Everyday memory impairment in patients with temporal lobe epilepsy caused by hippocampal sclerosis

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ABSTRACT

Objective: Patients with temporal lobe epilepsy caused by hippocampal sclerosis (TLE-HS) have episodic memory impairment. Memory has rarely been evaluated using an ecologic measure, even though performance on these tests is more related to patients' memory complaints. We aimed to measure everyday memory of patients with TLE-HS to age- and gender-matched controls.

Methods: We evaluated 31 patients with TLE-HS and 34 healthy controls, without epilepsy and psychiatric disorders, using the Rivermead Behavioral Memory Test (RBMT), Visual Reproduction (WMS-III) and Logical Memory (WMS-III). We evaluated the impact of clinical variables such as the age of onset, epilepsy duration, AED use, history of status epilepticus, and seizure frequency on everyday memory. Statistical analyses were performed using MANCOVA with years of education as a confounding factor.

Results: Patients showed worse performance than controls on traditional memory tests and in the overall score of RBMT. Patients had more difficulties to recall names, a hidden belonging, to deliver a message, object recognition, to remember a story full of details, a previously presented short route, and in time and space orientation. Clinical epilepsy variables were not associated with RBMT performance. Memory span and working memory were correlated with worse performance on RBMT.

Significance: Patients with TLE-HS demonstrated deficits in everyday memory functions. A standard neuropsychological battery, designed to assess episodic memory, would not evaluate these impairments. Impairment in recalling names, routes, stories, messages, and space/time disorientation can adversely impact social adaptation, and we must consider these ecologic measures with greater attention in the neuropsychological evaluation of patients with memory complaints.

1. Introduction

Temporal lobe epilepsy (TLE) caused by hippocampal sclerosis (HS) is the most common cause of drug-resistant epilepsy in adults leading to surgical treatment [1]. Episodic memory impairment represents the most important cognitive deficit reported in adults [2,3] and children with TLE [4,5].

Traditionally, explicit memory tests — made up of free recall, cued recall, and recognition tasks — are used in the neuropsychological evaluation of patients with TLE. Wechsler Memory Scale (WMS) has widely been employed in this population and has consistently shown that patients with lesions in mesial structures of the temporal lobes show memory impairments [2,3].

Although "classic" memory tests are "gold standard" paradigms for episodic memory evaluation, there are some lines of evidence that performance on these tests may not represent everyday memory complaints of patients with memory dysfunction [6]. Some studies in healthy aging showed a weak association between subjects' memory complaints and objective results in "classic" memory tests [7,8].

Ecological measures were developed to investigate memory complaints of amnestic patients, as they occur in daily life and environment [9]. Both quantitative tasks and memory complaints questionnaires have been designed to measure everyday memory functions. Problems related to accuracy in self-reporting of cognitive symptoms have been demonstrated in a variety of health conditions, including in patients

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with epilepsy [10]. This reduced accuracy is related to over-reporting of symptoms, to cognitive impairment or insight, and to comorbid depression [11]. One may question whether the weak association of everyday memory complaints and "classic" memory tests may be related to the type of everyday memory paradigm used.

Everyday memory deficits have been previously demonstrated in two studies with adults with TLE [12,13], although some limitations may jeopardize the interpretation of the clinical applicability of these findings. Both studies included patients with mesial and neocortical TLE, and one of them used a neuropsychological battery that includes a daily living composite to infer about everyday memory deficits [12]. The only study that used a cognitive task especially developed to measure patients' functional repercussion of the memory impairment in the patient's life [13] — the Rivermead Behavioral Memory Test — did not aim to explore patients' objective memory deficits. The authors' primary objective was to determine discriminative abilities of traditional and behavioral memory tests in patients with Alzheimer's disease and TLE.

The aim of the present study was to characterize everyday memory deficits in a sample with a well-defined unilateral TLE-HS with a paradigm specifically designed to measure behavioral memory problems in patients with memory deficits. These deficits may represent important challenges in the daily lives of patients with TLE. A secondary aim of this study was to evaluate the association of patients' performance on traditional memory tests and an everyday memory task. We hypothesized that (i) patients with TLE-HS would show memory impairments in both types of tests; (ii) that some clinical epilepsy-related variables would more strongly impact their performance, and (iii) that traditional and behavioral tests would show a significant association.

2. Methods

2.1. Participants

Patients with TLE-HS were followed in the Outpatient Epilepsy Clinic in Clinics' Hospital — University of São Paulo. All subjects signed an informed consent form approved by the local Ethics Committee. We evaluated patients and controls with a protocol that included neurological, psychiatric, and neuropsychological evaluation. Besides, patients underwent neurophysiological and neuroimaging studies. We obtained epilepsy clinical information from the patient and, when necessary, from family members, close to the time of the neuropsychological assessment.

A psychiatrist also interviewed patients and control subjects using a structured clinical interview. For this purpose, we used the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) Axis I Disorders (SCID-I/P) [14] for the assessment of the presence of any psychiatric disorders. After this evaluation, we excluded patients and controls with major mood disorders, generalized anxiety disorder, conversive/dissociative disorders, or psychosis.

In the current study, we did not include patients with prior history of neurosurgery (including epilepsy surgery), drug intoxication, previous or current history of substance abuse, lack of adherence to treatment, and IQ scores lower than 70. We estimated IQ scores with Block Design and Vocabulary subtests of the Wechsler Adult Intelligence Scale 3rd. Edition—WAIS-III [15]. Finally, we also excluded patients with other lesions, such as dual pathology, previous history of stroke, or any other neurological disorder.

Patients and controls had similar gender distribution, age, and socio-economic background.

2.1.1. Patients with TLE-HS

We enrolled 43 patients with TLE after neurological and psychiatric evaluation. We excluded four patients with TLE because of lack of confirmation of hippocampal sclerosis in 3.0 T MRI, seven for incomplete neuropsychological assessment, and one with an IQ lower than 70.

Our final sample consisted of 31 patients with TLE-HS, surgical candidates with refractory epilepsy. We evaluated all patients before the surgical procedure. These patients had an unequivocal diagnosis of TLE-HS according to MRI. The epileptogenic zone was determined by EEG and long-term inpatient video-EEG.

This group was composed of twenty-two female (71.0%) and nine male (29.0%) patients. Participants were right-handed, had a mean age of 37.29 years (SD: 14.32, ranging from 16 to 64 years), an average length of education of 10.10 years (SD: 3.26, ranging from 4 to 17 years) and mean estimated IQ of 92.77 (SD: 12.73, ranging from 74 to 129). Eighteen patients (56.1%) had a left side TLE-HS, eight patients (25.8%) had a history of status epilepticus, twelve patients (38.7%) had a history of febrile seizures, and two patients (6.5%) were seizure-free at the time of clinical evaluation. Seizure semiology was characterized by autonomic seizures (two patients); dyscognitive seizures (ten patients); generalized tonic–clonic seizures (GTC, one patient); autonomic and dyscognitive seizures (six patients); autonomic, dyscognitive, and GTC (four patients); autonomic and GTC (one patient) and dyscognitive with GTC seizures (two patients). The mean age at epilepsy onset was 16.09 years (SD: 14.26; ranging from 1 to 52 years). The average duration of epilepsy was 21.38 years (SD: 12.87; ranging from 3 to 54 years). Seven (22.6%) patients were on monotherapy and twenty (64.5%) were on polytherapy. Clinical data were not available or incomplete for six patients.

2.1.2. Group of healthy controls

We also evaluated 34 healthy volunteers with no history of neurological or psychiatric disorders. Twenty-three subjects (67.6%) were female, and eleven (32.3%) were male, with a mean age of 33.76 years (SD: 11.21, ranging from 18 to 56 years). The average length of education was 12.84 years (SD: 3.05, ranging from 8 to 23 years) and mean estimated IQ was 107.41 (SD: 17.08, ranging from 75 to 138).

2.2. Methods

The Research Ethics Committee of the University São Paulo considered all methods and procedures in agreement with the Declaration of Helsinki. We obtained a written informed consent from all participants.

Neuropsychological evaluations were performed at least 48 h after the last seizure. Two well-trained and board-certified neuropsychologists (P.R.; E.M.L.) administered the tests, in a quiet laboratory setting, and in a standardized sequence. Evaluations were conducted over the course of two sessions, with a battery for memory span, working memory, and long-term memory tests.

2.2.1. Everyday memory test

– Rivermead Behavioral Memory Test (RBMT) — [16] The RBMT consists of 11 subtests. These tests include: remembering a person's first and last name (Name and Surname); remembering a hidden belonging (Belonging); remembering an appointment (Appointment); picture recognition (Pictures); remembering the gist of a short passage (Story); face recognition (Faces); remembering a new route (Route); delivering a message (Message); answering orientation questions (Orientation); remembering the date (Date); and remembering a short passage. Remembering a short story and a route around the room has both an immediate and a delayed recall component. Memory for familiar objects and faces is assessed using a recognition paradigm in which subjects must identify the original items among distractors. The RBMT evaluates prospective memory on three measures: (a) remembering at the end of the session to ask for a personal possession that was put away at the beginning of the meeting; (b) remembering when an alarm rings to ask a specific question that was assigned when the alarm was set 15 min earlier; and (c) remembering to take a message on the route around the