

Epilepsy Surgery: Guidelines for Patients

This brochure outlines the procedures and considerations prior to epilepsy surgery and then describes the surgery to remove the seizure focus.

❖ Types Of Surgery

- The main purpose of epilepsy surgery evaluation is to identify exactly where seizures arise in the brain so that this region can be removed (or “resected”). This type of epilepsy surgery is only appropriate for people who have seizures that begin focally in the brain, called complex partial seizures or secondarily generalized seizures. “Primary generalized seizures” arise throughout the entire brain simultaneously so removing only one brain region will not help.
- *Temporal lobectomy* is the removal of part of the temporal lobe of the brain (the region behind the temple). It is the most frequent type of epilepsy surgery performed for seizures because seizures most often arise from disease in the temporal lobe.
- “*Extratemporal*” surgery removes a part of the brain outside of the temporal lobe. The brain is composed of the temporal, frontal, parietal, and occipital lobes. The frontal lobe is the second most common region to be operated upon, after the temporal lobe, but any brain area could be operated upon.
- When removal of a brain region is not appropriate, then other procedures on the brain can be considered.

❖ When To Consider Surgery

- When three or more anti-seizure medications have not controlled your seizure activity.
- Your seizure type is complex partial or secondarily generalized.
- Your seizure focus (where your seizures start) can be localized.
- The area (focus) can be safely removed.

Benefits Vs Risks with Surgery

❖ Benefits

- Patients who have temporal lobectomy have a 70% chance of being essentially seizure free.
- Patients who have extra temporal surgery have a 50% chance of being essentially seizure free.
- In most cases, it is better to have surgery at a younger age.
- Some people are able to decrease the number of antiseizure medications after two years.
- Some people (about 50%) are able to discontinue antiseizure medication completely

❖ Risks

- Less than 1% of patients have a serious unexpected complication (like stroke or death).
- About 15% of patients have a temporary or mild complication:
 - Examples of temporary complications are headaches or depression for 6 months after surgery.
 - Examples of mild permanent complications include mild memory difficulties or a change in peripheral vision

❖ Questions To Consider

- What are your goals for surgery?
- What are your risks for injury with seizures?
- How do your seizures affect your quality of life?
- How do you think your life would be different if your seizures were controlled?

Phase 1: Presurgical Evaluation

❖ Tests Prior To Surgery

- In general, testing is done to clarify your type of seizure and to localize the “seizure focus”, where seizures start in your brain. No one test alone gives enough information for surgical treatment; therefore, several tests are conducted.
- **MRI (magnetic resonance imaging)**
 - Provides a visual image of your brain.
 - It is a painless procedure.
 - You will lay flat on a narrow table inside the opening of a large magnet. You will need to lie still while the scan is completed. You will hear loud humming/whirring sounds.
- **Routine or Baseline EEG**
 - An EEG records the electrical activity of the brain from wires on the scalp. It is painless. A routine EEG, in between your seizure activity, gives clues to the type of seizure and location.
 - This is usually performed at the beginning of your hospitalization.
- **Video/EEG Intensive Monitoring**
 - Your electrical brain activity, along with a video recording of your seizure activity, can usually provide a definitive diagnosis of your seizure type and help localize the site of onset.
 - It is performed in the Epilepsy Monitoring Unit where the EEG wires are plugged into the wall and video cameras are mounted throughout the Unit. Seizures are detected either because you push a button to notify the staff that a seizure is coming or because the computer that monitors your brain waves detects a seizure.
 - It is important to record your brain waves before, during and after a seizure.
 - The video picture makes the interpretation of your EEG more accurate.
- **Neuropsychological Testing**
 - This is a battery of tests that tests different functions of the brain; including memory, IQ, motor and speech functions.

- These tests can help locate your seizure focus because sometimes the area where the seizure starts doesn't work as well as the rest of the brain. However, this is not always true; the test can be normal.
- Everyone has areas of the brain that are stronger or weaker than others, but in people with seizures the weaker area often corresponds with the seizure focus.
- **SPECT Scans**
 - In general when a patient has a seizure, the blood flow increases in the area of the brain where the seizure begins. And, in between the seizure activity the blood flow is less.
 - **Ictal (Seizure) SPECT Scan**
 - During a seizure the nurse will inject a small amount of a radioactive tracer (a very low dose of radioactivity) into an I.V. in your arm. This tracer marks the area where the blood flow was increased during your seizure. We will attempt to inject this within 45 seconds or less after the onset of your seizure in order to get the best information.
 - A scan is performed up to 6 hours after the injection to identify the area of increased blood flow during your seizure. This is a painless procedure. You will go downstairs to Nuclear Medicine for this scan. You will lie down on a narrow table while a huge camera scans your head; it takes approximately 45–60 minutes. The radioactive tracer does not cause you to feel abnormal in any way or give any common side effects.
 - **Interictal SPECT Scan**
 - The radioactive tracer will be injected when no seizure activity has occurred for several hours.
 - A comparison of the ictal and interictal SPECT scans may reveal a focal area of abnormal blood flow indicating the seizure focus.
- **PET Scan**
 - PET is similar to SPECT but PET measures brain sugar metabolism rather than blood flow. This test also requires a radioactive tracer.
 - Like blood flow, in between seizures the seizure focus usually uses less blood sugar than the rest of the brain, indicated by decreased radioactivity in that area.
 - This test is not necessary for everyone.
 - It is only performed in between seizures, not during seizure activity, because the radioactive tracer only lasts a few minutes and could not wait for a seizure to occur.
 - To prepare, you have to be NPO (nothing by mouth), including no caffeine, no sugar, and no chewing gum for four hours before the injection of the tracer. After the injection, you need to sit quietly for an hour. Otherwise the experience is basically the same as the SPECT scan.
- **Wada Test**
 - This is also called an intracarotid amobarbital procedure.
 - Almost every patient gets this test prior to surgery.
 - It is sometimes used to obtain more information about the location of your seizure focus; but the primary purpose is to determine if you use the left or right side of your brain for speech and language. The test also checks to see if your memory is better on one side of the brain that doesn't have the seizure focus. In temporal lobe epilepsy, the affected side usually has poor memory because the temporal lobe controls memory. If the temporal lobe is not working properly then memory is bad in that side of the brain.
 - You arrive the day before the Wada test for a check up at the Epilepsy Clinic and blood work. The morning of your test you should arrive at the EEG lab at 07:30AM for the application of scalp EEG electrodes. The test is usually over by noon.

- The test is similar to a routine cerebral angiogram, with the addition of injection of a medication into the blood stream. A thin catheter tube is inserted into a blood vessel in the thigh and guided through your body up to the blood vessels that go to your brain. You will be injected with medicine that puts one half of your brain temporarily to sleep. The physicians will ask you questions and ask you to remember a few simple things to test the half of the brain that is awake. The medication wears off in about 5 minutes and the procedure is repeated to test the opposite half of your brain.
 - Under most circumstances, the radiologist can place an Angioseal plug in the blood vessel and you can sit up and walk in about an hour. You will go home in just a few hours.
 - If an Angioseal cannot be placed, then you must lie flat for six hours and cannot bend the leg on the side of the incision. You will be allowed to turn on your side, with your leg remaining straight, after 1-2 hours. You will be transferred to a unit, usually 6 Central or 6 West, where the nursing staff will monitor you during the 6-hour period. They will assess the incision, take your blood pressure, pulse, and respirations, and check your neurological status. Most patients are discharged to home the same day. If you live far away, you may need to spend the night in Charlottesville. You will not be discharged from the hospital until after the six hour time is over.
- *Epilepsy Surgery Committee*
- All of your tests will be reviewed by a committee of epilepsy neurologists, neuropsychologists, neurosurgeons, and others to determine if you are a candidate for surgery.

Phase 2: Intracranial Monitoring

- ❖ When the Phase 1 evaluation reveals the seizure focus, then you can proceed to removal of the seizure focus (Phase 3 below) without any other tests. However, if the Phase 1 evaluation does not clearly indicate which brain region to remove, then Phase 2, intracranial monitoring is indicated.
- ❖ Scalp electrodes are relatively far away from the brain. There is skin, muscle, bone and the cerebral spinal fluid between the scalp electrodes and the brain, which can make localization difficult. Sometimes, in order to get the information needed to localize the seizure focus the physician will need to surgically place electrodes inside the skull (also called cranium).
- ❖ Whether to proceed to Phase 2 is a joint decision between you and your physician; you always have the final decision.
- ❖ There are different types of electrodes that can be applied.
 - “Subdural” electrodes are placed on the surface of the brain. They are typically arrayed as:
 - Strips
 - 4 to 8 electrodes in a strip of plastic 2-4 in. long, placed through a small 1 inch burr hole in the skull.
 - Grids
 - 20 to 64 electrodes in a rectangular piece of plastic, placed through a large hole that requires lifting a piece of skull bone.
 - “Depth” electrodes are in the form of a single wire that is placed into the “depth” of the brain.
 - May require a stereotactic frame to be placed on your head and an MRI performed to obtain a three dimensional picture of your brain to know exactly where to place the electrodes.
 - The brain itself does not feel pain so the electrodes themselves do not hurt, although the incision to place them may hurt for a few days.

- ❖ The type of electrodes and where they are placed depends on results of your earlier testing and which areas of the brain need to be looked at more closely.
- ❖ Once the electrodes are placed, you will be in the Epilepsy Monitoring Unit to record seizures exactly as in Phase 1. This usually takes one to three weeks.
- ❖ Sometimes, the physicians will do cortical mapping and this will be explained to you.
- ❖ Sometimes the final surgery to remove the seizure focus is done when the electrodes are removed, and sometimes at a later date.

Phase 3: Surgical Removal of the Seizure Focus

- ❖ Your length of stay will vary; each person is an individual and responds differently to surgery. Usually, patients spend 1-2 nights in the Neuroscience Intensive Care Unit where you will be monitored very closely. Afterwards, you will be transferred to the Epilepsy Monitoring Unit to complete your stay. When the physicians are confident you are doing OK you will be discharged to home.
- ❖ After surgery you can expect to experience some headache, occasional facial swelling, bruising, broken blood vessels, difficulty opening your mouth widely, and some temporary blurry or double vision. If the surgery occurred on your dominant language side, you may have difficulty speaking at first; a few people haven't been able to talk at all for a few days. You are also at a slightly increased risk of having a seizure right after surgery. You can usually get out of bed briefly the day after your surgery. Remember, you are an individual and may or may not experience the above symptoms. As with any surgery, you will need lots of rest and a quiet environment.
- ❖ When you are discharged to home, you will still continue to need lots of rest. Do not lift anything that is heavier than 10 lbs for six weeks. Usually you can return to work or school after six weeks.
- ❖ *You should continue to take your anti-seizure medication exactly as you took it before surgery, unless your neurologist tells you otherwise.* Medications are not usually changed for a year after surgery.
- ❖ Most of your recovery will occur within the first six weeks.
- ❖ One year after surgery, neuropsychological testing or other tests may be administered.

If you have any concerns, questions, anything you do not understand, please feel free to discuss it with your nurse or physician. They will be glad to assist you in your care. It may be helpful to write your questions down before you see your doctor.