



Quality of life one year after epilepsy surgery

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ABSTRACT

Background: The aim of surgery for medically intractable epilepsy was to achieve seizure freedom and improve overall quality of life (QOL) in patients. This investigation looked at changes in QOL one year after epilepsy surgery and the relationship of changes to mood, language, and seizure outcomes.

Method: Depressive symptoms, QOL, and naming were measured in 25 patients with temporal lobe epilepsy before and one year after dominant temporal lobe resection. The Quality of Life in Epilepsy-89 (QOLIE-89), Beck Depression Inventory II (BDI-II), and Boston Naming Test (BNT) were used, respectively, and seizure outcome was reported according to the Engel classifications. Minimum clinically important differences (MCID) and reliable change indices (RCI) were used to assess the proportion of patients who achieved meaningful improvement or worsening in the respective areas of functioning, and the relationship between outcomes was evaluated. Changes on the 17 individual items of the QOLIE-89 were also assessed.

Results: Overall, there was a significant improvement in QOL, reduction in depressive symptoms, and decline in naming one year after surgery. Positive clinically important improvement in QOL was achieved in 76% of patients, meaningful reduction of depressive symptoms was achieved in 20%, and clinically important naming declines were observed in 48% of the cohort. Sixteen patients were seizure-free one year after surgery, but there was no significant correlation between changes in QOL and seizure outcome, depressive symptoms, or naming.

Conclusion: The results in the reported cohort of patients showed that surgical treatment of temporal lobe epilepsy in the dominant hemisphere resulted in clinically meaningful improvement in overall QOL and declines in naming but no significant reduction of mood disturbance.

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1. Introduction

Epilepsy surgery is the primary treatment for drug-resistant epilepsy, which is reported in 20% to 40% of people newly diagnosed with epilepsy (patients) [1]. Temporal lobe epilepsy (TLE) is the most prevalent of epilepsy syndromes and is also commonly drug-resistant, making patients among the most suitable surgical candidates and the syndrome the most frequently surgically treated form of epilepsy [2]. Surgical treatment of intractable TLE is well established [3,4]. Although seizure control is the primary aim of surgical intervention and the most frequently studied outcome, of equal or greater importance is the impact of any treatment on overall quality of life (QOL). Depression is a prevalent psychiatric comorbidity in epilepsy [5], and epilepsy surgery carries additional potential risks to patients, including deterioration in memory and language difficulties following dominant hemisphere temporal lobe resections [6]. Naming declines are reported in between 25% and 60% of patients undergoing standard temporal lobectomy in the dominant hemisphere, and pooled estimates demonstrate a 34% risk of decline in naming

after left-sided resection [6]. Changes in personal relationships and emotional support that may also accompany seizure freedom have also been cited as a potential source of psychological distress in patients [7]. In light of patient's inherent vulnerabilities and the potential cognitive side effects of surgery, QOL after surgery needs to be carefully assessed to appreciate to the reward-to-risk tradeoffs of treatment. People with medically refractory temporal lobe epilepsy have a higher mortality than peers of a similar age in the general population. Surgery reduces the excess mortality associated with medically refractory temporal lobe epilepsy.

Improvements in QOL have been reported in patients who are rendered seizure-free following temporal lobe surgery despite changes in memory [8], and surgical patients, on average, report greater improvements in QOL than nonsurgical patients [6]. There remains a lack of robust evidence on the subject, however, due to the variability in methodology and scales used to measure QOL, the use of pooled estimates as opposed to proportions of patients who achieve improvements in QOL, and the fact that MCID and RCI are seldom used to capture clinically meaningful change [1,9]. Fiest et al. (2014) set about measuring positive MCID on the QOLIE-89 in patients undergoing epilepsy surgery compared to those receiving antiepileptic drug (AED) treatment and reported MCID improvement in QOL in 56% of the surgical patients compared to 11% of patients who received AED treatment alone six months

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after surgery. These authors recommended longer-term follow-up of patients and assessment of the impact of postoperative language declines on QOL.

In this prospective study, we assessed clinically meaningful changes in QOL, depressive symptoms, and naming, in accordance with reported MCID and RCIs, in at a cohort of patients with dominant hemisphere TLE before and one year after surgery. The relationship between these outcomes and seizure outcome was also evaluated. Changes on the individual 17-items of the QOLIE-89 were also assessed to investigate which factors of QOL were most sensitive to change.

2. Method

Quality of life, depressive symptoms, and naming were measured in 25 adult patients at a single epilepsy surgical center before and one year after dominant hemisphere temporal lobes resections. The patients were all deemed suitable surgical candidates following long-term epilepsy monitoring and had all provided informed consent to take part in a randomized controlled trial investigating language outcomes of selective amygdalohippocampectomy versus standard temporal lobectomy. Patients were considered eligible for the study if they were over the age of 18 and diagnosed with medically refractory TLE and without known psychopathology or previous neurosurgery. The Human Research Ethics Committee at the University of Cape Town granted ethical approval.

2.1. Instruments

The *Quality of Life in Epilepsy-89* (QOLIE-89) is comprised of 17 individual items totaling a score ranging between 0 and 100 [10]. The instrument is widely used in patients with epilepsy and has sound construct validity, internal consistency, and test-retest reliability, and responsiveness to change. MCIDs for the instrument have been calculated by comparing the magnitude of change in 136 patients with focal epilepsy over six months with their qualitative reports of change [11]. This analysis produced patient-centered thresholds for small (8.5), medium (15.2), and large score (22+) changes in QOL (Table 1). Further to this, distributional statistical methods have shown that a score change of ± 13 excludes chance or measurement error with 90% certainty [3].

The *Beck Depression Inventory* (BDI-II) is a widely used psychometric instrument to measure severity of depression, with scores between 0 and 13 suggesting minimal depression; 14–19, mild depression; 20–28, moderate depression; and over 29, severe depression [12]. Clinically important differences on the BDI-II are measured on a ratio scale as a percentage reduction of score dependent on initial depression severity; a 17.5% difference in patient initially reporting mild depression and 32% difference for individuals with longer duration depression who had not responded to antidepressants [13].

The *Boston Naming Test* (BNT) is a confrontation naming test depicting 60 line drawings of common objects that the patient is required to name [14]. It is the most frequently used formal assessment of visual naming in patients with epilepsy, and the test that has

shown to reliably detect postoperative dysnomia [15]. Reliable change index of ≥ 5 has been calculated for the scale [16].

2.2. Analyses

The QOLIE-89, BDI-II, and BNT scores were collected on the two testing occasions, and change scores were calculated for each participant. The proportion of patients achieving clinically important differences on the scales was assessed, and group aggregates in change scores were also calculated. Paired sample *t*-tests were conducted to assess changes on each measure before and after surgery, and Pearson correlation coefficients were calculated to test the relationship between change scores. Change scores on the 17 individual items of the QOLIE-89 were reported for secondary interest to observe the area of most improved functioning following surgery. Seizure outcome was reported according to Engel class criteria (Table 2) and correlated with changes in QOLIE-89, BDI-II, and naming scores to determine the extent of influence of seizure outcome on QOL and symptoms of mood disturbance. All statistics were conducted using SPSS.

3. Results

Descriptive analyses were conducted on patient demographics. The cohort consisted of 15 females and 10 males with age ranging between 22 and 57 years old ($M = 42$, $SD = 10$), and all were right-handed. The average age of seizure onset was 20 (14), and all patients had diagnosed left hemisphere TLE. Of the 25 patients, 13 underwent standard temporal lobectomy, and 11 underwent selective amygdalohippocampectomy.

3.1. Primary analyses

All but three patients reported improvements in QOL one year after surgery, with an overall group aggregate increase of 17 points on the QOLIE-89 ($t_{24} = -5.16$, $p < 0.000$). Of the 22 patients who reported improvements, 19 achieved a MCID in QOL (76%). Five of these patients experienced a small positive change in overall QOL (20%), seven experienced a medium positive change (28%), and seven experienced a large positive change in QOL (28%). Fifty-six percent ($n = 14$) of these patients' change scores were above the RCI threshold of a 13-point increase. Three patients reported deterioration in QOL, indicated by a reduced score on the QOLIE-89, one being a small MCID (10-point decline), and one a medium MCID (14-point decline).

Prior to surgery, six patients fell into the mildly depressed category on the BDI-II, two fell into the moderately depressed category, and three fell into the severely depressed category. All but four patients reported improvements in mood one year after surgery, with an overall 5-point group average change on BDI-II ($t_{24} = 2.2$, $p < 0.039$). A decline in depressive symptoms was clinically important in four patients (16%). Two of the patients with MCID in depressive symptoms fell in the mild to moderately depressed category prior to surgery, and two had fallen into the severe depression category and thus exhibited 17.5% and 32% improvement in depressive symptoms one year after surgery. Four patients reported increased mood disturbance, which was a clinically important increase in one patient. This patient also reported a negative MCID in QOL and had lost a relative in the year since surgery. Although

Table 1
Clinically meaningful score changes.

Instrument	Change
QOLIE-89 (MCID)	8.5 – small change
	15.2 – medium change
	22 – large change
QOLIE-89 (RCI)	13
BDI-II	17.5% – in mild depression
	32% – in severe depression
BNT	≥ 5

Note: QOLIE-89, Quality of Life in Epilepsy-89; BDI-II, Beck Depression Inventory; BNT, Boston Naming Test.

Table 2
Changes in quality of life and mood one year after surgery.

Instrument	Prior to surgery	1 year after surgery	Change score
QOLIE-89	55.8 \pm 12	73 \pm 16	17.2***
BDI-II	13.2 \pm 10.7	8.5 \pm 8	4.7*
BNT	41.3 \pm 12	36.6 \pm 9	4.6*

Note: QOLIE-89, Quality of Life in Epilepsy-89; BDI-II, Beck Depression Inventory; BNT, Boston Naming Test.

* Statistical significance at <0.05 .

*** Statistical significance at <0.001 .

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