

Neuropsychology of Epilepsy

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Introduction

Epilepsy is a neurological disease characterized by recurrent and unprovoked seizures. Seizures are episodes that can fluctuate from brief and nearly undetectable to long periods of strong shaking. Epileptic seizures occur as a result of a sudden surge (overload) of electrical activity in the brain, causing unusual behavior, sensation and sometimes loss of consciousness. Seizures are generally described on which they start “generalized and partial seizures” and how they behave like “syndromes”. Epilepsy is a common neurological disease worldwide, however, there are enormous difficulties precise epidemiological statistics for heterogeneous conditions like epilepsy. It is estimated that more than 65 million people around the world have epilepsy, children and older adults are the fastest-growing segments of the population with new cases of epilepsy [1]. Most cases of epileptic seizures have unknown causes (idiopathic), attributing to a genetic form of epilepsy, others may be occurred by a change in the brains “symptomatic and cryptogenic) that causes the electrical storms of seizures. Epilepsy can be diagnosed by implementing of different methods of investigations, including clinical exams, EEG, and structural and functional neuroimaging. From the management side, there are certain medications for controlling seizures “antiepileptic drugs”, drug-resistant seizures may be intractable, they may respond well to other epilepsy managements such as neurosurgery, the vagus nerve stimulations “VNS” and ketogenic therapy. However, the consequences of epilepsy are often as serious as having the disease itself. Therefore, there is an else face for epilepsy, it does have an essential clinical importance alongside the medical aspects of epilepsy, it is the neuropsychology of epilepsy. This editorial article shows what neuropsychology can provide for epileptic patients under the umbrella of patient-centered care of epilepsy.

Neuropsychology of Epilepsy

Cognition, Behavior and Epilepsy

Brain is an organ central body, it runs the basic vital, motor and sensory, alongside cognitive functions, behaviors, emotions and personality. While it is afflicted, all or some of these functions will be damaged as well. Seizures are a brain-quake, they will leave unwanted effects on the areas they start from and spread over. It is well-known that neuropsychological deficits can be detected among patients with epilepsy. Neuropsychological impairment is an important comorbidity of chronic epilepsy [2]. Types and severity of neuropsychological dysfunctions are associated with certain factors e.g. epileptic zone area, types of seizures, etiology, age of onset, duration, chronicity and severity. Frontal and temporal lobes epilepsies have the most impact on cognitive functions, especially memory, executive functions, mental slowness and attention deficits [3-4]. Moreover, seizures have an impact on developing cognitive processes when they occur early in childhood, resulting to learning disabilities, mental retardation and academic poor achievements [5]. Thus, cognitive dysfunctions are one of the major contributors to the burden of epilepsy, they can, however significantly disrupt intellectual development in children and functional status and quality of life in adults [6]. Furthermore, a very recent systematic review shows that social cognitive abilities and information processing are impaired in temporal lobe epilepsy (TLE), right-sided was associated with more severe deficits recognition of fears, sadness and disgust [7].

Management of epilepsy and cognition and behavior

Seizures auspiciously can be decreased by using antiepileptic drugs (AEDs). Antiepileptic drugs (AEDs) can adversely affect cognitive functions by suppressing neuronal excitability or enhancing inhibitory neurotransmission [8]. The impact of antiepileptic drugs may be substantial if critical functions are involved, such as learning in children or driving capacity in adults, or if functions are impaired that are already vulnerable, such as memory in elderly people [9]. The primary cognitive effects of AEDs are impaired attention, memory, language, vigilance, mood, and psychomotor speed, but secondary effects can manifest on other cognitive functions. However, adverse cognitive effects of AEDs can be avoided by evaluating cognitive functions periodically, using screening tests and slow titration to the lowest effective dosage and by too avoiding polytherapy. Seizures in some cases cannot be controlled by antiepileptic drugs, they become “intractable seizures”. Based on medical and neuropsychological evaluation and assessment, other invasive techniques (surgery and vagus nerve stimulation) may be an option, however there are different types of surgeries for epilepsy. Epilepsy surgery is indicated for patients with focal epilepsy who don not respond to appropriate medications. Overall, epilepsy surgery reduced seizure activity in randomized clinical trials when compared with continued medical therapy [10]. Although neurosurgery may improve cognitive decline associated with pharmacoresistance, surgery bears the risk of additional impairments which, in interaction with normal or even pathological processes of mental aging, may accelerate cognitive decline at an older age [11]. Moreover, patients underwent epilepsy surgery appear to be at risk of postoperative cognitive decline, even when their seizures freedom achieved following surgery [12]. In addition, vagus nerve stimulation is effective in reducing seizures, but it impaired cognitive abilities and creativity [13].

Lateralization and localization

Until recently neuropsychological assessments were used to lateralize and localize seizures, advances in neuroimaging techniques such as fMRI and Meg have been intensively used as a substitute to neuropsychological assessments. Although Wada test remains the most practical techniques for lateralization and localization of both language and memory prior to epilepsy surgery [14].

Psychological and psychosocial issues related to epilepsy

Patients living with seizures suffer psychological distress [15]. Many recent epidemiological studies have found the prevalence of depression and anxiety to be higher in people with epilepsy than people do not [16]. The fact, the altered brain activity that causes epileptic seizures can lead to depressive moods and the stress of living with a chronic condition can worsen feelings of anxiety and depression. Low self-esteem and behavioral adjustment are commonly prevalent in patients with epilepsy [17]. Additionally, psychological factors have become increasingly recognized as playing a part in the occurrence of seizures [18]. Stigma and subsequent psychosocial issues are major hurdles that people with epilepsy confront in their daily life [19]. More recently, Chui, *et al.* [20] and his colleagues evaluate the public's attitudes and behaviors toward persons with epilepsy using U.S. nationally representative samples in 2005 and 2013, they found Adults' level of personal fear and intention for social avoidance worsened from 2005 to 2013. Besides, seizures affect patients' quality of life, patients may have felt social rejection and stigmatization from others due to certain reasons, mostly are the negative beliefs lay people hold about the nature of epilepsy [21-22].

Psychogenic Seizures

Psychogenic non-epileptic seizures (PNES) are attacks that look like real epileptic seizures, but are not caused by abnormal electrical discharges as EEG reports. They attribute to psychological causes. It is estimated that PNES are detected in 20 to 30% of epileptic patients. PNES may mislead the diagnosis, EEG-Video monitoring is the best way to diagnose PNES, which the access to it may be unavailable in all medical settings. Psychological interventions, especially cognitive-behavioral therapies are most effective techniques in reducing the frequency of PNES and improving the quality of life [23].

Conclusion

The specialty of neuropsychology needs to be part from the comprehensive epilepsy program (CEP) alongside neurology, neurophysiology, neuroimaging and neurosurgery. Neuropsychology provides a specialized healthcare for dealing with neuropsychological impairments, psychological dysfunctions and psychosocial issues related to epilepsy, moreover it can be there for preoperative lateralizing/localizing language and memory (Wada test).

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