BC Epilepsy Society

Why Consider Early Epilepsy Surgery?

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Background

Various epilepsy surgery procedures can be used to cure or reduce seizure frequency. Most procedures are either designed to resect or disconnect the area of the brain where seizures originate or spread. Epilepsy surgery is a procedure that either removes or isolates the area of the brain where seizures originate. Epilepsy surgery can significantly improve seizure control in a carefully selected group of individuals. Seizure freedom can be as high as 70-80%, and a large percentage of patients can have a significant reduction in seizure frequency or disabling seizures following surgery. However, referral for evaluation often is delayed and occurs years later after numerous medications have been tried. Unfortunately, it often takes 20 years for a patient to be referred for evaluation for epilepsy surgery.

Worldwide, referral for epilepsy surgery is underutilized. Less than 1% of patients with treatment resistant epilepsy are referred for a surgical evaluation. Lack of knowledge by physicians of the benefits of surgery and appropriate surgical candidates, fear of complications, and the thought that people may outgrow the epilepsy at a later time are some of the reasons. Another reason could be due to physicians' perception of epilepsy surgery as a "last resort" procedure.

In British Columbia, 40,000 individuals have epilepsy. Approximately 30% have treatment resistant epilepsy. Therefore, 3000-5000 patients in our province could benefit from epilepsy surgery.

Natural history of epilepsy and response to medication

One of the main arguments for early epilepsy surgery is the observation that once seizures do not respond to treatment (treatment resistant), the chance of seizure freedom with further medication trials is small. One study looked at patients who had epilepsy for at least 5 years and at least one seizure per month. Of those who had tried less than five medications, in 24% seizures were controlled with expert treatment. In comparison, only 11% of those who had tried five or more medications became controlled (1). This is obviously dependent on the cause of seizures and the epilepsy syndrome. Children may have a higher response rate to medications. Also, the introduction of newer anti-seizure medications may slightly change these numbers. Resistance to medications may remit over time (at a rate of 4% per year among adults and a higher rate among children). However, seizure relapse is common, suggesting epilepsy can have a fluctuating course (2).

Kwan and Brodie reported that those who have many seizures before therapy or who have an inadequate response to initial treatment with anti-seizure medications are likely to have treatment resistant epilepsy. They found that 47% became seizure free with their first anti-seizure medication and 14% became seizure free during treatment with a second or third medication Among patients who had no response to the first medication, the percentage that subsequently became seizure free was smaller (11%) when treatment failure was due to lack of efficacy than when it was due to intolerable side effects (41%) (3).

Consequences of uncontrolled seizures

The goals of epilepsy surgery are to decrease seizure frequency or to render patients seizure free sooner with better success than medical therapy. Surgery in children also aims to prevent the negative effects of seizures on brain development and to improve quality of life in the child and family. Better and earlier seizure control should reduce seizure associated morbidities.

Mortality

Uncontrolled frequent seizures are associated with an increased risk of death. Sudden unexplained death in epilepsy (SUDEP) rates are quoted to be the highest in surgical series patients with treatment resistant epilepsy compared with community prevalence samples (4). Lower mortality has been consistently observed among patients who are seizure free by surgery compared with both surgical patients who have persisting seizures and patients who were evaluated for but did have surgery.

Cognitive decline

Seizures can have a negative effect on brain development and learning especially in children. Good seizure control, even after years of treatment resistance, can have a beneficial impact on cognition (5).

With temporal lobe epilepsy, in cross-sectional studies memory is worse in patients with a longer duration and earlier age at onset of epilepsy (6). In one longitudinal study, surgery abolished or reversed the decline in memory function (7). In another study, 25-40% of treatment resistant patients showed decline on tests of confrontation and naming compared to friend or relative controls (8).

It also known that frequent seizures can lead to “pseudo-regression” where the seizures and medications impact sleep, energy, attention, mood, learning and interaction with the environment. This is thought to be reversible with better seizure control.

Effectiveness of epilepsy surgery

Evidence for the effectiveness of epilepsy surgery has been shown in one randomized controlled trial in temporal lobe epilepsy. 58% of surgically treated patients were seizure free at one year compared with 8% of medically treated patients (9). The resulting practice guideline by the American Academy of Neurology, the American Epilepsy Society and the American Association of Neurological Surgeons recommends that those with partial seizures who failed first-line anti-seizure medications should be referred to an epilepsy surgery center, and that those who meet the criteria for mesial temporal resection should be offered surgery. There is evidence for success of epilepsy surgery from other areas of the brain also.

The success rates of surgery are dependent on several factors, such as the presence or absence of a lesion, seizure etiology, area of seizure onset, concordance of other tests, etc.

Self-reported quality of life (QOL) studies consistently show improvements with postsurgical seizure control. The results are not so favorable when seizures persist (10, 11).

Risks of epilepsy surgery

As is true for any surgery, brain surgery has risks. General risks of surgery include complication of anesthesia, bleeding and infection. A more serious infection, meningitis, can occur after brain surgery. This is an infection of the layers that cover the brain. Brain swelling can also occur and lead to headache and discomfort. The surgeon will often prescribe a medication to reduce the risk of swelling after surgery. Rarely, a vascular injury can occur intraoperatively and this can lead to a stroke. The risks are dependent on the area and extent of the resection. Investigations, such as cortical stimulation or mapping brain function, neuropsychological evaluation and functional MRI, can predict and determine the risks of neurological deficit prior to surgery. In one meta-analysis of temporal lobe resections, dysphasia or speech alteration occurred in 3%, weakness on one side of the body occurred in 2%, and large visual field defects occurred in 2%. Of these, half were permanent. Death was reported in 0.4% and was unrelated to surgery (12).

Declines in verbal memory and word finding are the most common cognitive side effects, occurring in up to 40% of patients with temporal lobe resections. However, these are often known with the pre-surgical work-up, and the risks versus benefits are discussed with the patient (13). Of note, memory decline has been associated with a decline in the quality of life when seizures persist (14).

Cognitive outcomes of epilepsy surgery

Early surgery may reduce cognitive morbidity by preventing progression associated with frequent seizures. Timing may be very important, as younger brains may have a greater capacity for plasticity or “rewiring” of function and therefore better recovery. Some believe that the long-term cognitive trajectory after surgery may be related more to progression of the underlying disease than to seizure control. Early surgery could be most beneficial if it could decrease or halt progression of the underlying disease.

There are not many studies comparing epilepsy surgery in adults and children. One study compared cognitive tests between groups of children and adults. Adults and children with a left sided resection showed expected mean declines in verbal memory at three months following surgery. By one year, the mean scores for children were no longer different from pre-surgical scores, but adult scores remained below their pre-surgical mean (15). This exemplifies the potential benefits of early surgery.

Conclusion

The evidence for performing surgery earlier is persuasive. It is known that late remissions with medical treatment are less likely. The data regarding the impact of uncontrolled seizures on morbidity, quality of life, mortality, and social and cognitive functions supports early surgery.

Also, the efficacy and safety of surgery have been established in patients. However, the optimum timing of surgery has not been fully determined. Treatment resistance and consideration for surgery does not develop at a uniform time in surgical candidates, and late remissions are still possible. Ultimately, the goal is to reduce seizure frequency, optimize quality of life, and reduce morbidity and mortality as soon as possible. Good prospective studies looking at standardized interventions and outcomes are necessary. However, evidence to date suggests benefits of early epilepsy surgery in appropriate candidates.

References

1. Luiano AL, Shorvon SD. Results of treatment changes in patients with apparently drug-resistant chronic epilepsy. Ann Neurol 2007; 62:375-381.
2. Choi H, Heiman G, Pandis D, et al. Seizure remission and relapse in adults with intractable epilepsy : a cohort study. Epilepsia 2008; 49:1440-1445.
3. Kwan P, Brodie MJ. Early Identification of refractory epilepsy. New Engl J Med 2000; 342:314-319.
4. Hitiris N, Mohanraj R, Norrie J, Brodie MJ. Mortality in epilepsy. Epilepsy Behav 2007; 10:363-376.
5. Thompson PJ, Duncal JS. Cognitive decline in severe intractable epilepsy. Epilepsia 2005; 46:1780-7.
6. Jokeit H, Ebner A. Long term effects of refractory temporal lobe epilepsy and cognitive abilities; a cross sectional study. J Neurol Neurosurg Psychiatry 1999; 6:44-50.
7. Helmstaedter C, Kurthen M, Lux S, et al. Chronic epilepsy and cognition: a longitudinal study in temporal lobe epilepsy. Ann Neurol 2004; 54:425-432.
8. Hermann BP, Seidenberg M, Dow C, et al. Cognitive prognosis in chronic temporal lobe epilepsy. Ann Neurol 2006; 60:80-7.
9. Wiebe S, Blume WT, Girvin JP, Eliasziw M. A randomized controlled trial of surgery for temporal lobe epilepsy. N Engl J Med 2001; 345:311-18.
10. McLachlan RS, Rose KJ, Derry PA, et al. Health-related quality of life and seizure control in temporal lobe epilepsy. Ann Neurol 1997; 41:482-489.
11. Vickrey BG, Hays RD, Rausch R, et al. Quality of life of epilepsy surgery patients as compared with outpatient with hypertension, diabetes, heart disease, and/or depressive symptoms. Epilepsia 1994;35: 597-607.
12. Chelune GJ, Naugle R, Luders H, et al. Individual change following epilepsy surgery: practice effects and base-rate information. Neuropsychology 1993; 7:41-52.
13. Langfitt JT, Westerveld M, Hamberger MJ, et al. Worsening of quality of life after epilepsy surgery: effect of seizures and memory decline. Neurology 2007; 68:1988-1994.
14. Seidenbert M, Hermann B, Wyler AR, et al. Neuropsychological outcome following anterior temporal lobectomy in patients with and without the syndrome of mesial temporal lobe epilepsy. Neuropsychology 1998; 12:303-16.
15. Gleissner U, Sassen R, Schramm J, et al. Greater functional recovery after temporal lobe epilepsy surgery in children. Brain 2005; 128:2822-2829.

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