

What is epilepsy surgery?

A QUICK GUIDE FOR PARENTS

Epilepsy surgery is any type of surgery where parts of the brain are **removed, disconnected, destroyed, or stimulated** to stop seizures.

There are many different types of epilepsy surgeries. Which procedure a surgeon uses depends on the type of seizures the child has, where the seizures start in the brain, what is causing the seizures, and the training and experience of the neurosurgeon.

Resections are surgeries which cut out part of the brain, while a **disconnection** is a procedure which disconnects part of the brain while leaving the rest of the brain intact. Other surgeries may destroy a small or large part of the brain with **heat, radiation, or by preventing blood flow.**

LESIONECTOMY

A lesionectomy is a surgical procedure that removes or destroys a small brain abnormality, known as a lesion, that causes seizures. For example, sometimes an area of cortical dysplasia in the brain can be so small that it is called a lesion. Hamartomas on the hypothalamus are also considered lesions.

Lesionectomies are performed using various techniques. Some lesions require the surgeon to open the skull (called a craniotomy) to cut out the abnormality.

Other lesions can be destroyed with lasers through small holes in the skull. Visualase® is one laser system used by surgeons which destroys a lesion using heat. Some surgeons are also using this system to disconnect small areas of the brain.

Sometimes a lesion can be destroyed with radiation without creating an opening in the skull. Gamma Knife® is a system that many surgeons use to destroy lesions with radiation.

LOBECTOMY

A lobectomy or lobe resection is a surgical procedure in which one or more lobes of the brain are removed.

The most common form of epilepsy surgery is temporal lobectomy. Frontal lobectomies are also performed, and, although rare, occipital lobectomies.

TEMPORO-PARIETAL-OCCIPITAL DISCONNECTION/RESECTION

A temporoparietaloccipital disconnection/posterior quadrant resection involves the removal of all or part of the temporal lobe and disconnects the occipital and parietal lobes on the affected side of the brain, leaving the frontal lobe, which is largely responsible for intentional movement, intact.

HEMISPHERECTOMY

There are several different types of hemispherectomy procedures. They include the anatomical hemispherectomy, subtotal hemispherectomy, the functional hemispherectomies, and the hemispherotomies. The main goal of each procedure is to stop the seizures by completely disconnecting one half of the brain from the other in order to prevent seizures from spreading to other parts of the brain.

The goal of most surgeries is to stop the seizures completely. There are other procedures which aim to stop the seizures after they begin or reduce their frequency and duration. These are known as palliative procedures. They include:

MULTIPLE SUBPIAL TRANSECTION

The surgeon makes very small cuts in the outer layer of the brain, called the cortex, which interrupt the horizontal fibers of the neurons in the cortex layer of the brain, but not the vertical fibers that go down to other parts of the brain and the body. This procedure can prevent the spread of seizures while preserving critical brain functions like movement.

CORPUS CALLOSOTOMY

A corpus callosotomy is a surgical procedure to control generalized seizures by cutting the corpus callosum, a large band of fibers that connects and transmits messages from one side of the brain to the other.



Some surgeons perform callosotomy by opening the skull, while others may use lasers or radiation. A partial callosotomy, where only part of the corpus callosum is cut, may be appropriate for some children.

VAGUS NERVE STIMULATION

A vagus nerve stimulator is designed to prevent seizures by transmitting regular, mild pulses of electrical energy to the brain via a small coil around the vagus nerve in the neck. These electrical pulses are controlled by a device similar to that of a pacemaker and is implanted in the chest.

Every few years the battery must be placed. This requires surgery to access the device in the chest.

Some VNS systems are approved for children as young as 4 years old.

RESPONSIVE NEUROSTIMULATION

A responsive neurostimulator is a device that continuously monitors brain signals and automatically provides stimulation to abnormal electrical events when detected as necessary. This programmable device is able to sense and record specific patterns that could lead to a seizure and in response can provide brief pulses of stimulation intended to disrupt the abnormal brain activity before a seizure occurs.

Neuropace's RNS® System is currently the only responsive neurostimulation system on the market. It is FDA approved for adults only; however, some neurosurgeons are using it "off label" in children. The device requires surgery because it is embedded in the skull. Two small wire leads are inserted into the brain where they monitor and disrupt seizure activity.

DEEP BRAIN STIMULATION

Deep brain stimulation is achieved when electrodes implanted in the brain emit pulses of energy that block the abnormal activity in the brain. The control piece of the device is implanted in the chest.

Medtronic's DBS® System is approved for adults only; however, some surgeons are using it in children today.

UNDERSTANDING YOUR CHILD'S OPTIONS

There are **many other surgeries** which a neurosurgeon can discuss with you. But first, it's important that your child has a **comprehensive epilepsy surgery evaluation** at a hospital with **sufficient expertise** given your child's age, condition that is causing the seizures, and type of surgery.

Comprehensive epilepsy centers can be found at the National Association of Epilepsy Center's website at www.naec-epilepsy.org. We encourage an evaluation at a **level 4 pediatric** epilepsy facility.

It's important to understand that all level 4 pediatric epilepsy facilities **are not the same**. Experience of the neurologists, epileptologists, and neurosurgeons vary from hospital to hospital.

Some hospitals have more experience in one type of surgery compared to another. Other hospitals have surgeons with more experience performing surgeries on infants and babies.

Be sure to check our website for **questions to ask** the neurosurgeon.

For further information, go to our website at brainrecoveryproject.org