



# Epilepsy surgery in the underserved Hispanic population improves depression, anxiety, and quality of life☆☆☆

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## ABSTRACT

**Objective:** The objective of this study was to investigate the effect of epilepsy surgery on depression, anxiety, and quality of life (QOL) in a Hispanic, primarily immigrant, Spanish-speaking population with intractable epilepsy (IE).

**Methods:** Patients with IE from a comprehensive epilepsy treatment center in an urban, public healthcare setting who underwent resective brain surgery between 2008 and 2014 ( $N = 47$ ) and completed presurgical and post-surgical neuropsychological evaluation were retrospectively identified. Presurgical and 1-year postsurgical Beck Depression Inventory-II (BDI-II), Beck Anxiety Inventory (BAI), and QOLIE-31 ratings were analyzed as postsurgical outcome measures. One-tailed paired sample  $t$ -tests were used to evaluate whether scores improved post-operatively. Established severity level classifications of depression and anxiety (i.e., minimal, mild, moderate, or severe) were used to analyze changes in occurrence of depression and anxiety.

**Results:** Medium to large improvements on the BDI-II and most QOLIE-31 subscales, with a smaller effect on the BAI and remaining QOLIE-31 subscales, were noted 1-year postsurgery. Levels of depression and anxiety were significantly reduced 1-year postsurgery. Depression, anxiety, and QOL improvements were robust and unaffected by gender, levels of education, or hemisphere of surgery.

**Conclusions:** This study supports the positive benefits of epilepsy surgery on depression, anxiety, and QOL in Hispanic, primarily undocumented immigrant, Spanish-speaking people with epilepsy (PWE) in the US. These results are useful for educating this particular population about the possible benefits of surgery for IE and can enhance presurgical counseling.

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## 1. Introduction

People with epilepsy (PWE) have a higher risk of psychiatric illnesses such as depression and anxiety compared with the general pop-

ulation [1]. Multiple pathogenic mechanisms may explain this association; however, the cause remains unknown. Among PWE, those with intractable epilepsy (IE) have reported the highest rates of anxiety [1]. Furthermore, mood is closely associated with patients' perceptions of quality of life (QOL) [2].

Previous studies on European [3], Latin American [4], and U.S. Spanish [5] speakers with IE revealed high degrees of comorbid depression and anxiety presurgically. Similarly, higher depression and lower QOL scores have been documented in Spanish-speaking, immigrant PWE compared with their U.S. born, English-speaking counterparts [6]. Sociocultural factors, such as language barriers, education level, and misconceptions about epilepsy and its treatment, have been documented in Hispanics [7,8] and may differ from the general U.S. population. Epilepsy is disproportionately common in U.S. Hispanics [8], yet studies suggest that Hispanics are less likely to undergo state-of-the-art therapies such as epilepsy surgery [7]. This is concerning as surgical

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intervention has been shown to significantly improve seizure control and has a 90.6% positive effect on QOL [9].

The Quality of Life in Epilepsy Inventory-31 P version 2 (QOLIE-31) [10,11] is a measure of QOL in PWE that has been translated into multiple languages and used across cultures [12]. Furthermore, its use, validity, and reliability have been specifically documented for use in a Spanish-speaking population [13]. More recently, the QOLIE-31 was used to assess and document 1-year postsurgical score improvement [14] outcomes in a small, U.S. Hispanic patient cohort that elected to undergo surgery for IE. The current study expanded on this previous investigation and hypothesized that controlling epilepsy with surgical intervention would improve this unique population's depressive and anxiety symptoms, in addition to their QOL.

## 2. Materials and methods

### 2.1. Standard protocol approvals, registrations, and patient consents

The Institutional Review Board at the Rancho Research Institute approved the current study. Consent was not obtained because of the retrospective nature of the study.

### 2.2. Study design and setting

This retrospective study occurred in Southern California, specifically, Los Angeles County (LAC), where an estimated 1,000,000 unauthorized immigrants (non-U.S. citizens) reside, according to 2014 estimates [15]; and according to a 2008–2012 population study, of the LAC unauthorized immigrant population, 85% are Latino [16]. Because of the sensitive nature of immigration status, it was not possible to accurately evaluate the number of patients within this sample who were undocumented.

Participants in this study were primarily immigrant, Hispanic patients from a public health, comprehensive epilepsy treatment center in Los Angeles, CA and underwent resective surgery for IE between 2008 and 2014 ( $N = 47$ ).

### 2.3. Data collection

Standard, initial neurobehavioral status exams were completed with all patients prior to neuropsychological testing. Patients who presented with severe cognitive impairment (i.e., were unable to comprehend instructions or functionally communicate; thus, unable to meaningfully participate in neuropsychological testing) were by default excluded from this analysis. Of the patients included in this analysis, 94% were immigrants. Monolingual Spanish speakers were the majority (70.2%), while 29.8% were self-identified as bilingual (Spanish–English). Language of testing was determined via interview, considering reported usage of Spanish versus English, time in country, and patient preference. Ultimately, 87% were determined to be primary Spanish speakers; additionally, their pre- and postsurgical neuropsychological and outcome studies were completed in Spanish by bilingual, bicultural neuropsychologists.

Patients completed the Beck Depression Inventory-II (BDI-II) [17], Beck Anxiety Inventory (BAI) [18], and QOLIE-31, at their pre- and 1-year postsurgical neuropsychological evaluations. In some instances, whenever necessary, the psychologist read the above measures to those patients with limited reading skills. To obtain a fair characterization of the BDI-II, BAI, and QOLIE-31 outcomes, patients were not excluded based on cognitive scores, demographic variables, or psychological symptoms.

Lastly, change in patients' clinical classification of depressive and anxiety severity was assessed using established cutoffs for the BDI-II and BAI. Patients were classified with moderate–severe levels of depressive or anxious symptoms if their individual scores fell above the

respective cutoff points for moderate severity on the BDI-II and the BAI at pre- and postsurgical assessments.

All information, i.e., clinical, demographic, and outcomes, were initially collected as part of routine assessment for surgical workup for IE or postsurgical follow-up. Data were collected retrospectively via medical record review and then entered into a secure database for analyses.

### 2.4. Clinical characteristics

Seizures arose from the temporal lobe in 91.5% of participants and the left hemisphere in 46.8%. Of the total sample, neuroimaging reports revealed that 74.5% had mesial temporal sclerosis (MTS; per MRI study) and 14.9% had neurocysticercosis (NCC; per CT study), with 10.6% having both MTS and NCC. Formal pathology reports were available for 46 of the 47 postsurgical specimens. Patients who underwent a standard anterior temporal lobectomy or selective amygdalohippocampectomy ( $n = 37$ ) had confirmed hippocampal sclerosis (74.5%), astrocytoma (2.1%), and gliosis and neuronal migration disorder (2.1%). Nine out of the 10 patients who underwent either a nontemporal lesionectomy or a lateral temporal resection had formal pathology reports available, and all had abnormalities present, specifically gliosis or abnormalities of neuronal migration. The average number of antiepileptic drugs (AEDs) used at presurgical ( $M = 2.75$ ,  $SD = .74$ ) and postsurgical evaluations ( $M = 2.60$ ,  $SD = .83$ ) was consistent and did not statistically differ. Finally, the number of failed AEDs at the presurgical evaluation was recorded ( $M = 1.89$ ,  $SD = 1.55$ ). See Table 1 for full demographic and clinical characteristics.

### 2.5. Statistical analysis

Change values (i.e., postsurgery minus presurgery scores) were calculated for each of the depression, anxiety, and respective QOLIE-31 subscales. The scores were analyzed to rule out differences based on gender, education, and hemisphere of surgery. Normal distribution characteristics for these change scores were confirmed before conducting further analyses. One-tailed paired sample *t*-tests analyzed the a priori prediction that surgery for IE improves scores on mood, anxiety, and the QOLIE-31 and its subscales for Hispanic PWE. Most participants ( $n = 38$ ) had complete data, while few had partial BDI-II, BAI, and QOL data; however, all participants (i.e., with and without complete data) were categorically similar and no significant differences between these groups were observed (see Table 2). Spearman correlations were completed to examine the relationships between the following: 1) 1-year postsurgical seizure freedom or frequency (i.e., 1-year ILAE classification); 2) change in number of AEDs from pre- to postsurgical evaluations; and 3) use of an antidepressant at pre- and postsurgical time points; and all mood, anxiety, and QOL outcome measures. Finally, Pearson correlation explored the relationship between the number of failed AEDs at presurgical evaluation and all outcome scores.

## 3. Results

There was a significant improvement in the postsurgical measures of depression, anxiety, and all subscales of the QOLIE-31 (Table 3). McNemar chi-square tests demonstrated significant postsurgical reductions in the number of patients with moderate and severe levels of depressive ( $p = .006$ ) and anxious ( $p = .007$ ) symptomatology (Fig. 1). After surgery, the incidence of moderate–severe depression and anxiety was reduced by greater than half. The number of patients with moderate/severe levels of depression declined from 37.0% to 15.2%, while the number of those with moderate/severe anxiety declined from 32.6% to 8.7%.

Beck Depression Inventory-II and most QOLIE subscales improved after surgical intervention, with medium to large effect sizes, while BAI and the remaining QOLIE-31 subscales improved with small effect sizes after surgery (Table 3). Seizure worry was the lowest presurgical

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