Original article

Self-assessed remission rates after electroconvulsive therapy of depressive disorders

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ARTICLE INFO

Article history:
Received 5 May 2017
Received in revised form 16 June 2017
Accepted 20 June 2017
Available online xxxx

Keywords:
Mania and bipolar disorder
Unipolar depression
ECT

ABSTRACT

Background: Electroconvulsive therapy (ECT) effectively treats severe depression, but not all patients remit. The aim of the study was to identify clinical factors that associate with ECT-induced remission in a community setting.

Methods: Depressed patients who underwent ECT in 2011–2014 were identified from the Swedish National Quality Register for ECT. Remission was defined as self-rated Montgomery-Åsberg Depression Rating Scale scores of 0–10 after ECT. Other registers provided data on previous antidepressant use, comorbidities, and demographics.

Results: Of 1671 patients fulfilling the inclusion criteria, 42.8% achieved remission. Older age, education length over 9 years, psychotic symptoms, shorter duration of preceding antidepressant use, pulse width stimulus > 0.50 ms, absence of substance use disorders, anxiety diagnosis, lamotrigine, and benzodiazepines, were associated with remission.

Conclusions: This study shows that psychotic subtype of depression and older age are clinically relevant predictors of a beneficial ECT effect. Additionally, ECT outcomes can be further improved by optimizing the treatment technique and concomitant medication.

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1. Introduction

Electroconvulsive therapy (ECT) is effective for patients with depressive disorders, but not all patients benefit. While clinical trials show that the remission rate is often 50% or more after ECT [1,2], a large-scale population-based study in a community setting reported somewhat lower remission rates [3].

Accurate prediction of treatment outcomes in different subgroups of patients with depression are of great importance. Although there are some candidates, a reliable biomarker that predicts responsiveness to ECT has not been established [4,5]. Therefore, clinicians must rely on clinical history, signs, and symptoms when selecting candidates for ECT. A recent meta-analysis showed that shorter episode duration and absence of prior antidepressant medication associate with higher responsiveness to ECT [6]. The impact of several other factors such as age, presence of psychosis, and symptom severity remains unclear due to discrepancies between studies [6].

Abbreviations: CGI-S, Clinical Global Impression Severity Scale; CI, confidence interval; ECT, electroconvulsive therapy; ICD, International Classification of Diseases; MADRS-S, Montgomery-Åsberg Depression Rating Scale; OR, odds ratio; Q-ECT, The Swedish National Quality Register for ECT.

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Please cite this article in press as: Brus O, et al. Self-assessed remission rates after electroconvulsive therapy of depressive disorders. European Psychiatry (2017), http://dx.doi.org/10.1016/j.eurpsy.2017.06.015
Technical factors may also influence the effectiveness of ECT. The stimulus pulse width is of particular interest because ultra-brief (< 0.50 ms) stimulus associates with fewer memory disturbances than brief (0.50–1.50 ms) pulse stimuli [7,8]. On the other hand, a recent meta-analysis suggested that ultra-brief stimulus reduces the rate of remission compared with brief pulse stimulus [8]. The aim of this population-based study in a community setting was to identify the clinical and methodological factors that associate with the self-assessed remission rate after ECT.

2. Methods

2.1. Patient selection

All 57 hospitals offering ECT in Sweden have been reporting data to the Swedish National Quality Register for ECT (Q-ECT) since 2011 [9]. The study cohort consisted of consecutive patients who underwent ECT for depression in March 2011–December 2014. They were identified using the Swedish version of the International Classification for Diseases (ICD)-10 codes F32.1–F32.3, F33.1–F33.3, and F31.3–F31.5 in the Q-ECT [10]. While the Q-ECT is a voluntary register, 85–90% of the patients who receive ECT in Sweden agree to participate in the register [9]. When a patient had multiple ECT treatment series for depression during the study period, only the earliest treatment series was used. Patients were excluded if any of the following information was missing in the Q-ECT: the self-rated Montgomery-Asberg Depression Rating Scale (MADRS-S) score after treatment, the diagnosis, the severity of symptoms as rated by the Clinical Global Impression Severity Scale (CGI-S) before ECT [11], the treatment setting, the number of ECT sessions in the treatment series, electrode placement, the pulse width, the frequency, the duration or the current. The diagnoses were categorized as unipolar or bipolar depression with or without psychotic features.

2.2. Retrieval of data from registers

Additional data were obtained from three other national registers that were linked by using the personal identity numbers of the patients identified in the Q-ECT. The Swedish National Patient Register, which is held by the National Board of Health and Welfare, includes data on inpatient episodes, dates of admission and discharge, and main and secondary diagnoses. ICD-10 codes are used to classify the health problems in the patient register. The register is mandatory for all patients in Sweden and the coverage is estimated to exceed 99%. For the present study, we used this register to determine whether a personality disorder (F60, F61) anxiety disorder (F41), obsessive-compulsive disorder (F42) or (non-nicotine) substance use disorder (F10–F16, F18, and F19) had been ever diagnosed [12].

The Swedish Pharmaceuticals Registry is mandatory and provides complete coverage of all prescribed drug dispenses since 2005 [13]. Drugs that are administered in hospitals are not included. For the present study, this register was used to determine if the patients had had antidepressant drugs dispensed prior to ECT. The Swedish health care system insures the lowest costs for the patient if prescriptions are collected every three months or more often.

The Swedish Longitudinal Integration Database for Health Insurance and Labour Market Studies is an integrated register of demographic data held by Statistics Sweden. The register is mandatory. For the present study, this register was used to determine the education level, income, and marital status of the patients [14].

2.3. Definition of remission

Remission status was determined on the basis of the patient-assessed MADRS-S score within 1 week of completing ECT [15]. This self-rated scale consists of nine items and each item is scored from 0 (no symptoms) to 6 (severe symptoms). The maximum possible score is 54 points. A patient was deemed to be in remission after ECT if the post-ECT MADRS-S score was 0–10. Patients with scores of ≥ 11 after ECT were considered not to be in remission [16].

2.4. ECT

ECT was administered using the bidirectional constant current brief pulse Mecta (Mecta Corp, Lake Oswego, OR, USA) or Thymatron (Somatics Inc., Lake Bluff, IL, USA) devices. During the procedure, the patients were sedated with propofol or thiopental. Succinylcholine (0.5–1.0 mg/kg) served as a muscle relaxant and glycopyrrolate (0.2 mg) or atropine served as an anticholinergic agent when necessary. The electrodes were placed unilaterally, bitemporally or bifrontally.

2.5. Statistical methods

The association between remission and various clinical factors was evaluated using logistic regression analysis in both unadjusted and adjusted models. Continuous variables were categorized to identify potential non-linear relationships with the outcome. The following potential confounding variables were included in the adjusted models: sex, age group, marital status, income, education, unipolar/bipolar status, psychiatric features, substance use disorder, personality disorder, obsessive compulsive disorder, prior anxiety disorder, prior antidepressant treatment, CGI-S score within 1 week before ECT, treatment setting, coercion, medications at the end of ECT, number of ECT sessions, electrode placement and stimulus parameters. Linear trends of odds ratios (ORs) of age and stimulus parameters were tested using likelihood ratio test. Stratified analyses were carried out, separating patients with unipolar and bipolar depression as well as patients with and without psychotic features, personality disorders, and substance use disorders. Interactions between factors that were statistically significant in the adjusted model were examined pairwise using logistic regression models. Odds ratios and corresponding 95% confidence intervals (CIs) were calculated. P-values of 0.05 or less were considered statistically significant. Excluded patients were compared to the patients who were included in the study in terms of sex, by using Chi² tests and age as well as CGI scores using Student’s t-tests. Spearman’s correlation was calculated for correlation between pulse width and number of sessions. The data were managed and analyzed by using the statistical packages SPSS 22 (IBM Corp, Armonk, NY, USA) and SAS 9.4 (SAS Institute, Cary, NC, USA). Fig. 1 was created using Microsoft Excel 2010 (Microsoft, Redmond, WA, USA).

2.6. Ethics

The Regional Ethical Vetting Board in Uppsala approved the study (2014/174). The patients were informed that their data would be included in the Q-ECT unless they declined to participate.

3. Results

3.1. Included and excluded patients

In total, 5976 patients with depression treated in 57 hospitals were included in Q-ECT during the study period. Of these,
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