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Role of susceptibility weighted imaging and evoked potential studies in early detection of neuropsychiatric manifestations in the patients with systemic lupus erythematosus

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KEYWORDS

Systemic lupus erythematosus;
Neurological lupus;
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Abstract *Background:* Central nervous system involvement in SLE as a part of neuropsychiatric lupus is a complex diagnostic entity due to its multiple clinical presentations.
Objective: This study aimed to assess the value of susceptibility weighted imaging (SWI) and neurophysiological assessment on 30 patients with SLE in order to determine the value in the early diagnosis and management of neurological manifestation of lupus.
Materials and methods: Thirty patients with ACR criteria for SLE are involved in this study. Antiphospholipid antibodies, SWI, and evoked response studies were used to assess neurological involvement in SLE.
Results: Eighteen patients presented with clinical neurological manifestations attributed to neurological lupus. Abnormal SWI findings were found in 16 patients. 11 SLE patients were positive for antiphospholipid. 17 patients presented with abnormal neurophysiological parameters. No correlation between individual neurophysiological disorders (NPD) and specific neuropsychiatric

Abbreviations: SLE, systemic lupus erythematosus; CNS, central nervous system; SWI, susceptibility weighted imaging; PA, antiphospholipid antibodies; aCL, anticardiolipin antibodies; LA, lupus anticoagulant.

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symptoms was observed. There was no significant correlation between the electro physiologic findings and SLE related auto antibodies.

Conclusions: SWI and neurophysiological studies may provide a useful test in the evaluation and management of early neurological lupus.

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Introduction

Systemic lupus erythematosus (SLE) is a chronic, autoimmune, multiorgan disease with a broad spectrum of clinical manifestations. SLE with involvement of the central nervous system (CNS), which is often called neuropsychiatric SLE (NP-SLE), is one of the most important manifestations of SLE.[1] The condition may be both neurological and psychological,[2,3] and the reported prevalence of CNS involvement varies in different studies.[4–8] This probably reflects differences in patient selection, different criteria for NP-SLE, differences in the neuropsychological tests used and the lack of standard diagnostic instruments for CNS manifestations.

The pathogenesis of CNS dysfunction in SLE is not well understood. The observation of both diffuse and focal CNS involvement in SLE has led to the hypothesis that there are several pathogenic mechanisms in NP-SLE, such as micro vascular damage, small-vessel vasculopathy and autoantibody-mediated neuronal cell injury.[9–12]

Many biochemical and immunological studies have been undertaken in an attempt to identify specific abnormalities which might be helpful to the clinician.[13] In addition, the value of imaging techniques has been investigated.[14] However, despite considerable research, the management of neurological lupus has not been facilitated by the emergence of sufficiently reliable or practical investigative techniques. Neurophysiological techniques have been of value in the assessment of neurological symptoms occurring in other diseases such as multiple sclerosis.[15,16]

The aim of the present study was to assess the value of susceptibility weighted imaging (SWI) and neurophysiological studies on thirty randomly selected patients with SLE in order to determine whether this form of assessment might be of value in the diagnosis and management of neuropsychiatric manifestations of SLE and to correlate the radiological and electrophysiological abnormalities with SLE related auto antibodies.

Methods and patients

Thirty SLE patients were randomly selected from a population attending the Department of Rheumatology. All patients fulfilled the American Rheumatism Association, 1982 revised criteria for SLE. A detailed history and clinical examination of all patients were performed. The study also included 15 age and sex matched healthy control subjects. The entire protocol was approved by Human Ethics Committee of the Faculty of Medicine, Alexandria University, Egypt and informed consent was obtained from each human subject prior to participation.

Several investigations like autoantibody batteries [antiphospholipid antibodies (PA), anticardiolipin antibodies (aCL) and lupus anticoagulant (LA)], susceptibility weighted imaging (SWI), and electro diagnostic studies [somatosensory evoked potential (SSEP), visual evoked potential (VEP) and brain stem auditory evoked response (BAEP)] were all used to study neuropsychiatric involvement in SLE.

Patients were evaluated with routine MRI sequences; namely axial and sagittal T1-weighted images, axial and coronal T2-weighted images and coronal T2-weighted images as well as FLAIR sequences, in addition to susceptibility weighted imaging. Studies were performed on a 1.5 T MRI scanner (General Electric Medical Systems). T1-weighted images were acquired utilizing 500/20/2 TR, TE, excitations, 256×256 matrixes, FOV of 20 cm, 6 mm slice thickness, and 0.6 mm inter-slice gap. The T2-weighted images were acquired utilizing 4000/100/2 TR, TE, excitations, 256×256 matrixes, FOV of 22 cm, 5 mm slice thickness and 0.5 mm inter-slice gap. The SWI sequence parameters were TR/TE 500/30, number of excitations 2, flip angle 20°, 5 mm contiguous slices.[17]

Statistical analysis

The data were collected and entered into the personal computer. Statistical analysis was done using Statistical Package for Social Sciences (SPSS/version 20) software.

Arithmetic mean, standard deviation, for more than two groups ANOVA test was used. The level of significance was 0.05.

Results

The study included thirty SLE patients, the patient characteristics are summarized in Table 1. The mean age of the patients was 31.3 ± 9.9 years (range: 9–49).

Twenty-eight patients were females (93.3%), while two patients were males (6.7%). The duration of SLE ranged between 1 and 20 years with a mean of 6.7 ± 4.9.

Hypertension was found in 11 patients (36.7%) and nephritis was found in 6 patients (20%).

There were 18 (60%) patients who presented with definite neuropsychiatric events and twelve (40%) patients were neurologically free. Stroke was the most frequent neurological manifestation (7 patients), another 6 patients presented with headache mostly migraines, 3 patients with psychosis, 3 patients with epilepsy, two patients with mood disorder like depression, and 3 patients with polyneuropathy. Six SLE patients had more than one neuropsychiatric symptom. Seizures can occur at any time during the course of the disease. Psychosis was found in the younger age group (ranged between 12 and 29 years) while patients with polyneuropathy were about 45 years of age. Neuropsychiatric signs were significantly present in patients with hypertension ($p = 0.02$) and nephritis ($p = 0.03$).

The routine MR imaging sequences were relatively insensitive for small micro hemorrhages resulting from underlying vasculopathy and only detecting the residual area of

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