

**Some people with epilepsy can't obtain seizure control despite trying a number of antiepileptic medications. There are other treatment options available to manage epilepsy and control seizures. One of these is surgery.**

## Why epilepsy surgery?

Epilepsy surgery offers you a chance to be seizure-free or at least to have fewer seizures. Surgery may also allow your antiepileptic medications to be reduced - although ongoing antiepileptic medication is sometimes necessary long-term.

## Surgery is considered when:

- Seizures originate from only one small area of the brain (partial seizures, even if they secondarily generalise)
- Seizures are particularly debilitating or dangerous such as tonic, atonic seizures (drop attacks) and status epilepticus (very long seizures)
- Seizures are occurring many times a day, making normal life impossible
- The cause of seizures requires surgery, e.g. a tumour or abnormal brain tissue

## Pre-surgical evaluation

Epilepsy surgery is performed at a number of hospitals in Australia's capital cities. The pre-surgery work-up is very extensive and comprehensive and can take up to 12 months or more to complete. It involves a number of tests and often a period of 1-2 weeks in hospital. A large range of tests are done to determine where in the brain your seizures originate, and what surgical procedure, if any, is the most appropriate for you. Prior to each test the doctor or person performing them will give you a full explanation.

***Tip:** This is an important time to ask questions and be fully aware of what is involved. You will be asked to sign a consent form for some tests.*

## The tests in the pre-surgical workup include:

### Video/Telemetric EEG (electroencephalogram)

This is a continuous EEG recording and video monitoring for a period of several days. The aim is to record a number of seizures on EEG and at the same time videotape what you do during seizures. This helps to identify the area of your brain where the seizures are starting.

Small electrodes (approximately 20) are glued to the scalp and may be secured with a bandage. The bandage, not the electrodes, will be removed every day for showering. To reduce the time needed in hospital, your medication doses may be lowered to help provoke seizures. You may be kept awake longer than normal, because sleep deprivation can often trigger seizures. Being monitored can be a difficult and frustrating time as it can often take days for a seizure to occur. Ideally 3-5 seizures should be recorded.

**Tips:** *Changing clothes is easier by wearing tops that button or zip up at the front or back.*

- ◆ *Some centres will ask you to sleep without sheets or blankets and wear dark clothing which will help to see your movements during seizures.*
- ◆ *Bring into hospital items that do not need to be attached to a power source such as books, journals, games and puzzles. You may use a computer but the battery will need to be charged away from the monitoring equipment.*
- ◆ *Watching television or videos and having lots of visitors can also help.*
- ◆ *Smoking is not permitted inside the hospital and you will not be able to leave the monitoring room. If you smoke, consider giving it up before admission or talk to the nursing staff about patches.*
- ◆ *Chewing gum will not be allowed as it interferes with the EEG.*

### **MRI – Magnetic Resonance Imaging**

An MRI records detailed pictures of the brain and is effective in identifying brain abnormalities seen with epilepsy. The scanner is like a tunnel and makes loud thumping noises. Most MRI scanners are equipped with mirrors, microphones and music so you will be able to relax or communicate with the technician. The MRI may last from 30-60 minutes.

**Tip:** *It is important to notify the technician prior to the test if you are stressed by confined spaces as a short acting relaxant can be given.*

### **SPECT – Single Photon Emission Computerised Tomography**

A SPECT scan examines blood flow within the brain. A radioactive substance is injected into the bloodstream and carried to the brain. Usually two of these scans are done if surgery is being considered: one when you are not having a seizure and the other when you are. Only the injection is given during the seizure – the scan can be done within four hours of the injection. When there is no seizure activity, the blood flow should be reduced in the region of the seizure focus. During a seizure the blood flow should increase in this area. The scan takes about 30 minutes.

### **PET – Positron Emission Tomography**

This scan looks at the glucose metabolism in the brain - so you will be asked to fast beforehand.

Once again, a radioactive substance is injected into the bloodstream and carried to the brain. Just prior to the scan, a mask is moulded to your face and earplugs and eye patches are applied to reduce external stimulation (because the scan examines how the brain is functioning, so stimulation can alter results).

The scan itself takes approximately 30-45 minutes and it is important that you remain quiet but awake during this scan. On most occasions a video/telemetric EEG will be performed 30 minutes prior to the scan and also simultaneously with the PET scan, so the whole procedure can take over 2 hours.

Women of reproductive age will be routinely tested for pregnancy prior to this test. It will not be performed during pregnancy.

Once these scan are all completed they will be viewed by your Neurologist and compared for consistency.

### **Psychiatry**

The surgical program is not an easy process and can be a stressful time for most people. A routine visit to a psychiatrist is part of the pre-surgical work-up. The psychiatrist will assess how the you are coping with living with epilepsy and seizures and how well you may cope with surgery.

### **Neuropsychological Evaluation**

This evaluation helps to determine which regions of the brain may be related to or affected by the seizures. The neuropsychologist will test your mental functions such as memory, problem-solving, attention, conceptualisation, planning, organisation, learning, language, academic skills, perceptual and motor abilities, emotions, behaviour and personality. There are no invasive procedures, no pain, no needles, or electrodes. The neuropsychologist may also ask you about your family and medical history. Testing may take 6-8 hours to complete, often in blocks of 2-3 hours when you are functioning well and there is no pass or fail.

***Tip:** This testing should be done when you are feeling well and alert, so let the neuropsychologist know if you are feeling overtired or may have a seizure. It is important the neuropsychologist knows when your last seizure occurred or if you feel like you may have a seizure on the day as it can affect results.*

### **Visual Field Test**

Some centres will ask you to attend an eye clinic to have your visual fields tested. This is to determine what normal field of vision you have. This test will be repeat after surgery.

### **WADA Test**

This test is usually not necessary and is only done if the neuropsychological evaluation tests were not able to determine which half of the brain is dominant for speech and memory. It also helps to assess how well the temporal lobes will support good memory function after surgery.

The test involves an anaesthetic which is injected into a large artery to put half of the brain to sleep. During this brief anaesthesia, the neuropsychologist will ask you to identify objects and remember a number of pictures and words. About 15 minutes later, you are then asked to recall these pictures and words. Because half of the brain is anaesthetised for this short time about 5 minutes, half of the body will be paralysed, vision in one eye is lost and you may have speech difficulties. Some people can find this distressing, but it is only lasts for the duration of the anaesthetic. This test also requires an angiogram, which will be explained to you by the doctor.

Because the WADA test is more complex than explained here, and an angiogram carries a risk of complications, a thorough explanation and consent is necessary.

### **Depth or grid electrodes**

These are not commonly used but may be needed when other tests have not determined the exact location of the seizure focus. This is a major surgical procedure and electrodes are implanted on and within the brain, depending on which electrodes are used. After the electrodes are implanted, there will be another period of video-EEG monitoring to record seizures. The type of electrodes and surgery varies and will be fully explained to you prior to the test and you will be asked to complete a consent form.

### **Surgery - who decides and when?**

Usually there is a meeting of all the professionals involved in your pre-surgical work-up where all the test results are discussed. Surgery will not be performed unless all the professionals involved are confident that you will obtain significant benefit.

**The decision to operate is only made after all the tests are done** and is based on the results of the tests and you wanting to proceed with surgery. Your chances of successful surgery and risks for complications will be explained to you by the surgeon.

**At any stage during the pre-surgical work-up you can decide that you do not want to have surgery. Also be prepared that surgery may not be an option for you.**

### **The surgery**

**The goal of epilepsy surgery is to improve a persons quality of life by stopping or reducing the frequency of seizures, without causing neurological impairment.**

### **Preparing for surgery**

- ◆ When you are about to have surgery it is important to:
- ◆ Stay healthy
- ◆ Talk to your family and friends about the surgery
- ◆ Take your medications as prescribed by your doctor
- ◆ Stop smoking
- ◆ Stay well informed through the surgical process by being in touch with the hospital professionals
- ◆ Ask for assistance from them if you have any questions about the surgery and post surgery time
- ◆ Speak to someone who has had the surgery. Epilepsy Action Australia can put you in touch with someone.
- ◆ Ask lots of questions

### The operation

Usually a small strip above the operating area is shaved, which can be covered with the hair that remains. Ask the surgeon to show you how much hair will be shaved when discussing the surgery. The surgery will be performed by a neurosurgeon and takes a few hours but it will take longer for you to fully recover. Most people spend a night in intensive care and then about five days in a ward. The surgical incision is usually closed with skin staples, which are removed in about 5-10 days. Removing the skin staples can be uncomfortable but is generally not painful. The area around the incision site and sometimes the eyes can be puffy and numb for several days.

As with most surgery there are risks like infection and haemorrhage (bleeding). Common symptoms straight after surgery are numbness around the incision site, dizziness, unsteadiness, nausea, vomiting, headache, jaw ache, swelling, bruising, blurred vision and short-term depression.

### After surgery

Discharge from the hospital following surgery is usually after about seven days. Before discharge, the neurologist and neurosurgeon will arrange follow-up appointments for you, which will usually occur about four weeks after surgery.

The scar from the surgery should be kept clean and dry and it is important to let the surgeon know if it is red, swollen or painful. Hair washing is okay, but it is not advisable to use hair dyes for a few weeks after surgery.

It is important to rest following surgery, gradually increasing activity over the next couple of weeks. A daytime rest may be reasonable but ensure that this does not affect your night sleep. Increase exercise gradually but avoid exhaustion and overdoing it. All contact sports should be avoided for 12 months while the skull bone is healing.

The neurologist may change your medications on discharge from hospital or at follow-up appointments. It usually takes about 6-8 weeks before you will be ready to return to work or school. Follow-up appointments with the Neurologist and the Neurosurgeon will be arranged for approximately every three months for about a year.

You will also be asked to see the Neuropsychologist to retest your memory etc to assess any changes to these. You may find that your memory seems better and that you feel more alert. Most often the test shows that memory has improved slightly or has remained unchanged.

You will also be asked to see the Neuropsychiatrist to discuss how you are coping after your surgery. Some people experience some depression following surgery but this is temporary and should resolve within 3-6 months. If you experience any depression you should notify your Neurologist immediately.

Your visual fields may also be retested to see if these have changed.

### Life after surgery

A large percentage of people become seizure free after surgery. Not having seizures can create significant changes to your life, such as relationship dynamics, employment options and choices. Often this is a time to make major life-changing decisions. Although a lot of these adjustments are positive, some people encounter difficulties adapting or find the experience overwhelming. Do not be afraid to seek help if you feel you are not coping, as this can be a normal response.

Not all people who have epilepsy surgery are seizure-free following surgery, but there is usually a significant decrease in seizures. Some people may have some seizures immediately after surgery but this does not mean that the surgery has not been successful.

The driving licensing authority enforces *no driving for 12 months* after surgery.

Speak to the neurologist before drinking alcohol or taking other medications or drugs

**For more comprehensive details about the above procedures, speak to your doctor.**

### REFERENCES

- > Mackenzie, R.A. Non-Pharmacological Modalities in Epilepsy. *Current Therapeutics* August 2000
- > Schwartz. T.H. Epilepsy-Surgery.com. *Weill Cornell Medical College*
- > Dr Cecilie Lander *Royal Brisbane Hospital, Australia*

This information is given to provide accurate, general information about epilepsy. Medical information and knowledge changes rapidly and you should consult your doctor for more detailed information. This is not medical advice and you should not make any medication or treatment changes without consulting your doctor.