Pre-Surgical Evaluation of Epilepsy
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Hello, I am Dr. Norman So, a neurologist specializing in the treatment of epilepsy at the Cleveland Clinic Epilepsy Center. Today, I am going to give an introduction on the pre-surgical evaluation of epilepsy.

And I am Dr. Lachhwani – I specialize in the treatment of epilepsy in children. I will share with you the key pertinent points about evaluation and management of seizures in young patients.

While medications control seizures for a majority of patients with epilepsy, they do not always work. After several medications have been used singly or in combination and the person continues to have seizures, we call it medically intractable epilepsy. Epilepsy surgery should be considered as an option for a person who has medically intractable epilepsy that interferes with quality of life or produces disability.

Children are (unfortunately) not immune to medically intractable epilepsy; in fact, the incidence of epilepsy is highest in the first decade of life. A proactive specialist team can help to evaluate young patients for possible surgical candidacy early in the course of epilepsy. Promptly identifying candidates for surgical treatment and pursuing a surgical cure when they are young not only prevents years of suffering from seizures, but also allows for earlier recovery and getting brain development back on track. Such a window of opportunity is clearly lost beyond the years of childhood.
Central to successful epilepsy surgery are 2 principles:

(1) Confident localization of the seizure generating area of the brain, also called the epileptogenic zone, or seizure focus, and

(2) A plan to accomplish the surgery safely without undue risks. For our young patients, we strive to carry to do this in a child friendly environment and to take into account the needs of the child and family.

Pre-surgical evaluation can be looked upon as a series of steps. This starts with safer, non-invasive tests. Additional tests are added as needed. Procedures that carry some risk, like the implantation of intracranial electrodes into the brain are usually reserved to the end. While there are some common tests that are frequently done, we are not talking about a cookbook recipe approach.

A good quality MRI of the Brain and prolonged video-EEG recording with scalp electrodes in the Epilepsy Monitoring Unit to capture seizures are the cornerstones of any evaluation. Sometimes this is enough to localize where the seizures are coming from and allow our specialists to develop a surgical plan. But results may not be clear cut and additional testing required, tailored to the needs of each person. In order to be confident of where the seizures are coming from, we need convergence of several independent tests pointing to the same area in the brain. This is an important point.

There are a number of tests to visualize abnormalities in the brain. The PET scan standing for Positron Emission Tomography gives a metabolic image of the brain after an isotope is injected intravenously. The ictal SPECT scan, standing for Single Photon Emission Computer
Tomography gives a different picture when a radio-isotope is injected during the early part of a
seizure and has to be done in the Epilepsy Monitoring Unit. MEG stands for magneto-
encephalography. The MEG records magnetic signals from the brain, which are complimentary
to and yet different from the EEG. Because the technology uses more than 300 sensors with
advanced signals analysis, the MEG can improve on what is detected by the EEG.

Separately there are tests of brain function to assist in planning for safe surgery. The
neuropsychological evaluation comprises an IQ battery, together with testing of memory, verbal,
visual and other functions. This gives an assessment as to how the brain of a person can tolerate
surgery. Knowing which side of the brain and where language functions are located can be very
important in making surgical plans. To find out which side of the brain has language function;
either a Wada Test or functional MRI can be performed. In the Wada Test, a small amount of an
anesthetic is injected into the main carotid artery that supplies one side of the brain followed by
testing. In functional MRI, language testing is done inside a MRI machine. By testing other
things like hand and foot movements during functional MRI, we can also get information on the
location of essential motor and sensory areas in the brain.

By now, a lot of information has been gathered. All the data need to be analyzed, put together,
and presented to our Epilepsy Surgery Patient Management Conference. This is attended by all
team members at the Epilepsy Center which include neurologists, neurosurgeons,
neuropsychologists, psychiatrists, social workers, nurses, amongst others. The task is to examine
all the results critically, and come to a recommendation as to whether surgery can control a
patient’s seizures, how the surgery is to be performed, and estimate the probable risks and
benefits. In many cases, non-invasive test results permit a recommendation for surgery.

However, when the picture is more complex, or when precise mapping either of the seizure generating area or of critical brain functions are required, the team will recommend placement of intracranial electrodes. The placement of intracranial electrodes for pre-surgical evaluation will be addressed in a separate talk.