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A neuropsychological study of patients with temporal lobe epilepsy and chronic interictal psychosis

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Abstract

Purpose: To characterize the pattern of cognitive deficits in patients with temporal lobe epilepsy (TLE) and interictal (schizophrenia-like) psychosis and to examine the relationship between neuropsychological deficits and Magnetization transfer imaging.

Methods: Twenty patients with TLE and interictal psychosis were compared to 20 non-psychotic TLE patients. Patients were matched with respect to premorbid IQ, age and conventional MRI findings. A battery of neuropsychological tests was administered. The neuropsychological tests which showed significant group differences were used for correlational analysis with magnetization transfer ratio (MTR) which provides a quantitative measure of macromolecular structural integrity.

Results: Patients with interictal psychosis were significantly more impaired on executive and semantic memory tasks than the non-psychotic TLE group. Vocabulary test scores correlated significantly with MTR reduction in the left fusiform gyrus in the psychotic but not the non-psychotic group.

Discussion: In this study, patients with TLE and interictal psychosis were more cognitively impaired than non-psychotic TLE patients. Our findings suggest that the cognitive deterioration in these patients may occur as the illness progresses and the causes for this are probably multifactorial. Our study also provides further evidence that MTR may be useful in investigating structural correlates of cognitive impairment.

Keywords: Temporal lobe epilepsy; Interictal psychosis; Neuropsychological deficits; Magnetization transfer imaging

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1. Introduction

Chronic interictal (schizophrenia-like) psychosis can occur in patients with epilepsy, particularly in those with temporal lobe epilepsy (TLE) (Flor-Henry, 1969; Kanemoto et al., 2001; Slater et al., 1963). The clinical symptoms of interictal psychosis resemble those of primary schizophrenia (Perez and Trimble, 1980; Toone et al., 1982). Whilst cognitive deficits have been well described in patients with schizophrenia (Lewis, 2004; Rund et al., 2004; Saykin et al., 1994) and those with TLE (Hermann and Seidenberg, 2002; Oyegbile et al., 2004), they have been less extensively explored in patients with TLE and chronic interictal psychosis.

Earlier studies have reported lower IQ scores in patients with interictal psychosis compared to non-psychotic patients with epilepsy (Kristensen and Sindrup, 1979) or patients with postictal psychosis (Umbricht et al., 1995). Two more recent studies have compared cognitive abnormalities in patients with interictal psychosis, non-psychotic patients with epilepsy and schizophrenia (Mellers et al., 2000; Nathaniel-James et al., 2004). Patients with interictal psychosis had less severe but a similar pattern of neuropsychological deficits involving attention, episodic memory and executive functions, compared to patients with schizophrenia, whilst non-psychotic patients with epilepsy showed less severe impairments of memory and executive functions. The structural correlates for these cognitive deficits have not been fully explored to date. Whilst structural brain abnormalities in chronic schizophrenia are reported to be widespread (Foong et al., 2001; Marsh et al., 2001; Shenton et al., 2001), the abnormalities appear to be focal in patients with TLE and interictal psychosis (Conlon et al., 1990; Marshall et al., 1993; Mellers et al., 1998).

Magnetization transfer imaging (MTI) is a newer MRI technique that allows indirect visualization of protons tightly bound to macromolecular structures that are essentially invisible to conventional MRI. The exchange of mobile protons and bound protons is represented by the magnetization transfer ratio (MTR) which provides a measure of the structural integrity of tissue. Reductions of MTR in white matter are considered to be associated with myelin or axonal loss (Dousset et al., 1997; Mottershead et al., 1998; Thorpe et al., 1995), whereas the histopathological correlates of reduced MTR in grey matter are still not known but are likely to reflect neuronal or glial abnormalities (Bagary et al., 2003; Foong et al., 2001; Ge et al., 2001). MTR has also been found to be sensitive in detecting subtle pathology in normal appearing brain tissue (Cercignani et al., 2001; Filippi et al., 1998). Furthermore, reduced MTR has been reported to correlate with neuropsychological impairment in patients with neurological diseases such as multiple sclerosis, stroke and Alzheimer disease (Iannucci et al., 2001; Rovaris et al., 2000; van Buchem et al., 1998; van der Flier et al., 2002) suggesting that this neuroimaging technique may be useful in investigating the underlying structural correlates of cognitive dysfunction.

We have previously reported MTR reductions in the left temporal lobe in a group of patients with TLE and interictal psychosis without focal lesions on conventional MRI when compared to non-psychotic controls (Flügel et al., 2006).

The aim of our study was firstly to characterize the pattern of cognitive deficits in patients with TLE and interictal psychosis and to assess if this differs from TLE patients without psychosis; and secondly to examine the relationship between neuropsychological deficits and MTR.

2. Methods

2.1. Subjects

Twenty patients with TLE and chronic interictal psychosis (IP) (13 females/7 males) with a mean age of 39.1 years (S.D. 9.9) were recruited from the neurology and neuropsychiatry outpatient clinics at the National Hospital for Neurology and Neurosurgery, London, and the National Society for Epilepsy, Buckinghamshire. All IP patients fulfilled DSM IV criteria for schizophrenia. Ten patients had hippocampal sclerosis (HS) (6 left, 4 right) and 10 patients had no focal lesions on conventional MRI. The mean age of onset of psychosis was 26.4 years (6.5) and the mean interval between the onset of epilepsy and onset of psychosis was 20.1 years (7.2) with a mean duration for psychiatric symptoms of 12.5 years (9.2). All patients were on antiepileptic drugs (AED) and 16 were on antipsychotic medication, mainly atypical drugs (Clozapine, Risperidone, Amisulpiride and Olanzapine).