12 Effect of Acupuncture on Epilepsy

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Summary Acupuncture has been used for suppression of epileptic seizure for more than two thousand years in Chinese medicine. Also, significant progress towards elucidating the biological basis of the acupuncture suppression has been made in the past several decades. This chapter will summarize the clinical applications and the experimental studies on acupuncture therapy for epilepsy. The therapeutic methods of acupuncture or simulated acupuncture include fine acupuncture, catgut implantation at acupoints, acupuncture plus Chinese herbs and many others. The commonly used acupoints are those along GV and CV meridians. Most reports showed that acupuncture induced remarkable efficacy although there was negative evidence in some of the studies. Optimizing acupuncture conditions including delivery ways, acupoints and stimulation parameters may further improve the efficacy of acupuncture therapy for epilepsy. In animal models, neurobiological insights into the underlying mechanism have been achieved by a variety of modern approaches including biochemical, molecular, electrophysiological, immunological techniques as well as electroencephalogram and power spectra. Accumulating data have showed that acupuncture suppress epileptic seizure through regulation of several neurotransmitters/modulators and their receptors including excitatory (e.g., glutamate) and inhibitory (e.g., gamma-aminobutyric acid) amino acids, neuropeptides such as cholecystokinin, somatostain, enkephalin, dynorphin, and nitric oxide. However, the cellular and molecular basis of acupuncture therapy for epilepsy is far away from well understanding.

Keywords seizure, acupuncture, electroencephalogram, excitatory amino acids, inhibitory amino acids

12.1 Introduction

Epilepsy is a common disease of the central nervous system characterized by excessive, episodic and synchronized activity of a group of neurons. The neurophysiologic disorder of cerebral function leads to paroxysmal derangement
of epileptic seizure. Different occurrences of seizure activity in different regions of the brain cause different patterns of pathophysiologic behavior. Seizure can be involved with instant loss of consciousness that might be undetectable to the patient or a witness nearby. It can also be associated with severe symptoms, such as a several-second-lasting jerking of entire body induced by a grand mal tonic-clonic seizure.

The biologic basis underlying the abnormal and spontaneous burst-firing of neurons is likely to mainly involve imbalance between GABAergic inhibitory amino acid system and glutamatergic excitatory amino acid system although investigation of the cellular and neurochemical mechanism has undergone slow and steady progress during the last decade. Many anticonvulsive drugs have been designed and developed to enhance the inhibitory effectiveness of GABA neurotransmission. Other mechanism considerations are related to widespread neurotransmitters, neuropeptides and receptor systems, such as imbalance of enkephalin and dynorphin, release of nitric oxide and influx of calcium. There are many types of epilepsies. There are many patterns of seizures, categorized mainly as focal or generalized. An epileptic seizure could be genetic or acquired. The traditional risk factors of acquired seizure are head injuries, lack of oxygen during birth, lead poisoning, severe infections (meningitis and encephalitis), problems during development of the brain, post-surgical seizures, stroke, multiple sclerosis, Alzheimer, neuroinfection, alcohol, drugs, cerebral tumors and many others. Seizure occurrence could be from one factor or integration of several factors.

Treatment and prevention of epilepsy have been focused on using anticonvulsants to modify neural excitability. Some anticonvulsant drugs are developed to enhance Na⁺ channel inactivation, such as phenytoin, carbamazepine, oxcarbazepine, lamotrigine, topirimate and felbamate. Some work to enhance inhibitory GABAergic transmission, such as benzodiazepine, barbiturate, phenobarbital, vigabatrin, tiagabine and gabapentin. Unfortunately, many patients with intractable epilepsy do not respond to anticonvulsant drugs. Some drugs make unwanted side effects, such as phenobarbital and trimethadione, which have been abandoned to apply in clinic because their sedative or hypnotic properties always lead to tiredness, forgetfulness and confusion. The development of new and effective drug forms is still rather limited in spite of rapid increase in our understanding of related factors in epilepsy.

The prevalence of human epilepsy is high. One among two hundred people in Chinese population is diagnosed with epilepsy based on epidemiological studies in China. In the worldwide, the incidence is high up to about 1%. Many patients with intractable epilepsy suffer from depression of consciousness, transient blindness or even paralysis. Brain surgery resolves part of the problems but may potentially lead to new disorders, such as dysfunction of learning and memory.

Acupuncture, as an effective and a safe treatment, has been served in inhibiting epileptic seizure in clinic for thousands of years. The potential neurobiology pathway