What Are the Chances That Epilepsy Surgery Will Allow My Child to Come Off Meds? Assessing Pediatric Epilepsy Surgery Outcomes: Data on ASM Freedom

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Antiseizure Medication Use and Medical Resource Utilization After Resective Epilepsy Surgery in Children in the United States: A Contemporary Nationwide Cross Sectional Cohort Analysis

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Objective: Antiseizure drug (ASD) therapy can significantly impact quality of life for pediatric patients whose epilepsy remains refractory to medications and who experience neuropsychological side effects manifested by impaired cognitive and social development. Contemporary patterns of ASD reduction after pediatric epilepsy surgery across practice settings in the United States are sparsely reported outside of small series. We assessed timing and durability of ASD reduction after pediatric epilepsy surgery and associated effects on health care utilization. Methods: We performed a retrospective analysis of 376 pediatric patients who underwent resective epilepsy surgery between 2007 and 2016 in the United States using the Truven MarketScan database. Filled ASD prescriptions during the pre- and postoperative periods were compared. Univariate and multivariate analyses identified factors associated with achieving a stable discontinuation of or reduction in number of ASDs. Health care utilization and costs were systematically compared. Results: One hundred seventy-one patients (45.5%) achieved a >90-day ASD-free period after surgery, and 84 (22.3%) additional patients achieved a stable reduction in number of ASDs. Achieving ASD freedom was more common in patients undergoing total hemispherectomy (n = 21, p = .002), and less common in patients with tuberous sclerosis (p = .003). A higher number of preoperative ASDs was associated with a greater likelihood of achieving ASD reduction post-operatively (hazard ratio [HR]: 1.85, 95% confidence interval [CI]: 1.50–2.28) but was not associated with a significant difference in the likelihood of achieving ASD freedom (0.83, 95% CI: 0.49–1.39). Achieving an ASD-free period was associated with fewer hospital readmissions within the first year after surgery. Significance: Patterns of ASD use and discontinuation after pediatric epilepsy surgery provide an unbiased surgical outcome endpoint extractable from administrative databases, where changes in seizure frequency are not captured. This quantitative measure can augment traditional surgical outcome scales, incorporating a significant clinical parameter associated with improved quality of life.

Commentary

In the role of “best advocate” for our patients with drug-resistant epilepsy (DRE), clinicians are required to counsel patients about the next best steps (and therefore therapy) on a case-by-case basis. Epilepsy surgery evaluation is frequently that next best step. The best outcome after epilepsy surgery is a “cure” with seizure freedom and anti-seizure medication (ASM) freedom. While all parents want their children to have seizure freedom or meaningful seizure reduction, they always ask about the chances of medication reduction after epilepsy surgery. Engel outcome scores/International League Against Epilepsy scores do not address ASM use after different types of epilepsy surgery. Let’s try to answer the question: What are the chances that epilepsy surgery will allow my child to come off ASMs? in an SBAR (Situation, Background, Assessment, Recommendation) format:

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Situation

In 25% to 30% patients with DRE, evaluation for surgical candidacy should be initiated as soon as medical intractability is suspected and ascertained. Despite a randomized clinical trial in pediatric epilepsy proving efficacy; epilepsy surgery in pediatric drug-resistant epilepsy is underutilized. One of the barriers to epilepsy surgery utilization includes patient as well as physician knowledge gap/s. Data on ASM reduction as a surrogate for epilepsy surgery success is not widely published.

Background

Earlier epilepsy surgery in pediatric patients has benefits all around but greater education about possible health care outcomes after epilepsy surgery is desirable. Outcome measures after epilepsy surgery include seizure frequency, cognition, health-related quality of life, continued exposure to ASM as examples. In a study on adult satisfaction with epilepsy surgery and looking at what matters to patients with DRE, reduction of ASM after epilepsy surgery is an important outcome measure. Reduction in ASM exposure is associated with better cognitive outcomes in children after epilepsy surgery. Thus, ASM exposure also affects quality of life of patients with DRE.

The Time to Stop Study published in 2012 tried to answer the question of timing of ASM withdrawal and association with seizure recurrence after successful pediatric epilepsy surgery. This study was conducted retrospectively on a cohort of 766 children who underwent epilepsy surgery and subsequently started ASM withdrawal across 15 European epilepsy centers during the time frame of January 2000 to October 2008. Authors looked at the association of timing of ASM withdrawal with chances of achieving seizure freedom at 1 year of follow-up. Authors reported a median time to reduction of 1 year after epilepsy surgery and that such reduction did not affect ultimate seizure freedom. On the contrary, they concluded that seizure recurrence after ASM withdrawal was an indicator of incomplete surgical success and allowed earlier identification of children who would need longer term continuation of ASM treatment. Thus, successful ASM withdrawal is a surrogate for adequacy of surgical treatment in pediatric epilepsy. One of the factors associated with higher chance of successful surgical outcome was completeness of the resection (or disconnection-in patients undergoing hemispherotomy).

In a recent article published in Epilepsia, Parker and colleagues study ASM prescriptions and medical utilization after epilepsy surgery as a surrogate marker of epilepsy surgery outcome by looking at the National Truven Market Scan databases. These databases contain inpatient and outpatient claims: outpatient prescription claims, clinical utilization records, and health care expenditures for patients who have employer-sponsored insurance plans. Thus, the databases allow study of cohorts of patients across various epilepsy centers in the United States allowing for control against selection bias and individual practice patterns. Patients who formed this cohort had undergone epilepsy surgery between 2007 and 2016. Authors studied ASM use, emergency room (ED) visits, and readmissions within 30 days and 1 year of resection. Additionally, health care costs of patients who achieved ASM freedom versus those who did not were studied.

Current procedural terminology codes for lobectomy, focal resection or hemispherotomy, intracranial monitoring, tuberous sclerosis as a diagnosis and so on were accessed. Only patients who had pharmaceutical coverage, at least 1 year of follow-up and were on at least one preoperative ASM were included in the analysis. Authors categorized ASM use as ASM freedom if patient achieved any 90-day epoch during the mean 1329 days of follow-up data without any active ASM prescriptions. They also categorized stable decrease in ASM as a reduction of at least one ASM compared to baseline ASM count prior to surgery. The final cohort included 376 patients who underwent either hemispherectomy, lobectomy, or focal resection of epileptic focus. Of all, 171/376 (45%) patients achieved ASM freedom during follow-up. Of these, 55/376 (14.6%) children achieved ASM freedom at 1 year of follow-up and 120/271 (44.3%) were ASM free at 2 years of follow-up. An additional 22% had a stable postoperative decrease in ASM. Patients who were on a higher number of AMSs preoperatively were found to have greater likelihood of achieving stable decreases in ASM postoperatively (HR: 1.85, 95% CI: 1.5-2.28). A stable decrease in ASM was first noted prior to discontinuation of ASM at 11.8 months after surgery (range 3-57.7 months). This value likely represents universal trends in ASM reduction that typically starts at between 6 months and 12 months after epilepsy surgery at most centers. Average cost of index admission was US$40,000 less for patients who achieved ASM freedom compared to those who did not. Among the different surgery types, ASM reduction was higher in patients undergoing hemispherectomy (75% patients) than any other surgery. Authors found that patients who underwent invasive monitoring had a longer duration of stay in the hospital.

As one might expect; a statistically greater number of patients who did not achieve ASM freedom were seen in the ED or were admitted within 1 year of epilepsy surgery. Additionally, although preoperative pharmaceutical costs were uniform for all patients at an average of US$31/day, they dropped to US$17/day 1 year after discharge for those who achieved ASM freedom. Durability of cost trends was assessed over 3 years of follow-up after index surgery and authors found that among patients who did not achieve ASM freedom in the first 2 years, pharmaceutical costs were US$36.3/day and increased to US$41/day in the third year after surgery.

Assessment

It is important to recognize that percentages of ASM freedom achieved as reported by authors do not equate directly to percentages of seizure freedom after epilepsy surgery.

However, ability to achieve ASM freedom or reduce ASM exposure is a surrogate marker of epilepsy surgery success.
Recommendation

This data can be used to discuss the chance of ASM reduction after epilepsy surgery. As reported in this paper, reduction in ASM after surgery is associated with lower hospital readmissions. A higher number of presurgery ASMs is associated with a greater chance of postoperative ASM reduction.

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