

Epilepsy Surgery

CASE STUDY:

Rayna, 15

Overview: Rayna was three days old when she was diagnosed with a large tumor that took up almost the entire left side of her brain. The only presenting symptom was a bulging fontanelle. Surgery removed 25% of the tumor, and subsequent surveillance MRIs, performed without chemotherapy or radiation, revealed the tumor was gone.

At age 12, Rayna began having partial focal seizures of the right leg that caused her to fall frequently. Despite treatment with three antiepileptic medications, she continued to have seizures daily.

Treatment: In June 2008, Dr. Sun performed a functional hemispherectomy to stop the seizures by disconnecting the two hemispheres of her brain.

Outcome: Since the surgery, Rayna has not had a seizure. She is now off all medications. She is able to walk without falling and can even run. She is more articulate and doing better in school.

Testimonial: Rayna's mother says, "It's amazing that Rayna has no more seizures. We're thrilled."



Children's treated over 39% of northern California's pediatric inpatient epilepsy cases in 2008-09.

Children's Hospital is the only hospital in northern California with two pediatric epileptologists—Rachel Kuperman, MD, and Ali Mostajean, MD. The surgical program is headed by Kurtis Auguste, MD.

PROCEDURES FOR TREATING EPILEPSY

Most epilepsy patients can be successfully treated with either a single or combination of medications. However, some children do not respond to medications. Surgery in these cases can significantly reduce or cure the seizures.

TYPES OF SURGERY

Resective Surgery - Can significantly reduce or even completely control seizures. This surgical treatment requires pre-operative testing to assess a patient's candidacy. The first step is an EEG (electroencephalogram) test that monitors the brain's electrical activity in order to identify where the seizures originate. If the seizures appear to originate in a specific area, a variety of tests are performed including neuropsychological testing and functional MRI to evaluate how safely the affected portion of the brain can be removed. Additional information may be collected with a grid of electrodes placed on the surface of the brain. The surgery then removes the area of the brain where the seizures originate. The types of resections are:

- *Temporal lobectomy:* A portion of the temporal lobe is removed to alleviate the seizures.
- *Lobar resection:* A portion of the frontal, parietal, or occipital lobe is removed after it is determined that this can be done safely.

Disconnection Surgery - A second method that can eliminate seizures without removing significant amounts of tissue. For patients who are determined to be adequate candidates, disconnecting regions of the brain from each other can prevent the spread of abnormal electrical activity that leads to full-scale seizures.

- *Anatomic or Functional Hemispherectomy:* The half of the brain that is generating continuous seizure activity is either removed or disconnected from the other half. This surgery is reserved for young patients or patients where the function is transferable to the other hemisphere.
- *Corpus Callosotomy* - The structure connecting the two halves of the brain, the *corpus callosum*, is disconnected preventing seizures from crossing right-to-left or vice versa.

Vagal Nerve Stimulator Program - For patients with refractory epilepsy where the seizures are not localized to one part of the brain. This procedure involves minor surgery to implant an electrical stimulator that sends regular electrical pulses through the vagus nerve to the brain to reduce the onset and/or frequency of seizures.