



Temporal Lobectomies in Children: More Than Just for Seizure Control?

Long-Term Intellectual Outcome After Temporal Lobe Surgery in Childhood.

Skirrow C, Cross JH, Cormack F, Harkness W, Vargha-Khadem F, Baldeweg T. *Neurology* 2011;76:1330–1337.

OBJECTIVE: Temporal lobe resection is an established treatment for medication-resistant temporal lobe epilepsy, which in recent years has increasingly been performed in children. However, little is known about the long-term outcome in these children. The aim of this study was to characterize intellectual and psychosocial functioning of children after temporal lobe resection as they progress into late adolescence and adulthood. **METHODS:** We report the long-term follow-up of 42 children who underwent temporal lobe surgery after an average postoperative period of 9 years. Longitudinal change in IQ was documented, psychosocial outcome including quality of life was assessed, and preoperative and postoperative T1-weighted MRI brain scans were evaluated quantitatively. A well-matched nonsurgical comparison group of 11 children with similar clinical characteristics was also assessed. **RESULTS:** At follow-up, 86% of the surgical group were seizure-free, and 57% were no longer taking antiepileptic medication. A significant increase in IQ was found in the surgical group after an extended follow-up period of >5 years. This IQ change was not found in the nonsurgical comparison group. IQ increases were associated with cessation of antiepileptic medication and changes in MRI-derived gray matter volume. The surgical group also reported better psychosocial outcome including quality of life, which was more strongly associated with seizure freedom rather than surgery per se. **CONCLUSIONS:** Surgery for temporal lobe epilepsy performed in childhood results in excellent long-term seizure control and favorable cognitive outcome along with positive effects on brain development.

Commentary

Early referrals of adults for surgery in the current treatment of refractory temporal lobe epilepsy has now become a matter almost of public health concern. Data from the now famous 2001 *New England Journal of Medicine* study by Sam Wiebe and colleagues demonstrated 58% seizure-free response after 1 year compared with 8% with continued anticonvulsant treatment (1). As a result, if an adult with refractory epilepsy is a candidate for temporal lobectomy, it is appropriately strongly advised by most epileptologists (2).

What about children with temporal lobe epilepsy? Excellent seizure control can also be achieved, with results similar to adults. One of the biggest questions regarding this procedure in the pediatric population is whether cognition will improve as a result of surgery, theoretically interrupting a near epileptic encephalopathy at a critical developmental period in a child's life. This is not only relevant for surgery as a treatment, but for anticonvulsants and dietary management as well. Should we be more aggressive in recommending surgery not solely for seizure control, but primarily for potential benefits in cognition?

Prior to this important study by Skirrow and colleagues from the Institute of Child Health, University College London, and Great Ormond Street Hospital for Children, the answer to this question was a bit more uncertain. Previous studies in children had shown no obvious improvement in intellectual function after temporal lobectomy, yet typically investigators only followed patients for 2 years postoperatively (3, 4). However, there have been recent clues that improvement in intelligence may continue to occur over time in this population (5). The question is obviously critical for pediatric epileptologists counseling parents about what to expect for their child in school performance.

In order to determine if children who have had temporal lobectomies have better cognitive function years later, the authors studied 60 children who underwent surgery for either hippocampal sclerosis or dysembryoplastic neuroepithelial (DNET) tumors from 1992 to 2002 at Great Ormond Street Hospital in London. These children were chosen to be evaluated as they had significantly greater durations of follow-up than the typical 2 years in previous reports, with the time since surgery ranging from 5 to 15 years (mean 9 years), and their mean current age 22.7 years. Nearly one-third ($n = 18$) of the cohort were either unable to be located or declined to participate, but their baseline characteristics were similar to the 42 who were then included in the study. These now adults had IQ testing, MRI, quality of life assessment (QOLIE-36 UK), and seizure



outcomes recorded. For comparison purposes, the 42 subjects were also analyzed in contrast to 11 adults who had similar temporal lobe pathology as children but had not had temporal lobe resections.

As would be expected, seizure control was much better in those who had surgery: 86% versus 36% seizure freedom, and additionally fewer were still receiving anticonvulsant drugs (43% vs 73%). What about the effects on IQ? Of interest, no change was noted before 6 years follow-up, yet after that a significant improvement in full-scale (FS) IQ occurred. This improvement was especially dramatic after 8 years, with a 58% increase in FSIQ compared with baseline. In the nonsurgical group, no improvement in IQ was noted at any time point. Change in gray matter volume was correlated with improvement in IQ, and anticonvulsant medication use (particularly topiramate) was negatively correlated. Contrary to popular beliefs, earlier surgery was not more likely to lead to IQ improvement, nor was current seizure outcome or seizure type.

The authors then looked at quality of life assessments. As has been reported in other studies of epilepsy surgery in children, the most important factor here was seizure freedom (6). In this cohort, there was only one-third the incidence of disability if seizures were no longer occurring.

As a result of this study, we now have good evidence that cognitive function improves following temporal lobe surgery in children. Neurologists should not only counsel parents to make their decisions about proceeding with epilepsy surgery based on this information but also inform them that the improvement in intellectual function may take years to occur. As quality of life was directly related to seizure freedom, this should also be the clear goal of pediatric epileptologists and neurosurgeons.

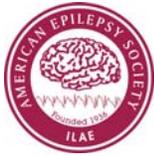
Equally intriguing was the additional finding that IQ was more likely to increase if anticonvulsant drugs could be successfully stopped. Perhaps we should be weaning drugs more quickly after surgery as a result. The benefits on intellect may outweigh the risks of a breakthrough seizure, and medications can always be restarted should this occur.

Continued investigations into outcomes other than seizure control in the pediatric population are warranted. When this research is performed, cognitive outcomes should absolutely be assessed after many years rather than months. More studies would be helpful for children with extratemporal lobe epilepsy, for varying underlying pathologies, and for incorporating other outcome measures such as EEG, fMRI, as well as mood and depression scales. Child neurologists also need to continue to ask about cognition in daily clinical practice for children with refractory epilepsy who have not had surgery, but could.

by Eric Kossoff, MD

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