PREDICTORS OF TEMPORAL LOBE EPILEPSY SURGERY OUTCOMES

Prognostic Factors and Outcome after Different Types of Resection for Temporal Lobe Epilepsy

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J Neurosurg 2002;97:1131–1141

OBJECT: It is unknown whether different resection strategies for temporal lobe epilepsy (TLE) produce alterations in seizure control or neuropsychological performance.

METHODS: A series of 321 patients who underwent surgery for TLE between 1989 and 1997 was submitted to a uni- and multifactorial analysis of clinical, electrophysiological, neuroimaging, neuropsychological, and surgical factors to determine independent predictors of outcome. Until 1993, most patients with TLE underwent standard anterior temporal lobectomy (ATL); beginning in 1993, surgical procedures were increasingly restricted to lesions detected on magnetic resonance (MR) imaging and the presumed epileptogenic foci: for example, amygdalohippocampectomy (AH) or lesionectomy/corticectomy began to be used more often.

The mean follow-up duration in this study was 38 months. Two hundred twenty-seven patients were classified as seizure free (70.7%), and 36 patients had rare and nondisabling seizures (11.2%); these groups were summarized as having good seizure control (81.9%). Twenty-four patients attained more than 75% improvement (7.5%), and no worthwhile improvement was seen in 34 cases (10.6%); these groups were summarized as having unsatisfactory seizure control (18.1%).

On unifactorial analysis the following preoperative factors were associated with good seizure control ($p \leq 0.05$): single and concordant lateralizing focus on electroencephalography studies, low seizure frequency, absence of status epilepticus, concordant lateralizing memory deficit, clear abnormality on MR images, suspected ganglioglioma or dysembryoplastic neuroepithelial tumor (DNT), and absence of dysplasia on MR images. Stepwise logistic regression revealed a model containing five factors that were predictive for good seizure control ($p \leq 0.1$): 1) clear abnormality on MR images; 2) absence of status epilepticus; 3) MR imaging-confirmed ganglioglioma or DNT; 4) concordant lateralizing memory deficit; and 5) absence of dysplasia on MR images. Seizure outcome was mainly correlated with diagnosis and clinical factors. No significant differences were found regarding different resection types performed for comparable tumors. Neuropsychological testing revealed better postoperative results after limited resections compared with standard ATL, especially with regard to attention level, verbal memory, and calculated total neuropsychological performance.

CONCLUSIONS: Different strategies for surgical approaches in TLE result in equally good outcomes. Seizure outcome is mainly dependent on the diagnosis and clinical factors, whereas the neuropsychological results are more beneficial after resections limited to an epileptogenic lesion and focus.

COMMENTARY

The study by Clusmann et al., is the largest single-center temporal lobe epilepsy surgery series in the era of magnetic resonance imaging (MRI). They found that a lesion on MRI, such as hippocampal sclerosis or neoplasm, was the strongest predictor of postoperative seizure freedom. In addition, preoperative electroencephalography (EEG), memory function, and seizure frequency provided prognostic information on seizure outcome. Surgical approach did not affect seizure outcome, but did affect neuropsychological outcomes.

Standard anterior temporal lobectomy was associated with deterioration in more patients (44.6%) and improvement in fewer patients (33.7%) for the total neuropsychological score compared to either selective amygdalohippocampectomy (25% worsen; 42.3% improved) or lesionectomies/corticectomies (36.5% worsen; 58.3% improved). The most critical neuropsychological outcome factor was verbal memory, which was worse postoperatively for patients with higher preoperative scores, older age, left-sided surgery, or standard anterior temporal lobectomy. The cognitive risk of temporal lobe surgery is predictable not only by the factors noted in the Clusmann et al. study but may also be predicted by Wada memory test, positron emission tomography (PET), and magnetic resonance spectroscopy. In the future, other functional imaging techniques (e.g., functional MRI [*f* MRI], magnetoencephalography [MEG], quantitative EEG) may also be helpful in this regard.

Before 1985, approximately 55% of patients with temporal lobe epilepsy became seizure free after surgery, and researchers at the Palm Desert Conference in 1992 reported 68% of 4000 patients became seizure free (1). Recently, a randomized, double-blind clinical trial by Wiebe et al. (2), demonstrated that 58% of patients were free of seizures that impaired consciousness, and the present study by Clusmann et al., had 70.7% seizure freedom. Together these findings demonstrate the value in evaluating epilepsy patients for surgery, as so many of them experience positive outcomes. The average duration of epilepsy prior to surgery remains unnecessarily long (ie, 15–20 years)—despite repeated demonstration of temporal lobe epilepsy surgery efficacy and the fact that only two to four antiepileptic drug treatments are needed to predict drug refractory epilepsy (3). There are reliable predictors of postoperative seizure and cognitive outcomes. Clusmann et al., have now demonstrated that cognitive risks can be further reduced by tailoring the resection to the epileptogenic focus. Standard of care should be altered such that patients are offered the option of epilepsy surgery much earlier in the course of refractory epilepsy.

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References:

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