

Neuropsychology of depression in people with epilepsy

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Summary

Patients with epilepsy have a high risk of cognitive impairment and depression. Given that depression alone can be associated with cognitive complaints, it is of special interest to know if patients with epilepsy with depression show more cognitive impairment than patients with epilepsy without depression.

Keywords: neuropsychology, memory, epilepsy, depression

Introduction

Cognitive impairment and depression are common comorbidities of epilepsy [1, 2]. Given that cognitive complaints are frequent in people with depression, it is of special interest to know if patients with epilepsy (PWEs) with depression have a higher risk of cognitive impairment than PWEs without depression. Starting with findings on the relationship between depression and neuropsychological performance in general, this article will then give an overview of evidence for an additional impact of depression on cognitive functioning in PWEs.

Neuropsychological studies in patients with depression

Because of the central role of the temporal lobe in both emotional processes and memory, early neuropsychological studies in patients with depression focused mainly on memory performance. However, the most robust findings to date are lower scores for depressed patients in complex attentional demands (divided attention) and some aspects of executive functioning (cognitive flexibility, divergent thinking) [3]. In all other areas, including memory, evidence is inconclusive [3]. Memory processes, especially encoding of material to be remembered, rely heavily on attentional processes, so that memory deficits in patients with depression might be regarded as secondary rather than primary deficits. Also, memory deficits in patients with depression have been attributed to “lack in effortful processes”, i.e., mental effort [3].

Factors responsible for inconsistent results include heterogeneity of the samples. This encompasses the age of the patients (risk of dementia in older patients), duration of depression and number of depressed episodes, diagnostic

procedure (clinical diagnosis vs cut-off score in a screening questionnaire), number of acutely depressed persons versus those in remission [3], as well as heterogeneity of the diagnosis of depression itself [4].

Additionally, adequate performance in classical neuropsychological tasks does not necessarily mean that a person is able to use the cognitive processes in question flexibly and adequately to meet everyday demands. This might be a reason for the notorious discrepancy between self- and other's rating of cognition and neuropsychological test results.

Studies on depression and cognition in PWEs

Studies on depression and cognition in PWEs mainly focus on memory performance, with the additional bias that neuropsychological data and depression screening scores are readily available in epilepsy surgery centres, especially for patients with temporal lobe epilepsy (TLE). However, findings are heterogeneous, which is not surprising given the heterogeneity of depressed patients without epilepsy. In one study, measures of executive functioning in depressed PWEs and depressed patients without epilepsy were compared, which suggested that the pattern of executive deficits associated with depression in PWEs may be distinct from that in depressed patients without epilepsy [5]. Differences between TLE patients with and without depression were small in this study. Some studies found lower memory scores in depressed compared with non-depressed PWEs, especially in people with left TLE, whereas other studies did not (see [6]).

When subgroups instead of the entire sample are considered, an interesting pattern of results emerges. In one study [7], focus lateralisation within the temporal lobe was not related to the incidence of depression, but it was related to the relationship with memory performance. Depressed patients with left lateral TLE scored lower in memory tests than depressed patients with other forms of TLE. The authors also found a pattern of lower memory performance in depressed patients with frontal lobe epilepsy. They concluded that the involvement of frontotemporal neural circuits might be a prerequisite for the coupling of depression and cognition. This makes sense because in depressed patients without epilepsy lower performance is mainly found in tasks tapping frontal attentional networks.

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In another study [6], a higher number of symptoms of depression was associated with lower scores in memory tests only in the small subgroup of patients with magnetic resonance imaging (MRI)-negative TLE. These patients also had a significantly higher level of psychological distress than patients with MRI-positive TLE. The authors point out that in studies *not showing* a relationship between depression and cognition the proportion of patients with MRI-positive epilepsy is higher than in studies *showing* such a relationship.

There is evidence that patients with non-lesional/MRI-negative epilepsy have a higher risk of depression and other psychological disorders than patients with lesional/MRI-positive epilepsy [8]. As this was an unexpected finding at the time, the authors speculated that a complete disruption of neuronal circuits through a lesion can be easier to compensate for than more diffuse disturbance in non-lesional epilepsy. To put it differently, MRI-positive lesions could result in reorganisation of neuronal networks, whereas the presumably very small lesions in MRI-negative focal epilepsy could cause network dysfunction without enough “pressure” for reorganisation.

Key points

- There is no conclusive evidence that PWEs and depression score lower on neuropsychological tasks than PWEs without depression.
 - The assumption that patients with TLE have a higher risk of depression-associated cognitive impairment than patients with other forms of epilepsy is not warranted.
 - The discrepancy between MRI-positive and MRI-negative epilepsy is as yet unexplained.
- Network models of psychological disorders and cognition seem to be a promising target for research.

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