

GREGORY D. CASCINO: There are several different types of epilepsy surgeries that can be performed. The most common procedure, since the introduction of epilepsy surgery, has been to remove a portion of the anterior temporal lobe in patients who have drug-resistant focal epilepsy.

After a structured comprehensive evaluation to indicate the site of seizure onset and the likely underlying etiology or cause, a neurosurgical team removes a portion of one anterior temporal lobe. That would be the most common surgical procedure, but not the only one.

ROBERT W. WHAREN, JR.: So I think the best way to consider the different options are those that can directly eliminate the spot in the brain where the seizures are coming from, and those that indirectly try to minimize or eliminate seizures. It all depends on localization. How well can the seizures be localized? Do we know exactly the area in the brain where the seizures are emanating from?

If we know exactly where it's coming from, but we're not able to safely remove that area of the brain, we now have an option in which an electrode can be placed over that area and connected to a computer chip that is embedded in the skull. That computer chip can monitor, on a continuous basis, the EEG. And when the brainwaves start to get to the point where they're starting to build up the seizure, it can deliver a stimulus to try and abort it. This is called a responsive neurostimulator device. And it is an excellent option for people whose seizures have been well-localized.

JAMIE J. VAN GOMPEL: So there's a procedure-- we call it a stage two approach-- but a procedure in which, after all the initial workup, we still kind of have to find where the seizures are, because it's more common that they have temporal lobe. So it could be in the frontal lobe or the parietal lobe or an odd part of the temporal lobe, the back side, maybe, or even the insular. There's all these different areas.

So then there's a set of procedures that are either laying buttons on the brain, which we call subdural grids, or putting depths into the brain, or putting even finer things called stereo EEG, which are multiple little kind of pencil lead things into the brain to detect seizures. Those too have buttons, but they're not laying on top.

And all those procedures are just designed to record more invasively from the brain to better understand where the seizures are coming from. If we find a spot with those, we oftentimes then come back and either remove that spot, or in some circumstances, put electronics around that spot to modulate or change the seizures there. So that's a whole separate set of procedures.

ROBERT W. WHAREN, JR.: But the seizure focus is in a part of the brain that can't be removed, what we call elephant brain. And this way, we can try and control that area without causing any destruction. Sometimes, the seizures are such where it's not localized to a spot that can be removed or treated with the laser or put an RNS device. And that's when we start to utilize techniques that can indirectly try and increase the suppression of seizures, such as a vagal nerve stimulator or deep brain stimulation, in which we try to stimulate the areas of the brain that can prevent seizures.

And one of the things we've learned about those techniques is that they continue to improve over time. The second year is better than the first. The third year is better than the second for reasons that we don't completely understand. But it is a generalized phenomena with either vagal nerve stimulation or responsive neurostimulation that the more it can inhibit seizures, the more effective it will become over time.

JAMIE J. VAN GOMPEL: So palliative procedures, one of which is a VNS stimulation-- so a little electrode that goes on the neck and may help reduce, in 50% of the patients, 50% of their seizures. There's palliative procedures that we do electrical stimulation within the thalamus, which may have a similar effect to what the VNS does.

ALFREDO QUINONES-HINOJOSA: There are multiple variations of treatment of patients. But I always believe that consulting with an expert on epilepsy surgery is crucial to find the treatment that is going to fit that particular patient.