

## TRACKING THE CONSEQUENCES OF CHRONIC EPILEPSY ON COGNITION

**Chronic Epilepsy and Cognition: A Longitudinal Study in Temporal Lobe Epilepsy**

Helmstaedter C, Kurthen M, Lux S, Reuber M, Elger CE  
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It remains unclear whether uncontrolled epilepsy causes mental decline. This longitudinal study contrasts changes of memory and nonmemory functions in 147 surgically and 102 medically treated patients with temporal lobe epilepsy. All participants were evaluated at baseline (T1) and after 2 to 10 years (T3). Surgical patients underwent additional testing 1 year after surgery (T2). Data were analyzed on an individual and a group level. Sixty-three percent of the surgical and 12% of the medically treated patients were seizure free at T3. Fifty percent of the medically treated and 60% of the surgical patients showed significant memory decline at T3, with little change in nonmemory functions (difference not significant). Surgery anticipated the decline seen in the medically treated group and exceeded it when surgery was performed on the left, or if seizures continued postoperatively. Seizure-free surgical patients showed recovery of nonmemory functions at T2 ( $P < 0.001$ ) and of memory functions at T3 (T3,  $P = 0.03$ ). Multiple regression indicated retest interval, seizure control, and mental reserve capacity as predictors of performance changes. In addition, psychosocial outcome was better when seizures were controlled. In conclusion, chronic temporal lobe epilepsy is associated with progressive memory impairment. Surgery, particularly if unsuccessful, accelerates this decline. However, memory decline may be stopped and even reversed if seizures are fully controlled.

**COMMENTARY**

Patients with chronic temporal lobe epilepsy are often referred for surgical consideration late in the course of their disorder, arguably far too late in some instances. It is not uncommon for epileptologists to encounter individuals who have had surgically curable syndromes of temporal lobe epilepsy yet were

treated medically for years or even decades with poor results. On presentation for surgical evaluation, these patients may exhibit widespread cognitive morbidity, prolonged employment problems, and other associated reductions in health-related quality of life. Although many factors could contribute to this state of affairs, a strong suspicion is that too many years of poorly controlled seizures have taken their toll on the individual. Documenting the cumulative adverse effects of epilepsy on cognition and the impact of epilepsy surgery on this cognitive course could help to encourage more timely and appropriate surgical intervention.

It is in this context that Helmstaedter et al. report their interesting findings. In this study, 249 patients with temporal lobe epilepsy were examined—147 treated surgically and 102 treated medically. Patients were followed up prospectively for 2 to 10 years (mean, 4.7 years). Information was obtained regarding the clinical, cognitive, and quality-of-life outcomes of the cohort. Cognitive assessment was somewhat limited, focusing on verbal and visual memory and selected nonmemory cognitive abilities (e.g., attention, psychomotor speed). Patients who underwent surgery were tested on three occasions (preoperatively, postoperatively, and long-term follow-up), whereas patients managed medically were tested twice. Two issues were of particular a priori interest: (a) whether chronic epilepsy resulted in progressive cognitive decline, and (b) whether and how epilepsy surgery altered the impact of chronic epilepsy on this cognitive course.

A short synopsis can capture only the highlights of this study, which provided a wealth of information. Especially interesting findings included the following:

1. Chronic, poorly controlled temporal lobe epilepsy resulted in declining memory performance, consistent with the notion of cognitive progression and reports of progressive hippocampal atrophy. The decline in memory performance was demonstrated by using both group statistics and analyses of individual patient outcomes.
2. Surgical patients could be either so-called “double winners” (i.e., seizure freedom and cognitive stability) or “double losers” (i.e., persisting seizures, with the addition of surgically induced cognitive morbidity). In this regard, a considerable body of literature characterizes the preoperative features associated with favorable and unfavorable clinical and cognitive outcomes, which helps

to avoid such adverse outcomes, especially among candidates for left anterior temporal lobectomy.

3. Individuals varied in their so-called “reserve capacity” to compensate for cerebral damage—a point that has been recognized in other neurologic disorders for some time, but only recently discovered and demonstrated in epilepsy.

Because this study was not a randomized prospective clinical trial, the authors readily acknowledged the limitations of their study design and the associated interpretative cautions. As

is the case with important studies, this one raises several questions. What if cognition were more comprehensively assessed—would the outcomes of chronic epilepsy look worse and the outcomes of surgery better? At what point do adverse changes in cognition become manifest, and when do they translate to clinically significant impairments in functional status? Overall, the results of this investigation help to clarify the consequences of poorly controlled chronic epilepsy as well as the benefits associated with appropriately identified surgical candidates.

*by Bruce Hermann, Ph.D.*