Wieser 2004, Holmes et al. 2004, Schuele & Lüders 2008, Alexopoulos & Pati 2010).

The assessment of quality of life after invasive as well as minimally invasive epilepsy surgery is increasingly recognized as an important component of clinical care and operative outcome and in long-term follow-up depends on multiple factors and predictors of quality of life.

A study by Pauli et al. examined the quality of life of patients after resective treatment in patients with hippocampal sclerosis, found that after 1 year after surgery, quality of life improved with all domains of QOLIE-31, and that the absence of preoperative diagnosis of depression and complete seizure control postoperatively predict a significant improvement in quality of life (Pauli et al. 2017). A study by Lin et al found an improvement in the overall quality of life of patients with drug resistant epilepsy as early as 3 and 6 months after resective neurosurgical treatment, and an additional improvement in social functioning was observed one year after neurosurgical treatment (Lin et al. 2020). A multi-year study by Kim et al. from 2021 showed that the implantation of VNS in drug resistant epilepsy patients reduced the incidence of epileptic seizures by

more than 50%, which had an impact on improving quality of life in all QOLIE-31 domains and reducing depression in drug resistant patients epilepsy, but was not statistically significant (Kim et al. 2021).

According to the results of our study, one year after neurosurgical treatment (invasive and minimally invasive (VNS) 46 (47.9%) patients were completely seizure free, and 50 (52.1%) patients were not completely free of epileptic seizures, but in none of the patients there was a worsening or increase in the number of seizures, which confirms the positive effect of neurosurgical treatment, but unfortunately it took an average of 25.5 (±13.2) years to perform neurosurgical treatment.

Bjellvi et al. analyzed the impact of a previous duration of epilepsy of 2, 5, 10 and 20 years on the outcome of neurosurgical treatment, and the incidence of epileptic seizures and concluded that a statistically significant improvement ($p<0.01$) in the outcome of neurosurgical treatment and the incidence of epileptic seizures achieves in a group of patients 2 to 5 years of epilepsy (Bjellvi et al. 2019). The same indicates the need to set an indication for neurosurgical treatment as early as possible.

Analyzing the frequency of epileptic seizures before and one year after neurosurgical treatment, our study found that the number of epileptic seizures one year after neurosurgical treatment was significantly lower (C before = 10, C after = 1, $p<0.001$). Analyzing the impact of reducing the incidence of epileptic seizures one year after neurosurgical treatment on the experience of better quality of life, using the QOLIE-31 and BDI-I questionnaires our study showed a statistically significant difference ($p <0.05$), ie improvement of quality of life in 5 QOLIE-31 categories (seizure worry, overall quality of life, cognitive functioning, medication effect, social functioning, and overall score and also the BDI-I depression scale). Seizure worry about the occurrence of epileptic seizures have been reduced, the negative effect of antiepileptics, ie the side effects of their use, has been reduced, and the social functioning and mental state of patients have improved. The reduction in the number of epileptic seizures on emotional well-being and on energy / fatigue as QOLIE-31 domains had an impact, although it was not statistically significant.

Ahmad et al conducted a quality of life study in patients with drug resistant epilepsy between 2004 and 2006 using the QOLIE-31 questionnaire before and 6 months after neurosurgical treatment. Complete freedom from seizures was achieved in 77% of patients, and a 50% reduction in seizures was achieved in the remaining patients. Improvement in the quality of life of patients was achieved in all patients in all 7 domains of QOLIE-31, but statistically significant improvement ($p>0.005$) was confirmed only in patients with complete freedom from seizures in the following domains: seizure worry, overall quality of life, emotional well-being, energy and fatigue, and social functioning (Ahmad et al. 2007).

Elsharkawy et al. examined which predictors were important for improving quality of life in patients after surgery for temporal lobe epilepsy from 1991 to 2003. The impact of predictor variables was analyzed (age, gender, marital status, occupation, driver's license and driving, number of months since last epileptic seizure, clinical phenotype, age of onset of epilepsy, age of neurosurgical treatment, side of surgery (left / right), etiology of disease, duration of antiepileptic drugs and side effects (none, mild, moderate, severe), various comorbidities, with special emphasis on the mental state of patients preoperatively and postoperatively and the need for psychotherapy) on the quality of life through QOLIE-31 as a criterion variable. The results showed that important predictors of quality of life were occupation, driving license and ability to drive, mental state of patients, but statistically the most significant predictors of improving quality of life were complete freedom from seizures, absence of side effects of antiepileptics and these had an impact on better general social and cognitive functioning (Elsharkawy et al. 2009).

In their second study, Elsharkawy et al., analyzing the quality of life of people with drug resistant epilepsy through the QOLIE-31 questionnaire, tried to determine the most important predictors for improving quality of life, examining the same predictor variables as in their first study and came to the conclusion that they are important predictors of quality of life: complete freedom from seizures after surgery and depression as comorbidity preoperatively or diagnosed postoperatively with emphasis on the limitations of this retrospective study due to unperformed preoperative quality of life assessment (Elsharkawy et al. 2009).

In our study from 2015 to 2020, the quality of life in patients with drug resistant epilepsy before and one year after neurosurgical treatment using the QOLIE-31 questionnaire and the BDI-I questionnaire was with predictors which were important for improving quality of life in patients one year after neurosurgical treatment.

In order to single out potential predictors of quality of life in patients with drug resistant epilepsy, in our study we did the so-called a step-by-step backward stepwise procedure in which one by one independent variables are subtracted until the significance of R changes. The multiple correlation coefficient, i.e. R shows the degree of correlation between the optimal combination of predictor variables and the QOLIE-31 and BDI-I criterion variable, and it is evident that the basic predictor variables for improving the quality of life of patients with drug resistant epilepsy are: total disease duration in years ($p=0.034$), age of patients ($p=0.042$), number of antiepileptics one year after neurosurgical treatment ($p=0.001$), number of epileptic seizures per month ($p=0.016$) and social welfare rights ($p=0.045$).

From all the above it is evident that neurosurgical treatment in patients with drug resistant epilepsy is extremely effective due to complete relief or reduction of the number of epileptic seizures and reduction of number of antiepileptics after neurosurgical treatment in all patients, and that the quality of life of patients improved significantly one year after neurosurgical treatment.

All this indicates the need for early diagnosis of drug resistant epilepsy, and indications for neurosurgical treatment, but also early and late postoperative rehabilitation of patients to quickly and better adjust to a stable condition and to further improve overall quality of life.

CONCLUSIONS

Based on the analysis of quality of life predictors in patients with drug resistant epilepsy, in order to improve the overall quality of life, it is necessary to set an indication for neurosurgical treatment as early as possible. Our research shows that after neurosurgical treatment, complete relief or reduction in the number of epileptic seizures in patients was achieved, and the overall quality of life in patients improved significantly one year after neurosurgical treatment. In all patients, anxiety about the occurrence of epileptic seizures was reduced, the negative effect of antiepileptics was reduced, cognitive and social functioning and the mental state of patients were improved.

Acknowledgements:

Informed consent was obtained from all patients included in the study.

We are thankful to our colleagues for their support in this research:

- University Hospital Centre Zagreb, School of Medicine, University of Zagreb, Department of Neurology, Referral Centre of the Ministry of Health of the Republic of Croatia for Epilepsy, Affiliated Partner of the ERN EpiCARE, Zagreb Croatia: Zdravka Poljaković, Ervina Bilić, Andreja Bujan Kovač, Jela Dodig, Nikolina Hederić.
- University Hospital Centre Zagreb, School of Medicine, University of Zagreb, Department of Diagnostic and Interventional *Neuroradiology*: Marko Radoš, Milan Radoš, David Ozretić, Goran Pavliša.
- University Hospital Centre Zagreb, School of Medicine, University of Zagreb, Department of Neurosurgery, Affiliated Partner of EUROCAN, Zagreb, Croatia: Goran Mrak, Andrej Desnica, Jakob Nemir.
- University Hospital Centre Zagreb, School of Medicine, University of Zagreb, Medical Library Rebro: Arijana Hajnsek Čaklec.
- University Hospital Centre Split, Department of Neurology: Lidija Šodic.
- Neuropsychiatric Hospital Dr. Ivan Barbot, Popovača: Marijana Sarilar.

Conflict of interest: None to declare.

Contribution of individual authors:

Dragana Mijatović: study design of the article, data collection, literature searches, writing the manuscript, statistical analysis and interpretation of results, approval of the final version.

Željka Petelin Gadže: study design of the article, data collection, revisioning the manuscript, approval of the final version.

Elizabeta Dadić-Hero: study design of the article, data collection, revisioning the manuscript, approval of the final version.

Andrica Lekić: statistical analysis and interpretation of results, approval of the final version.

Sanja Hajnšek: conceived and helped design the protocol of this study.

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