Seizure threshold variations in ECT-treated chronic patients with schizophrenia: a brief report

La variazione della soglia convulsiva nei pazienti con schizofrenia cronica trattati con TEC: un breve report

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SUMMARY. Seizure threshold (ST) is a parameter that differs in each person and can be modified both spontaneously and because of drug intake and/or other exogenous factors. A rise in ST during a course of electroconvulsive therapy (ECT) has been demonstrated in patients with depression and mania, but little information has been available as to whether the same result occurs in schizophrenia (SCZ). 11 male patients underwent estimation of the seizure threshold over a bilateral ECT course. Mean ST changed not significantly. No correlations were found between baseline ST and Positive and Negative Syndrome Scale (PANSS) scores. A significant positive correlation emerged between baseline ST and the variation of Hamilton Depression Rating Scale (HDRS) total and cognitive scores. The results suggest that ST in SCZ patients is not related to baseline psychopathological features, it is not related to clinical improvements of negative or positive SCZ symptoms and it does not change during the ECT course but it appears predictive of the improvement of affective and cognitive symptoms.

KEY WORDS: electroconvulsive therapy, schizophrenia, seizure threshold.

INTRODUCTION

Brain-modulating techniques treatments are nowadays considered additional options for the treatment of several pharmacoresistant psychiatric disorders¹⁻⁴; electroconvulsive therapy (ECT) is one of the oldest forms of brain stimulation and has shown efficacy in a range of psychiatric disorders including depression, bipolar disorder and schizophrenia (SCZ)⁵⁻⁸. In ECT the seizure threshold (ST) is defined as the minimum stimulus intensity required to produce a generalized and adequate seizure; ST is a dynamic parameter that differs in each person and can be modified both spontaneously and because of drug intake or other exogenous factors⁹⁻¹⁰.

Several studies have investigated the variations of the ST in manic and depressed patients. ST proved to be higher in men and proportional to age in depressed patients; during
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Given to above, the aim of the present study was firstly to investigate whether ST in SCZ patients undergoes modifications during an ECT course similarly to what happens in mood disorders and secondly to ascertain any correlation between ST and treatment outcome.

MATERIAL AND METHODS

Subjects

11 male pharmacoresistant (resistant to 2 adequate for duration and dosage trials with different antipsychotics) inpatients (mean age: 28.45 ± 5.92; duration of illness: 8.72 ± 5.49 years) meeting DSM-IV-TR criteria for SCZ and without any psychiatric comorbidity were enrolled in the study. They were considered for ECT treatment if they were not in acute phases of the disease. Patients underwent ECT at the Psychiatric unit of Polyclinico Umberto I University Hospital, Sapienza University of Rome, between January 1999 and January 2001. ECT was administrated as an add-on treatment to patients who were stabilized on standard pharmacological maintenance therapies, that remained unchanged. All patients were on stable pharmacological treatment from at least two months. No patients received ECT in the past. All patients gave written informed consent and their relatives were also informed on the treatment and gave consent.

Clinical assessment

Patients’ clinical status was assessed through the Positive and Negative Syndrome Scale (PANSS) and the Hamilton Depression Rating Scale (HDRS) at baseline and after the 8th ECT session. PANSS subscales (positive, negative, general psychopathology) and factor scores (anergy, thought disorder, activation, paranoid, depression) were calculated. HDRS total score and HDRS factor scores (anxiety, loss of weight, diurnal variation, cognitive disturbance, retardation, sleep disturbance) were calculated.

Anaesthesia

Anaesthesia comprised 0.5 mg intravenous (i.v.) atropine, 0.5 mg/kg i.v. succinylcholine, and 1 mg/kg propofol in rapid infusion.

ECT procedure

A MECTA apparatus, model SR-1, was used to induce seizures. Patients were subjected to bifrontal ECT. They were anaesthetized under electroencephalographic (EEG), electrocardiographic and clinical monitoring throughout the entire treatment session. As soon as the first seizure appeared (after an average of 15 seconds, but ECT still represents a potential therapeutic intervention), despite recent renewals of interest in the use of ECT in SCZ, data on ST in this disorder are presently less consistent in comparison with affective disorder. Only one study of Chanpattana et al. in 2001 analyzed this issue.

RESULTS

All patients were subjected to assisted ventilation with 100% O₂, administered through a mask and carried on until complete patient awakening.

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The variations of ST and clinical scales after the ECT course were analysed through wilcoxon-Mann-Whitney test. Spearman’s Correlation Coefficient was used to evaluate the correlations between baseline ST and baseline psychopathological components. Significance threshold was arbitrarily chosen at 0.05.

The whole group showed significant clinical improvement in all symptomatological components (Table 1). Mean PANSS total score moved from 108.1±16.6 to 76.6±17.0 (p<.001), with a mean percent improvement of 29.3±10.3%. Mean HDRS total score moved from 22.6±5.6 to 13.7±4.1 (p<.001), with a mean percent improvement of 37.2±18.6%. ST modifications during the ECT treatment were non-significant (ST baseline: 12.23±6.18; ST final: 12.91±6.7). No correlations were found between baseline ST and baseline PANSS scores. Significant positive correlations emerged between base-
DISCUSSION

Although a progressive rise in threshold had been demonstrated during ECT in patients with depression and mania, only one prior investigation had described whether the same result occurs in patients with SCZ. The objective of the study was firstly to investigate whether ST in SCZ patients undergoes modifications during a course of ECT similarly to what happens in patients with mood disorders and secondly to ascertain any correlation between ST and treatment outcome.

The whole sample showed a significant clinical response in terms of symptom reduction. This response was homogeneous and confirmed both the validity of ECT in SCZ patients and its safety.

No significant modifications of ST were observed during the ECT course, differently from what was found in the previous study of Chanpattana et al. The absence of ST modifications in relation to clinical outcomes differs from what is reported in depressed and manic patients, where an increase of ST during the ECT course is predictive of favourable clinical outcome.

Significant reductions in PANSS and HDRS scores were obtained. No relationship was found between baseline ST and PANSS psychopathological items. The only correlations were found between baseline ST and the degree of improvement of depressive and cognitive symptoms. This result suggests that, even if ST variation is not predictive of therapeutic response, in SCZ patients high ST at baseline can be predictive of improvement in affective and cognitive symptoms.

Moreover, the improvement of cognitive cluster scores of HDRS empirically contrasts with the general idea that ECT induces cognitive impairments.

The meaning of the correlation between baseline ST and change in HDRS cognitive factor is unclear. It could be expected that high dosage of energy may induce a greater cognitive impairment, but the results show an opposite tendency. By a clinical point of view, it could be hypothesized that cognitive symptoms may be considered as part of the psychopathological profile of both SCZ and depression and that a higher electrical dosage treatment could thus exert a therapeutic effect on them.

In conclusion, the results of the present study suggest that ST in SCZ patients it is not related to baseline psychopathological features, it is not related to clinical improvements of negative or positive SCZ symptoms, and it does not change during the ECT course but it appears predictive of the improvement of affective and cognitive symptoms.

Since this study was carried out on a small sample of patients and it showed results different from those of the unique previous study, further investigations are needed on the topic. Elucidating the meaning of ST could contribute to shed some light on the mechanism of action and on the prediction of clinical response to ECT in SCZ patients.

Conflict of interest

All authors of this paper have no relevant affiliations or financial involvement with any organization or entity with a financial interest in, or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, homo-
Table 2. Correlations between Baseline ST and the variations of PANSS and HDRS

<table>
<thead>
<tr>
<th>Variation (final score – basal score) of PANSS</th>
<th></th>
<th>Baseline ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>r</td>
<td>.431</td>
</tr>
<tr>
<td>S. positive</td>
<td>Sig. (2-tailed)</td>
<td>.186</td>
</tr>
<tr>
<td>S. negative</td>
<td>r</td>
<td>.358</td>
</tr>
<tr>
<td>S. general psychopathology</td>
<td>Sig. (2-tailed)</td>
<td>.280</td>
</tr>
<tr>
<td>C. anergy</td>
<td>r</td>
<td>.117</td>
</tr>
<tr>
<td>C. thought disorder</td>
<td>Sig. (2-tailed)</td>
<td>.732</td>
</tr>
<tr>
<td>C. activation</td>
<td>r</td>
<td>.349</td>
</tr>
<tr>
<td>C. paranoid</td>
<td>Sig. (2-tailed)</td>
<td>.293</td>
</tr>
<tr>
<td>C. depression</td>
<td>r</td>
<td>.307</td>
</tr>
<tr>
<td>C. cognitive disturbance</td>
<td>Sig. (2-tailed)</td>
<td>.359</td>
</tr>
<tr>
<td>C. diurnal variation</td>
<td>r</td>
<td>.404</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variation (final score – basal score) of HDRS</th>
<th>HDRS Total</th>
<th>Baseline ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. anxiety</td>
<td>r</td>
<td>.731*</td>
</tr>
<tr>
<td>S. loss of weight</td>
<td>r</td>
<td>.542</td>
</tr>
<tr>
<td>S. diurnal variation</td>
<td>Sig. (2-tailed)</td>
<td>.085</td>
</tr>
<tr>
<td>S. cognitive disturbance</td>
<td>r</td>
<td>.747**</td>
</tr>
<tr>
<td>S. retardation</td>
<td>r</td>
<td>.244</td>
</tr>
<tr>
<td>S. sleep disturbance</td>
<td>r</td>
<td>.154</td>
</tr>
</tbody>
</table>

* p<.05; ** p<.01

REFERENCES


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