

SURGICAL MANAGEMENT OF EPILEPSY

Essay

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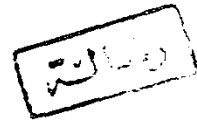
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INTRODUCTION

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Surgical treatment of epilepsy dates back to ancient times. Early attempts at trephination were inspired by the concept of epilepsy as the result of evil spirit within the cranium (*Penfield and Jasper, 1954*). More modern attempts at surgical therapy are based on the concept advanced over a century ago by Hughlings Jackson that seizure may arise from a focal zone of brain abnormality (*Jackson, 1931*).

In 1886, Sir Victor Horsley performed the first surgical procedure based on this hypothesis, involving resection of a traumatic cortical scar in a patient who had been diagnosed and carefully studied by Jackson *Penfield and Jasper, (1954)*.

This case illustrates the close observation between neurologists and neurosurgeons that is still required today for the successful surgical treatment of intractable epilepsy. With the development of modern neurosurgical techniques, a variety of structural lesions including tumours and arteriovenous malformations have been treated surgically, with resulting control of associated seizures. However, the term epilepsy surgery is generally reserved for surgical approaches aimed specifically at the control of epileptic attacks (*Engel, 1989*).

Surgical therapy is reserved for those patients with intractable epilepsy, i.e., those in whom seizures occur, despite the best medical therapy, with such frequency and intensity that they interfere with the patients' quality of life.

The past decade has witnessed a tremendous surge in interest in the surgical treatment of epilepsy. There has been a significant increase in the number of specialized centers offering this surgical modality. The renaissance of epilepsy surgery has benefitted from a convergence of advances in several disciplines related to clinical and basic neurosciences.

Advances in monitoring have included the advent of videotechnology (*Ives, 1987; Porter et al., 1985*), computer assisted EEG analysis (*Gotman, 1985*) paperless and digitized EEG processing (*Ives, 1987*), improved electrodes, individualized electrode options, and potential novel noninvasive electrode methodology and direct current electroencephalography (DC-EEG) (*Barth et al., 1982*).

Advances in imaging have included the popularization and wide availability of magnetic resonance imaging and the resulting refinement in visualization of structural pathology. Functional imaging has also become more widely available

including position emission tomography (*Engel, 1984; Engel et al., 1982*). Single photon emission computed tomography (*Bonte et al., 1983*).

Simultaneous advances in surgery have included microneurosurgical techniques allowing safer and more extensive resections of deeper regions of the brain and the preservation of vascular supply to tissue beyond the edge of proposed resection. The advent of modern stereotactic techniques and computer assisted neurosurgery has opened new vistas in the areas of invasive electrodes (including precise planning and verification of electrode localization and anatomic correlates) and in the approach to precise resections in deep regions of the brain.

Advances in basic sciences have provided innovative approaches to diagnosis and surgical planning. Regardless of the technique of recording, mapping, surgical selection, and the specific surgical treatment, the goal of epilepsy surgery is the control of epileptic seizures. Complete cessation of all ictal events obviously represents the most optimal outcome. However a satisfactory outcome may have a different meaning for individual clinical situations.

In some cases, the elimination of daytime seizures alone is extremely beneficial despite the persistence of auras and nocturnal events. In other instances, a favorable changes in seizure symptomatology may be beneficial. Additional considerations include the discontinuation or decrease of an anticonvulsant medication, the elimination of side effects and toxicity, improved neurocognitive function (as a result of decreased seizures or decreased medications) and more effective psychosocial performance (*Engel, 1989*).

AIM OF THE WORK

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The aim of this work is to give an idea about the magnitude of the problem of epilepsy, the surgical treatment of epilepsy. It also aims to evaluate the outcome and the factors predictive for a good prognosis of resective surgery for intractable epilepsy in order to reintegrate some of the chronically disabled epileptic patients back into productive ranks of society.

DEFINITION, EPIDEMIOLOGY

DEFINITION

Epilepsy is an anarchy of cell function, just as cancer is an anarchy of cell growth (*Lennox, 1960*). The term epilepsy does not refer to a specific disease but rather to a group of symptom complexes or a syndrome with many and varied causes some of which are static while others are progressive (*Marino, 1985*). The word epilepsy derives from a Greek word meaning to seize, and refers to a patient being seized by an epileptic event (*Engel, 1989*).

An epileptic seizure represents the clinical manifestation of excessive and/or hypersynchronous activity of neurons in the cerebral cortex (*Engel, 1989*). On the other hand, an epileptic disorder is a chronic neurological condition characterized by recurrent epileptic seizures.

EPIDEMIOLOGY

The incidence of epilepsy refers to the number of new cases of epilepsy occurring within a given period of time. Incidence is commonly reported as the incidence rate, i.e., the number of new cases diagnosed per year divided by the population under observation and expressed as a ratio. The prevalence of epilepsy usually refers to the number of cases of active epilepsy at a specific point in time. Like incidence, prevalence is usually reported as prevalence rate for a specific population also expressed as a ratio. The prevalence rate for epilepsy indicates the magnitude of the health problem presented by this disorder.

The best available epidemiological data derived from American studies have suggested an incidence rate of 46.7/100,000 per year (*Wood burry, 1977*). This suggests that, in the USA, over 100,000 new patients are diagnosed annually. It is estimated that in 1990 there are 400,000 patients with intractable epilepsy in the United States, with 10,000 new cases diagnosed each year.

A recent National Institute of Health consensus Development conference concluded that by the most

conservative estimates, one-half to one-third of these patients may derive significant benefit from surgical intervention. Yet, only a small number of patients with intractable epilepsy are currently undergoing evaluation for possible surgery. In developing nations, the prevalence of intractable epilepsy is thought to be much higher, and the availability of surgical treatment is quite scarce (*Engel, 1989*).

The incidence rate of epilepsy is higher in children below, 5 years of age, drops to a lower level between the age of 20-50 years and rises again in older people. The rate is also slightly higher in males than in females, which may be related to the higher incidence of head injuries in males (*Woodbury, 1977*).

In developing countries there are no recent or reliable statistics concerning the incidence and prevalence rate of epilepsy, although there is belief that the prevalence of epilepsy in these countries is just as high as in USA, if not higher. This is due to the lower socioeconomic standards of living and lower standards of perinatal health care, both of which have been shown to have a direct impact on the prevalence of epilepsy (*Engel, 1989*).