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Advances in the Management of Epilepsy

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Epilepsy remains one of the most common afflictions in humans, with a prevalence of about 1% in the general population. Since the advent of phenobarbital as a novel therapeutic agent for the prevention of seizures in patients in 1912, the medical and surgical treatments of epilepsy have advanced significantly. There were many early pioneers in epilepsy surgery, including Horsley, Keen, Nancred, and Sachs.[1,4] We must remember that their surgical attack on epilepsy was practiced long before we became familiar with the structure and function of the central nervous system, and the fine histoarchitecture of the neuronal networks within the cerebral cortex. Of course, the work of Penfield[2,3] in the 1930s set the stage for the modern revolution of surgical techniques applied to the study of human epilepsy.

In this special issue of *Neurosurgical Focus,* we have provided an update on the state-of-the-art management of epilepsy from both medical and surgical perspectives. We begin with a description of pharmacologically intractable epilepsy and proceed to a review of imaging strategies to identify neurosurgical candidates. It is becoming increasingly more apparent that neuroimaging is playing a pivotal role in our understanding of the causes of epilepsy in children and adults. We then review current techniques for temporal lobectomy, extratemporal cortical resections, corpus callosotomy, and treatment of hypothalamic hamartomas and tuberous sclerosis. The use of deep brain stimulation for epilepsy is discussed as a novel approach to the management of selected patients with intractable epilepsy. Recent adjuncts in the placement of intracranial electrodes, whether by use of neuronavigation or robotics, are described and can now be made widely accessible to most neurosurgical centers. Finally, some futuristic applications of technologies are presented, such as the use of optical spectroscopy in identifying the seizure focus and the identification of a novel bumentanide-sensitive Na-K-Cl^2 cotransporter.

There is much that neurosurgeons can feel proud of in the advancements of techniques that have improved the lives of patients with epilepsy. In the future, I predict that the use of resective surgery, which carries the risk of neurological impairment, will be supplanted by techniques that are more squarely aimed at increasing our understanding of the complexities of the neuronal circuits involved in the generation and propagation of epilepsy. Interrupting these circuits effectively is likely to be accomplished through sophisticated stimulation and electrical interference techniques in which neurosurgeons will continue to play a major role.

References

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