

## IS SEIZURE SURGERY AN OPTION FOR PATIENTS WITH VERY LOW IQ?

**Seizure Outcome after Resective Epilepsy Surgery in Patients with Low IQ.** Malmgren K, Olsson I, Engman E, Flink R, Rydenhag B. *Brain* 2008;131(Pt 2):535–542. Epilepsy surgery has been questioned for patients with low IQ, since a low cognitive level is taken to indicate a widespread disturbance of cerebral function with unsatisfactory prognosis following resective surgery. The prevalence of epilepsy in patients with cognitive dysfunction is, however, higher than in the general population and the epilepsy is often more severe and difficult to treat. It is therefore important to try to clarify whether IQ predicts seizure outcome after resective epilepsy surgery. The Swedish National Epilepsy Surgery Register, which includes data on all epilepsy surgery procedures in Sweden since 1990, was analysed for all resective procedures performed 1990–99. Sustained seizure freedom with or without aura at the 2-year follow-up was analysed as a function of pre-operative IQ level categorized as IQ <50, IQ 50–69 and IQ ≥70 and was also adjusted for the following variables: age at epilepsy onset, age at surgery, pre-operative seizure frequency, pre-operative neurological impairment, resection type and histopathological diagnosis. Four hundred and forty-eight patients underwent resective epilepsy surgery in Sweden from 1990 to 1999 and completed the 2-year follow-up: 72 (16%) had IQ <70, (18 with IQ <50 and 54 with IQ 50–69) and 376 IQ ≥70. There were 313 adults and 135 children ≤18 years. Three hundred and twenty-five patients underwent temporal lobe resections (TLR) and 123 underwent various extratemporal resections (XTLR). At the 2-year follow-up, 56% (252/448) of the patients were seizure free: 22% (4/18) in the IQ <50 group, 37% (20/54) in the IQ 50–69 group and 61% (228/376) in the IQ ≥70 group. There was a significant relation between IQ category and seizure freedom [odds ratio (OR) 0.41, 95% confidence interval (CI) 0.27–0.62] and this held also when adjusting for clinical variables [OR 0.58 (95% CI 0.35–0.95)]. In this population-based epilepsy surgery series, IQ level was shown to be an independent predictor of seizure freedom at the 2-year follow-up. However, many of the low-IQ patients benefit from surgery, especially patients with lesions. Low IQ should not exclude patients from resective epilepsy surgery, but is an important prognostic factor to consider in the counselling process.

### COMMENTARY

Although epilepsy surgery frequently offers the best hope for seizure control in patients with medically intractable epilepsy, a subset of patients fails to benefit despite exhaustive presurgical testing. Clinicians involved in the presurgical evaluation have long sought to understand factors that might predict postoperative seizure control. To date, structural imaging has proven most useful for defining the chances of postoperative seizure control (1). Independent predictors would be helpful, however, especially when MRI provides an ambiguous prognosis, such as patients with temporal lobe epilepsy and a normal MRI, who have roughly a 50/50 chance of gaining complete seizure control (2).

IQ measurements assess a wide range of cognitive functions, and outcomes are most strongly altered by conditions that diffusely injure the brain. Patients with lower IQ might be expected to have diffuse seizure onset zones or multifocal epilepsy, making surgery less effective. Based on this concern, some programs limit surgery for patients with low IQ. Malmgren and colleagues utilize the Swedish National Epilepsy Surgery Register to retrospectively analyze the relationship between IQ and postoperative seizure control for patients in Sweden. Their finding that patients with lower IQ have a poor prognosis for complete seizure control supports the hypothesis that seizures may

be less likely to arise from a discrete focus in patients with low IQ. However, the investigators found that patients with low IQ did not have higher risks for surgical complications.

Malmgren et al. acknowledge that prior studies on this topic have shown variable results (3–5). Yet, in these previous investigations, the number of patients with a very low IQ has been small and the results usually have not been subjected to multivariate analysis. Other studies have controlled for important factors, such as pathology or type of surgery, and the data suggest a modest association between low IQ and poor surgical outcomes (4,6). Malmgren and colleagues note that patients with a low IQ are underrepresented in epilepsy surgery series. Furthermore, reports from different countries vary considerably. Only 2 to 3 percent of patients in a large epilepsy surgery series from the United States had an IQ below 70 (4), while in contrast, 16% of patients in the present series had an IQ below 70 and 4% had an IQ below 50. The authors speculate that both referring physicians and epileptologists may be reluctant to recommend surgery to patients with low IQ for fear of poor outcomes. They also suggest that the most impaired patients may be cared for by physicians who are less attuned to surgical options. While the authors focus on reasons that physicians might under-refer patients with low IQ, they do not address patient or family preference as a factor. For example, some patients with rare but persistent seizures aggressively seek complete seizure freedom so that they can drive. In the absence of this social motivation, caregivers for patients with low IQ might not wish to risk surgery if their loved one is experiencing only

occasional or mild seizures. Furthermore, patients making their own decisions about surgical risks may have a different threshold for pursuing surgery than caregivers who are making the decision on behalf of another person. The authors also allude to there being less reluctance in Sweden and Norway to offer epilepsy surgery to patients with severe intellectual impairment than in the United States. It would have been helpful if Malmgren and colleagues had elaborated on common practice in these countries to back their assertion. If the authors are correct in this regard, their series may be less prone to selection bias than those performed in countries for which only the rare patient with low IQ is accepted for surgery.

The study has various limitations that must be considered. The inclusion of both adults and children resulted in methods for IQ determination that were not the same for all patients. Additionally, historical coding options in the national register did not allow for pathology to be categorized in a way that would be clinically most useful; for instance, mesial temporal sclerosis was lumped with gliosis. Consequently, it is not completely clear how much predictive value an IQ score adds to current, best preoperative prognostic factors. Finally, surgery type was dichotomized to temporal versus extratemporal and fails to take into account the fact that multilobar resection was five times more common in the patients with an IQ less than 70. Indeed, one possible reason that some of the patients with low IQ had excellent surgical outcomes is that early diffuse brain injury with attendant cortical reorganization of critical functions away from the seizure focus allowed extensive surgery to be undertaken with less risk for the development of new cognitive deficits than in patients with normal IQ.

While it seems likely that IQ is a modest, independent predictor of surgical outcome, it is not entirely clear how it can contribute to counseling individuals for epilepsy surgery. Until

further studies clarify the issue, it is probably safest to not be specific with numerical estimates of the probability of surgical success when counseling the guardians of patients with low IQ. While the implication for counseling is uncertain, the take home message from this series is clear: many patients with very low IQ will benefit from operative treatment, and IQ should not be used to exclude patients from surgery.

by Paul Garcia, MD

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