Comparison between two scoring systems of the Rey–Osterrieth Complex Figure in left and right temporal lobe epileptic patients

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Abstract

The Rey–Osterrieth Complex Figure (ROCF) is probably one of the most popular measurement instruments of visuoconstructional abilities and nonverbal memory. It is frequently part of neuropsychological test protocols in epilepsy surgery centers. In this study we compared the traditional scoring system of the ROCF developed by Taylor (1998) with a qualitative system that assesses spatial-relational errors devised by Loring et al. [Loring, D. W., Lee, G. P., & Meador, K. J. (1988). Revising the Rey–Osterrieth: Rating right hemisphere recall. *Archives of Clinical Neuropsychology*, *3*, 239–247] in a sample of left and right temporal lobe epilepsy patients undergoing pre-surgical evaluation. We investigated whether the relational-spatial scoring system would be more sensitive to right-sided memory deficits than the traditional Taylor version. There was no difference in the copy phase of the ROCF between the clinical and control groups. There was a significant difference between the control and the clinical groups when the 30-min delayed recall drawings were scored with the Taylor system. However, this system failed to find differences between left and right temporal lobe epileptic patients. On the other hand, comparisons with the qualitative scoring criteria used by Loring et al. [Loring, D. W., Lee, G. P., & Meador, K. J. (1988). Revising the Rey–Osterrieth: Rating right hemisphere recall. *Archives of Clinical Neuropsychology*, *3*, 239–247] revealed that right temporal lobe patients made more spatial-relational errors than patients with left-sided foci. Frequency distribution of these scores for all the three groups and sensitivity and specificity to correctly classify right temporal lobe patients are presented. This investigation demonstrated that applying qualitative, material-specific scoring criteria improves temporal lobe epilepsy presurgical protocols.
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1. Introduction

Most epilepsy neuropsychological protocols include measures of figural reproduction and recall in order to analyze differences in relation to lesion and seizure laterality (Jones-Gotman, Smith, & Zatorre, 1993; Mader, Damasceno, Frank, & Portuguez, 2001). While there is strong evidence of verbal memory losses associated with left seizure foci and left hippocampus sclerosis (Alessio et al., 2006; Kilpatrick et al., 1997; Mungas, Ehlers, Walton, & McCutchen, 1985; O'Brien, Bowden, Bardenhagen, & Cook, 2003), the association between right temporal seizure foci and delayed

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figural reproduction in presurgical samples has yielded rather inconsistent findings across epilepsy surgery centers (Barr et al., 1997; Helmstaedter, Pohl, and Elger (1995)).

From a measurement perspective, figural materials may not be reliable instruments of nonverbal memory to the extent that figurative stimuli can be verbalized and mediated by language-based operations. Helmstaedter, Pohl, and Elger (1995) compared left and right temporal epilepsy patients and controls on visual memory tests. They found that visual memory deficits in right temporal lobe patients became evident only when the verbal load of the figural material was beyond subjects' verbal learning capacity. From a more theoretical perspective, it has been argued that nonverbal measures have to be improved in order to address the particular processing quality of the dysfunctional area (Barr, 1997).

Among the nonverbal memory instruments, the Rey–Osterrieth Complex Figure (ROCF) stands out as one of the most widely used instruments in both clinical and experimental settings to evaluate visuoconstructional abilities and nonverbal memory (Spreen & Strauss, 1998). The importance of the ROCF is justified by its predominantly visual quality in relation to the other instruments.

Different scoring systems have been developed in order to evaluate the accuracy of the reproduction of the ROCF. Loring, Lee, and Meador (1988), searching to improve the sensitivity of the ROCF to right temporal lobe damage, devised a scoring system that targets qualitative spatial-relational type of errors. This system was initially administered to a single group of epileptic patients and later cross-validated with another independent epilepsy sample. These authors found that their scoring system revealed more of the right hemisphere errors.

In the present study, we compared the traditional scoring system developed by Taylor (1998) and the qualitative scoring system of spatial-relational errors developed by Loring et al. (1988) in a sample of right and left temporal lobe epilepsy patients undergoing presurgical evaluation in a reference hospital.

2. Method

2.1. Subjects

The clinical group consisted of 78 subjects selected from a consecutive sample of right-handed patients undergoing comprehensive multidisciplinary evaluation as candidates for epilepsy surgery. All patients had a history of symptomatic intractable complex partial seizures of temporal lobe origin (LTE), according to the classification system of the International League Against Epilepsy (ILAE), and hippocampal sclerosis as visualized on brain magnetic resonance. All patients clinical neurological exams were considered normal and no other known condition relating to the seizure disorder was reported by the medical team. The majority of the patients referred to this particular epilepsy center come from rural regions with predominately elementary school education (see Table 2 for sample characteristics). Subjects in the control group gave their informed consent to participate in the research project. The participants in the control group were volunteers recruited at their work place. They performed technical, janitorial and domestic work in the university, homes, public sites and schools. A screening interview was conducted in order to exclude healthy participants who had a psychiatric or neurological disorder, sensorial or motor impairment, use of psychoactive drugs and/or alcohol, history of learning disability and non-corrected visual acuity difficulties.

Among the patients, 44 had right temporal lobe epilepsy foci (RTL) and 34 suffered from seizures originating from the left temporal lobe (LTL). The location of the seizure focus was determined from ictal and inter-ictal recordings from video-electroencephalographic monitoring with scalp electrodes and confirmed on magnetic resonance. The control group was composed of 34 subjects, matched according to gender, age and level of education to the epileptic patients.

2.2. Instrument and procedure

All subjects were evaluated by the same psychologist who is specialized in neuropsychological assessment with this client population. Patients were tested with a battery of intelligence, language, memory, visuoconstructional and attention tests. The battery followed test selection guidelines recommended by the Brazilian League Against Epilepsy (Mader et al., 2001). The figural memory test and scoring procedures employed in the study are described below.