

Current Literature

In Clinical Science



Anterior Temporal Lobectomy – How Safe Is It?

Population-Based Analysis of Morbidity and Mortality Following Surgery for Intractable Temporal Lobe Epilepsy in the United States.

McClelland S III, Guo H, Okuyemi KS. *Arch Neurol* [published online ahead of print February 14, 2011]. 2011;68:725–729. doi:10.1001/archneurol.2011.7.

OBJECTIVE: To assess the morbidity of temporal lobe epilepsy (TLE) surgery on a nationwide level in order to address reservations regarding the morbidity of anterior temporal lobectomy (ATL) for TLE despite class I evidence demonstrating the superiority of ATL over continued medical therapy. **DESIGN:** Retrospective cohort study. **SETTING:** The Nationwide Inpatient Sample from 1988 to 2003 was used for analysis. **PATIENTS:** Only patients who were admitted for ATL for TLE (International Classification of Diseases, Ninth Revision, Clinical Modification codes 345.41 and 345.51; primary procedure code, 01.53) were included. **MAIN OUTCOME MEASURES:** Morbidity and mortality. Analysis was adjusted for several variables including patient age, race, sex, admission type, primary payer for care, income in zip code of residence, and hospital volume of care. **RESULTS:** Multivariate analyses revealed that the overall morbidity (postoperative morbidity and/or adverse discharge disposition) following ATL for TLE was 10.8%, with no mortality. Private insurance decreased postoperative morbidity (odds ratio [OR]=0.52; 95% confidence interval [CI]=0.28-0.98; P=.04) and adverse discharge disposition (OR=0.31; 95% CI=0.12-0.81; P=.02). Increased patient age increased postoperative morbidity (OR=1.04; 95% CI=1.01-1.07; P=.03) and adverse discharge disposition (OR= 1.08; 95% CI = 1.02-1.13; P=.004). Neither sex, income, race, nor hospital volume was predictive of postoperative morbidity. The degree of medical comorbidity directly correlated with the incidence of postoperative morbidity. **CONCLUSIONS:** Morbidity following ATL for TLE is low throughout the United States regardless of sex, race, insurance status, or income. Younger age and private insurance status are independently predictive of reduced postoperative morbidity. In patients with low medical comorbidity, ATL for TLE is safe, with low morbidity and no mortality.

Commentary

The increasing call for epilepsy surgery is driven by an understanding that in certain cases it can halt the epileptic process and greatly reduce the associated risks that include: 1) disease risk (sudden unexplained death in epilepsy [SUDEP], injury, suicide, comorbidities), 2) iatrogenic risk (medication reactions, injury during medication change), and 3) compliance risk (poor medication compliance, ignoring seizure precautions, drug and alcohol use).

Determining the point at which the risk/benefit balance for surgery actually tilts in favor of the patient is more complex than generally understood. Unfortunately, strong medical evidence is missing in most areas of epilepsy surgery (1). Even in situations where one is armed with efficacy and morbidity outcomes, it is useful to remember that the medical evidence mental construct for risk assessment is an idealized “statistical” patient, cared for by the medical team that performed the study; not necessarily a patient in your own hospital, cultural, and social setting.

McClelland and colleagues investigated the surgical risk of anterior temporal lobectomy (ATL) using an interesting informatics resource (2). There is now a family of nationwide patient-care databases (i.e., the Nationwide Inpatient Sample [NIS]) or healthcare cost and utilization project (HCUPnet) that offers a variety of search features. McClelland and colleagues searched the NIS hospital discharge database (overview available at <http://www.hcup-us.ahrq.gov/nisoverview.jsp>) for the time span of 1988 through 2003 to identify patients 18 years or older who had a diagnostic code of 345.41 (intractable partial epilepsy with impairment of consciousness) or 345.51 (intractable partial epilepsy without impairment of consciousness), and a primary procedure code of 01.53 (brain lobectomy). Their search covered approximately 20% of all inpatient admissions to non-federal hospitals in the United States.

In contrast to most retrospective studies, the NIS database allowed the authors to quickly search a remarkable number of hospital admissions. However, it also imposed limitations: 1) information included in HCUP’s nationwide databases only reveals what occurred during a single hospital stay; 2) it is not possible to track patients after discharge or analyze their readmissions or postdischarge morbidity and mortality; 3) it cannot be used to determine whether morbidity is transient

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or permanent; 4) data from rehabilitation hospitals is not included in the HCUP databases; and 5) the NIS does not include surgical reports dictated by the surgeons or other medical notes. Last, it is conceivable, but unlikely, that lobes other than the temporal were operated on, or the operation was for reasons other than refractory epilepsy.

With those caveats in mind, the database search revealed 677 probable anterior temporal lobectomy patients. Postoperative neurological complications (deficits, including those secondary to infarction or hemorrhage) affected 2.7%. Hydrocephalus occurred in 0.4% and ventriculostomy placement in 0.1%. Three patients (0.4%) were discharged with the anticipation of short-term rehabilitation, and 24 (3.5%) with long-term rehabilitation. Homonymous/heteronymous hemianopsia occurred in 1.1%, and postoperative infection in 0.8%. Medical comorbidity correlated with the incidence of postoperative morbidity. Younger age and private insurance status independently predicted decreased postoperative morbidity and better hospital discharge disposition. Neither African-American nor Hispanic race predisposed toward increased postoperative morbidity. There were no deaths during the postoperative hospital stay.

Mortality following surgery is generally considered to be a rare event. As summarized by Pilcher and colleagues (3), based on older ATL operative series that included large numbers of patients (2,282 operations from 1928 to 1973; 1,300 operations from 1928 to 1966), mortality occurred in up to 1% of ATL, most often due to postoperative hemorrhage, infarction, pulmonary complications, and sudden death. Current Web sites of active surgical centers; for example, the University of Pittsburgh (www.neurosurgery.pitt.edu/epilepsy/pediatric/surgery/temporallobectomy.html) and Stanford University (<http://stanfordhospital.org/clinicsmedServices/COE/neuro/epilepsy/surgicalTherapy/temporalLobectomy.html>) place the mortality risk at <0.5% and 0.1 to 0.5 percent, respectively. Polkey cited a mortality of 0.52% with deaths of two patients (4). In one, a deep vein thrombosis led to anticoagulation that precipitated a hemorrhage, and the other developed unexplained cerebral edema. In another series, similar to the findings of McClelland and colleagues, Olivier reported no deaths among 526 patients at Montreal Neurological Institute (operated prior to 1993) (5). In a more recent review at Thomas Jefferson University in Philadelphia, Sperling reports not having encountered perioperative death in a series of over 600 temporal lobe surgeries (M. Sperling, written communication).

These reports suggest that perioperative mortality in ATL—although a known risk—may be declining. However, mortality data from single institutions tend to represent experienced centers that perform a large number of surgeries and choose to share their results. It is therefore reasonable to ask what happens in less experienced centers. For immediate postoperative inpatient periods, McClelland and colleagues provide data. Surprisingly, they found that a third of all neurosurgeons performed less than three ATLs per year, and the median surgeon volume was only three cases per year. Assuming that all patients were electively admitted for temporal lobe epilepsy surgery, one way to view this information is that experience may have less of an impact on immediate perioperative mortality than newer surgical techniques and improved postoperative care.

McClelland and colleagues found overall morbidity (postoperative morbidity, adverse discharge disposition, or both) to be 10.8%. In deciding whether to advise a patient to undergo surgery, the risk of persistent, disabling, neurological deficits is of primary concern. It is a limitation of the authors' data search that they were unable to report whether patients became hemiplegic, hemiparetic, unable to walk, or aphasic, and whether deficits were transient or permanent. The fact that 3.5% of patients were discharged to long-term rehabilitation, and postoperative neurological complications (deficits, including those secondary to infarction or hemorrhage) affected 2.7%, suggests that the number of persistent disabling deficits may have exceeded 2%. Reports of other operative series describe hemiparesis as permanent in 2% and transient in 4%. Popovic and colleagues encountered severe hemiparesis in 2% and severe memory impairment in 1% of 200 temporal lobectomy patients (6). In general, it is believed that permanent hemiparesis varies between 0 and 2% (4). The etiology of paralysis has been ascribed to postoperative hemorrhage, or to spasm or thrombosis of the middle cerebral, posterior cerebral, anterior or posterior choroidal arteries.

This study could not address long-term morbidity from ATL, although it is part of the surgical decision-making process. It is reasonable to consider that following an ATL, if an individual sustains injury to their contralateral temporal lobe, they could be rendered amnesic. How often this has occurred is unknown, but it has been reported (7). Similarly, severe psychiatric conditions and suicide may occur more than a year following successful surgery, but a causative relationship remains unclear.

The surgical risk assessment also includes every invasive procedure leading up to the final resection. Angiography and subdural and depth electrode implantation have their own morbidity and mortality to consider. Despite favorable statistics, less experienced epileptologists and those who have not encountered serious surgical complications should never develop a false sense of security. This can potentially short circuit the decision-making and data-gathering process, compromising patient care.

The findings of McClelland and colleagues are encouraging, but further medical evidence would be helpful in guiding physicians and patients in making surgical decisions. Although not addressed by McClelland and colleagues, this is especially true for extratemporal resections. The decision to advise a patient to proceed with surgery is currently arrived at using existing medical evidence for surgery, the patient's diagnostic testing results (e.g., epilepsy monitoring, neuroimaging, neuropsychological testing), and their general surgical risk (age, medical condition, etc.). The decision to proceed is strengthened by congruent localizing findings and other generally accepted diagnostic criteria. A second necessary, but less frequently discussed evaluation process, which is more difficult to address, involves balancing the severity/disability of each patient's epileptic condition against surgical risk and their individual vulnerability to a poor outcome. It requires significant patient, family, and neurologist interaction and understanding, never assumes that a potentially dangerous procedure is "safe," and engages the physician in what is commonly referred to as the "art of medicine."



International efforts have been made to develop medical evidence for the efficacy of epilepsy surgery and the evaluation of presurgical patients, but less attention has been focused on complication reporting. Good outcomes are more likely to be reported than complications, and complication rates are often not included in surgical seizure outcome studies. Many more centers perform ATL or other epilepsy surgical procedures than report complication rates. The approach taken by McClelland and colleagues sidesteps some of these issues and forms a basis for further data gathering and interpretation. In view of the seriousness of potential complications, and their importance to surgical decision making, a more formal and expanded effort should be undertaken to gather morbidity and mortality data. In North America, this effort could begin with the leadership of the National Association of Epilepsy Centers working in conjunction with the American Epilepsy Society and American Academy of Neurology.

by Bruce Fisch, MD

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