UCLA MATTEL Children's Hospital

Children who continue to have seizures despite medical therapy may be candidates for curative epilepsy surgery

About 1 percent of children ages 17 and under are diagnosed with epilepsy. Medication can control seizures in the majority of patients. However, about 30 percent of children continue to have seizures while on medication. Epilepsy surgery, which was first proposed as a treatment more than a century ago, is highly successful in carefully selected children with medically refractory seizures, but remains an underutilized option.

UCLA's comprehensive pediatric epilepsy program pioneered the use of state-of-the-art evaluation methods to improve the selection of children, including very young infants, and offers multiple surgical and nonsurgical treatment options.

Importance of seizure control

Uncontrolled seizures in pediatric patients can lead to development delay, cognitive or memory deficits, poor quality of life or life-threatening accidents. Children with medically refractory epilepsy should be referred for a diagnostic workup to a high-volume, comprehensive pediatric epilepsy center if they have failed a second medication. Additional attempts at medical treatment after two failed trials of antiepileptics are rarely successful. Surgery is no longer considered an extreme or "last-resort" option for seizure control. In some cases, early epilepsy surgery may be the best method to maximize children's developmental and cognitive potential.

Filling a need to treat uncontrolled seizures

"Pediatric epilepsy patients who fail two or three drugs need alternatives, and we offer many alternatives in our program, both surgical and nonsurgical," says Raman Sankar, MD, PhD, director of the Pediatric Epilepsy Program and chief of pediatric neurology.

"Ongoing seizures are dangerous," says Aria Fallah, MD, assistant professor-in-residence of neurosurgery. "Any child with seizures despite medication therapy needs to be worked up for epilepsy surgery. Epilepsy surgery for a young child may sound radical or scary, but it may be in the best interests of the child. The vast majority of families who go through this say they are extremely grateful and feel like they got their child back.

"Pediatric epilepsy surgery is one of the most remarkable medical advances. We take a chronic, debilitating condition and in many cases are actually able to cure it — and very safely," continues Dr. Fallah.

Evaluation for surgery

Candidates for epilepsy surgery undergo a full workup to assess the suitability of surgery. At UCLA's dedicated pediatric epilepsy monitoring unit, children are admitted, typically for a few days, for a multi-step evaluation under the direction of a pediatric epileptologist. The workup includes a complete history and physical, video-electroencephalographic (EEG) monitoring and state-of-the-art imaging using 3T MRI and FDG-PET to identify the brain lesions that may be responsible for seizures.

The test results are analyzed during a team conference to determine whether the area of the brain producing seizures can be located and, if so, can be safely excised. While many children can be recommended for surgery on the basis of these results, others may require an additional workup featuring invasive EEG. This is a diagnostic operation in which electrodes are implanted in the brain to more accurately identify the epileptogenic zone and to assess the safety of surgery in that region of the brain.

Excellent surgical outcomes

The development of sophisticated neuroimaging and long-term video-electroencephalographic monitoring has reduced the morbidity and mortality of pediatric epilepsy surgery. Surgical options include hemispherotomy — disconnection/removal of the entire side of the brain responsible for seizure activity. Preferred for children 2 years old or under, hemispherotomy has been shown to resolve seizures in 80 percent of patients and allows for vastly improved neurological development as the remaining brain takes over the functions of the missing hemisphere. UCLA pioneered the use of hemispherotomy for select cases of infantile spasms.

More limited surgery can be performed on smaller lesions in the brain responsible for seizures. While this type of operation may involve craniotomy, some patients have the option to undergo an image-guided laser ablation procedure. Most children are discharged from the hospital after one day.

The majority of surgical patients become seizure-free with eventual reduction or sometimes even elimination of drug therapy. Pediatric epilepsy surgery mortality rates are less than 0.5 percent. Children who are not candidates for surgery may benefit from enrollment in a medication clinical trial, vagal-nerve stimulation therapy or a ketogenic (low-carbohydrate and high-fat) diet. UCLA has extensive experience and success in instituting and managing the ketogenic diet as well as the modified Atkins and the low-glycemic-index dietary therapies.

Epilepsy surgery outcomes are highly dependent on physician experience and this surgery is best performed at high-volume centers. Over the past four decades, UCLA physicians have pioneered novel treatments, protocols, diagnostic tools and evidence-based guidelines adopted by many children's hospitals around the world. With more than 800 surgeries performed since the program's inception, UCLA has the experience to offer personalized therapy for individual patients.

A team approach is applied to all cases and includes pediatric neurology, pediatric neurosurgery, pediatric neuroradiology, child psychiatry, pediatric neuropsychology, developmental linguistics and neuropathology.

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