ADVANCES IN EPILEPSY SURGERY

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Abstract

The history of epilepsy is probably as long as human race. It is estimated that 6-7% of population suffer at least one seizure at some time in their life, between 0.5-1% of population suffer from active epilepsy. Drug treatment even when successful is only suppressive, since none of the drugs is curative. Surgical approach, hence is more logical as it would eliminate the cause of the seizures. In pediatric age group, the need for early surgery is even greater as frequent seizure activity interferes with neuronal migration, leading to mental retardation.

For several years only small number of patients were offered surgery, however, advances in neuroimaging studies and development of new surgical techniques have enabled us to deal with the lesion in the eloquent areas, without any major problem.

Aim of Surgery

Surgical aim is to excise the discrete zone of epileptogenic tissue, to decrease the mass of abnormal tissue where complete excision is not possible or to perform the disconnection procedures to interfere with the spread of the seizure.

Preoperative Assessment

In order to localize the tissue which is structurally and functionally abnormal, both anatomical evidences and functional findings are required.

Before the advent of MRI, temporal lobe oriented images of CT were used to indicate abnormalities like mesial temporal sclerosis, AVM, and areas of calcification.

MRI is widely available now a days and its multiplanner imaging capabilities, high sensitivity for small and low grade tumors has made it investigation of choice for anatomical localization of focus. MR volumetric studies and MR spectros-

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CT scan of the same child which could have been passed as normal.

MEG (Magnetic encephalogram) provides the spatial orientation of the lesion. The use of this modality is however quite limited at present.
EEG studies in patients considered for resection commence with a careful workup which includes sleep recording. At this stage, if there is clear evidence from neuroimaging of a discrete lesion, and the location of this is in agreement with EEG and neuropsychological findings, it may be possible to plan surgery without further investigations. The use of foramen ovale electrodes greatly enhances the reliability of ictal localization in temporal lobe seizures.

Where FO telemetry fails to demonstrate a temporal ictal onset and or seizure onset is thought to be extratemporal, more invasive methods like depth electrodes and subdural mats are used, however there is a recent decline in the use of these invasive procedures.

PET/SPECT Scans have been used as diagnostic tools Role of PET studies in localization of focus is well proven and has both high specificity and sensitivity as it shows interictal hypometabolism and ictal hypermetabolism in the epileptogenic area.

**Surgical Procedures**

After careful preoperative evaluation and localization of the focus, the appropriate surgical procedure is adopted to suite the individual patient.

**Excision of Focus**

When epileptogenic focus is discrete, operative procedure may take the form of lesionectomy. Mesial temporal sclerosis is dealt with standard temporal lobectomy. Amygdalohippocampactomy is another alternative, when focus is very mesially located and speech and memory deficits have to be avoided.

Both temporal lobectomy and AH have high success rate in selected cases. Marked reduction in seizure frequency or fit free state is achieved in 75%-80% of the cases.
Disconnection Procedures
When no discrete zone is found, attempt is made to interrupt the pathways of seizure propagation.

Callosotomy provides reduction in seizure frequency in generalized multifocal type of seizures. Drop attacks are the seizure type most amenable to callosotomy.

**Corpus Callosotomy**

Division of corpus callosum disrupts interhemispheric pathway for secondary generalization of partial seizure (unilateral seizure focus)

To avoid unnecessary complications, only anterior 2/3 of corpus callosum divided. Total section may be done as secondary procedure.

**Hemispherectomy** is considered for the patients having uncontrollable seizures with unilateral hemiparesis. The common causes of the hemiplegia hemiseizure syndrome includes MCA territory infarction, Rasmussen encephalitis, Sturge weber syndrome, and cortical dysplasia.
Multiple Subpial Transection (MST) is a newer technique. It is based on the experimental work on monkeys where it was shown that the interruption of horizontal axons (in the superficial layers of the cortex) could result in reduction of spread of seizure activity, without causing any damage to the involved cortex. MST is now in use for the treatment of lesions situated in the eloquent parts of the dominant hemisphere, as in conditions like Lindau Kleffner Syndrome (Acquired dysphasia).

**Stimulatory Procedures**

Vagus nerve stimulation has been shown to be effective in reducing the frequency of seizure activity. In clinical trials, it has shown 50% reduction in seizure activity in 30% of patients with refractory partial and complex partial seizures.

Implantable pulse generator is used to stimulate left vagus nerve in the neck and the device is free of any serious side effects.

**Conclusion**

With the recent advances in neuroimaging studies, it has become possible to localize the focus easily and confidently. Surgical techniques like MST, and stimulatory procedures have provided new hopes for difficult cases. Moreover improved surgical techniques have reduced the morbidity and mortality associated with these procedures.

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