

Clinical and Treatment Characteristics of Chinese Patients Undergoing Electroconvulsive Therapy in an Acute Psychiatric Unit in Hong Kong

香港精神科急症病房接受電痙攣療法的病人的臨床及治療特徵

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Abstract

Objectives: To describe our early experience during the transition from a preselected dosage method to empirical titration of electroconvulsive therapy, and to describe the clinical characteristics of the patients, the treatment parameters, and side-effect profiles of those undergoing such therapy in a local psychiatric unit in Hong Kong.

Participants and Methods: A retrospective review of case records of 34 patients who had received electroconvulsive therapy during the 3-year period from June 2006 to April 2009 was conducted, after the start of empirical titration. Data on patient characteristics, treatment parameters, seizure threshold, and side-effects were collected.

Results: In all, 88% of the patients were female, 60% were aged 65 years or older, and 65% received electroconvulsive therapies to treat depression. The mean (\pm standard deviation) initial seizure threshold of bilateral electroconvulsive therapy carried out according to empirical titration was 81 ± 30 mC, and correlated with age. The use of the preselected dosage method according to the MECTA factory setting over-estimated seizure threshold by 67%. Headache and post-ictal confusions were common but more severe side-effects including dental injury, transient bradycardia, oxygen desaturation, and bronchospasm were also reported.

Conclusions: This study provides information about electroconvulsive therapy practice, patient characteristics, treatment parameters, and the side-effects of electroconvulsive therapy used to treat Chinese patients in Hong Kong. The electrical stimulus may be excessive if western dosing schedules are directly adopted for use on Chinese patients. Side-effects are common and careful clinical monitoring is important.

Key words: Asian continental ancestry group; Electroconvulsive therapy; Hong Kong; Side-effects

摘要

目的：報告有關香港精神科急症病房接受電痙攣療法的病人，當電流強度由預設的電荷改為由經驗控制滴定的轉變，以及這些病人的臨床特徵、治療參數和出現的副作用。

參與者與方法：回顧由開始了經驗控制滴定的電流強度後，於2006年6月至2009年4月期間，34位接受電痙攣療法的病人的病歷紀錄。本研究搜集有關病人特徵、治療參數、癲癇閾值及副作用的資料。

結果：88%的病人為女性，60%屬65歲或以上。有65%病人因抑鬱症而接受電痙攣療法。使用經驗控制滴定方法而進行雙側電痙攣療法的起初平均癲癇閾值為81 mC（標準差：30 mC），並與病人年齡有關。如根據MECTA指引使用預設電流強度，便會比癲癇閾值高了67%。病人普遍出現頭痛及癲癇發作後迷惑，亦有病人有更嚴重的副作用，包括牙齒受損、短暫的心博過緩、氧氣飽和度下降及支氣管痙攣。

結論：本研究為電痙攣療法提供了關於病人特徵、治療參數、及電痙攣療法副作用的資料。如參考外國電痙攣療法的電流強度直接使用在華籍病人身上，電流強度會過大。電痙攣療法普遍出現副作用，所以仔細的臨床監察相當重要。

關鍵詞：亞洲人種族；電痙攣療法；香港；副作用

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Introduction

Electroconvulsive therapy (ECT) is a controversial treatment. In 2003, a systematic review and meta-analysis of its efficacy and safety in depressive disorders was sponsored by the UK Department of Health and performed by the UK ECT Review Group.¹ A major finding of that review was that there was substantial evidence to support the short-term efficacy of ECT in depressive disorders, and that it was superior to antidepressant drug treatment. By contrast, other studies raised concerns about the cognitive side-effects of ECT.^{2,3} Empirical stimulus dose titration was proposed as a means of reducing such side-effects.^{4,5}

In Hong Kong, the utilisation of ECT is low. One study reported the number of persons receiving ECT in Hong Kong in 1998 to be 0.34 per 10,000 of the population,⁶ which was much lower than the rate in western countries.^{7,8} Also, only in the recent few years has empirical titration been widely practised by Hong Kong psychiatrists. Because of limited ECT research on Chinese patients and the relative lack of local experience with empirical titration, western guidelines have been adopted for this purpose. In particular, recommendations in the ECT Handbook of the Royal College of Psychiatrists were most often referred to.⁵ However, western guidelines are based on studies carried out on Caucasians and it is uncertain whether they can be generalised to Chinese patients. With a view to assessing the validity of such an assumption, we describe our early experience of ECT practice after starting empirical titration in 2006 in an acute psychiatric unit in Hong Kong.

Methods

This was a retrospective review of case notes of patients who had received ECT in the Pamela Youde Nethersole Eastern Hospital in Hong Kong from June 2006 to April 2009. This regional hospital undertakes a full range of specialty services. Its psychiatric unit serves a population of 0.8 million and admits both voluntary and sectioned patients. Empirical stimulus dose titration was first introduced in June 2006 and carried out using a standard protocol.

A total of 34 patients received ECT during the 3-year study period. All relevant patient medical and ECT records were retrieved. Data collected included: demographic and clinical characteristics, consent for treatment, ECT parameters, documented side-effects, and clinical response.

The ECT treatments were administered with MECTA spECTrum 5000Q (MECTA Corporation, Tualatin [OR], US). The device administered bidirectional, brief, square-wave pulses, using a constant-current stimulus (24-1152 millicoulombs [mC]). The empirical titration method was chosen, unless the patient had a life-threatening psychiatric illness (e.g. high suicidal risk or refusal to eat) necessitating a rapid clinical response, in which case preselected dosing was used. Preselected dosing was also used for patients who had previously responded well to such dosing, or

were taking a beta-blocker or were at increased cardiac risk for other reasons. We adopted the protocol recommended by MECTA Corporation for both empirical titration and preselected dosing.⁹ Empirical titration started with a stimulus of 48 mC. If this failed to produce a seizure of at least 15 seconds, re-stimulation was performed at the next level of 96 mC, followed by 192 mC; no more than 3 stimulations were undertaken per patient, per session. After the seizure threshold was determined, a stimulus of 50% above the seizure threshold was delivered at the next session. For preselected dosing, a stimulus of 144 mC was administered for females and 288 mC for males, in the belief it corresponded to 50% above the assumed seizure threshold. In patients taking anticonvulsants or benzodiazepines, the latter drugs might be withdrawn or reduced in dosage before starting ECT. Patients were given intravenous thiopentone for anaesthesia and intravenous suxamethonium as a muscle relaxant. All the patients were adequately ventilated with 100% oxygen before the administration of ECT stimulus.

We compared the seizure threshold determined by empirical titration and the MECTA instruction manual recommendation for preselected dosage.⁹ All statistical analysis was performed using SPSS Windows version 16.0 (SPSS Inc, Chicago [IL], US). The associations between seizure threshold of bilateral ECT using the empirical titration method and demographic and clinical factors were examined by Pearson's correlation. The *t* test between means was used to compare seizure thresholds in male and female subjects, and in patients in receipt of or not in receipt of specific concomitant psychotropic medications. The difference in demographic variables, clinical variables, clinical outcomes, and side-effects in patients undergoing empirical titration and preselected ECT dosing were compared using *t* tests between means for continuous variables, and Chi-square tests for categorical variables. The alpha level was set at 0.05 or below and all tests were 2-tailed. All data are shown as mean (\pm standard deviation [SD]). The study was approved by our hospital ethics committee.

Results

A total of 34 patients received ECT during the 3-year study period, which amounted to 0.6% of the total number of admissions to our unit. All the patients were Chinese, except one who was of mixed Chinese and British origin. Their mean (\pm SD) age was 62 \pm 19 (range, 21-87) years, and 60% were aged 65 years or above; 30 (88%) were females. Twenty-two (65%) patients suffered from depression, 8 (24%) had bipolar affective disorder, 2 (6%) had schizophrenia, and 2 (6%) had schizoaffective disorder. Twenty (59%) of the patients suffered from concomitant physical illnesses. Fourteen (41%) of the patients had hypertension, which was the most common physical disorder. The number of sessions at each course of ECT was 6 \pm 2 (range, 3-10); 6 (18%) were terminated early before the 6th session (5 because they enjoyed complete remission, and 1 case as

there was no seizure activity). Twenty-seven (79%) received ECT because of treatment-resistant illness; 5 (15%) as an emergency or life-saving procedure (high suicidal risk or refusal to eat), and 2 (6%) as first-choice treatment owing to a previous good response to ECT. Four (12%) of the patients lacked the capacity to consent for treatment for whom a second opinion was sought. Twenty-three (68%) of the patients received bilateral ECT, and empirical titration was used in 17 (50%) of them. The thiopentone dosage in the first session was 1.8 ± 0.6 (range, 1.0-3.3) mg/kg, and the suxamethonium dosage in the first session was 0.5 ± 0.1 (range, 0.2-1.1) mg/kg.

Thirteen patients received bilateral ECT treatment according to the empirical stimulus dose titration method, not having received ECT in the previous 12 months. The initial seizure threshold was 81 ± 30 (range, 48-144) mC, with a variation of 200%. Five (39%) patients had a seizure with the lowest stimulus level (48 mC), and 9 (69%) required re-stimulations to induce a seizure; 8 (62%) required 2 stimulations and 1 (8%) required 3 stimulations. Seven (54%) patients had an increase in seizure threshold in subsequent sessions. If the stimulus dose was preselected according to the MECTA instruction manual at 50% above the assumed seizure threshold, the stimulus dose was 177 ± 63 (range, 144-288) mC, which amounted to an average over-estimate of $67 \pm 88\%$ (range, -33 to 300%). Seizure threshold was found to correlate with age ($r = 0.6$, $p = 0.03$), but not body mass index ($r = 0.2$, $p = 0.63$), thiopentone dosage ($r = -0.1$, $p = 0.74$), or suxamethonium dosage ($r = -0.3$, $p = 0.26$), and was not associated with gender ($t = 0.07$, $p = 0.94$), concomitant use of antidepressants ($t = 1.1$, $p = 0.30$), anticonvulsants including benzodiazepine ($t = 1.1$, $p = 0.30$), antipsychotics ($t = 0.07$, $p = 0.94$), or lithium ($t = 0.47$, $p = 0.65$).

Among the 34 patients, side-effects were documented in 24 (71%). Headache was the most common side-effect and occurred in 16 (47%) of the patients, and post-ictal confusion in 8 (24%). A summary of the documented side-effects is shown in the Table. No patient suffered a prolonged seizure, for which an intervention was undertaken. Improvement in mental state was reported in 32 (94%) of the patients. Patients were discharged within 57 ± 105 (range, 1-547) days after having ECT; 19 (56%) were discharged within 3 weeks post-ECT.

Seventeen (50%) patients underwent ECT by empirical titration and 17 (50%) by the preselected dosage method. The age of patients having empirical titration was 52 ± 18 (range, 21-86) years, and the corresponding figures for those having preselected dosages were 72 ± 16 (range, 34-87) years; the difference between them being statistically significant ($t = 3.4$, $p < 0.01$). There were no statistically significant differences between the 2 groups with respect to other baseline characteristics, including: gender ($\chi^2 = 1.1$, $p = 0.60$), body mass index ($t = 3.3$, $p = 0.74$), presence of physical illness ($\chi^2 = 4.3$, $p = 0.08$), antidepressant use ($\chi^2 = 0.2$, $p = 1.00$), anticonvulsant use ($\chi^2 < 0.001$, $p = 1.00$), antipsychotic use ($\chi^2 = 0.1$, $p = 1.00$), lithium use ($\chi^2 =$

Table. Side-effects of electroconvulsive therapy treatment.

Side-effect	No. (%)
Headache	16 (47)
Post-ictal confusion	8 (24)
Nausea	5 (15)
Dizziness	4 (12)
Toothache	2 (6)
Short-term memory loss	2 (6)
Jaw pain	1 (3)
Sore throat	1 (3)
Dental injury	1 (3)
Bradycardia	1 (3)
Oxygen desaturation	1 (3)
Bronchospasm*	1 (3)

* The patient had a history of asthma.

0.1, $p = 1.00$), and concomitant medications for physical illness ($\chi^2 < 0.001$, $p = 1.00$). There were no statistically significant differences between the groups with respect to total number of side-effects ($\chi^2 < 0.001$, $p = 1.00$), post-ictal confusion ($\chi^2 = 2.6$, $p = 0.11$) or headache ($\chi^2 = 0.5$, $p = 0.49$). Other side-effects were too infrequent for meaningful analysis. Furthermore, there was no statistically significant difference between the groups with respect to clinical improvement ($\chi^2 < 0.001$, $p = 1.00$). On average, patients undergoing empirical titration were discharged earlier (44 ± 45 days) than those given preselected dosages (68 ± 140 days) after the completion of ECT, but this difference was not statistically significant ($t = 0.7$, $p = 0.50$).

Twenty-three (68%) of the patients underwent bilateral ECT and 11 (32%) underwent unilateral ECT. There was no statistically significant difference between these 2 groups in terms of baseline demographics and clinical characteristics, except that more of those receiving unilateral ECT suffered from physical illness (91% vs. 44%, $\chi^2 = 6.9$, $p = 0.01$). No statistically significant difference was noted between the groups for the total number of side-effects ($\chi^2 < 0.001$, $p = 1.00$), post-ictal confusion ($\chi^2 = 1.9$, $p = 0.23$), headache ($\chi^2 = 0.4$, $p = 0.72$), documented clinical improvement ($\chi^2 = 0.3$, $p = 1.00$), or length of hospital stay after ECT ($t = 0.6$, $p = 0.53$).

Discussion

This is an initial report of our early experience in transition from preselected dosage to empirical dose titration. Admissions for ECT accounted for 0.6% of the total number of admissions to our unit, compared to 0.4 to 1.7% found in state hospitals in the US.^{10,11} Most of our patients who received ECT were female (88%), and 56% were geriatric (aged ≥ 65 years). Similar findings have been reported in western countries. A study in the US reported that 71% of the patients who received ECT were female and 34% were aged 65 years or older,¹² and in Edinburgh 71%

were female and 46% aged 65 years or over.¹³ Some have postulated that the higher proportion of women among those receiving ECT was due to the higher prevalence of depressive episodes in women.¹⁰ Unlike western reports, where ECT was seldom performed for patients with any diagnosis other than depression,^{7,11,12,14} 35% of our patients suffered other psychiatric disorders. This was consistent with an earlier report of ECT indications in Hong Kong, in which 35% of the patients did not suffer from depression.¹⁵ In particular, 12% of our patients suffered from schizophrenia or schizoaffective disorder, which presumably reflects on the attitudes of Hong Kong psychiatrists regarding the management of the latter disorders. The Cochrane systematic review¹⁶ also suggested that ECT, when combined with antipsychotic drug treatment, may be considered a treatment option for patients with schizophrenia, particularly when rapid global improvement and reduction of symptoms was desirable. Most of our patients received ECT because of failed drug treatment.

We charted the initial seizure threshold for bilateral ECT carried out in our patients using empirical titration and found the mean was 81 mC, which was lower than that reported in studies carried out in the US (86-134 mC).^{17,18} In all patients, seizure occurred within 3 electrical stimulations in the first ECT session. The real mean seizure threshold was likely to have been lower than what we reported, because we followed the MECTA instruction manual and started with a stimulus of 48 mC.⁹ Since 39% of our Chinese patients had initial seizure thresholds of 48 mC or less, in contrast to only 4% with less than 50 mC reported in a UK study,¹⁹ a lower starting electrical stimulus may warrant consideration in our Chinese patients.

The Royal College of Psychiatrists in UK recommended that empirical titration should not be used in the management of life-threatening illness, where the rate of clinical improvement is critical,⁵ and we followed this advice in our hospital. However, due to the lack of studies and established dosing schedules for Chinese patients, we routinely followed the MECTA instruction manual preselected dosage table.⁹ Our study suggests that by doing so, we over-stimulated our patients by $67 \pm 88\%$, and in extreme cases, even up to 300%. Thus, to establish the average seizure threshold and a suitable preselected dosage schedule for Chinese patients, more research on a larger sample is necessary. We found that the initial seizure threshold increased with age, which was consistent with findings from western studies.^{17,18} No other factors were associated with the initial seizure threshold. This supported the use of empirical titration to determine the seizure threshold for non-urgent cases, because seizure threshold cannot be reliably predicted by patient demographic and clinical factors.

Side-effects were commonly reported after ECT though most were mild; headache was the most common (affecting 47% of the patients), whilst the more severe side-effects reported included: dental injury, bradycardia, oxygen desaturation, and bronchospasm. The patient who developed

bronchospasm had a history of asthma, whereas 2 others who developed bradycardia and oxygen desaturation had good past health. Thus, careful pre-ECT assessment, as well as monitoring during the procedure, are important. Post-ictal confusion occurred after 24% of the treatments, which may be a particular problem in elderly patients.²⁰ Since ECT is commonly performed in the elderly, regular assessment of cognitive function after ECT is recommended. Finally, improvement in mental state was reported in most patients, many of whom were discharged shortly after the completion of ECT.

Comparison of patients undergoing empirical titration versus preselected dosage did not show differences with respect to side-effects or clinical response. However, our results might have been limited by the small sample size, inaccuracy of retrospective data, and the lack of standardised instruments to assess clinical response and side-effects. Moreover, cognitive side-effects were not routinely measured using valid rating scales. Given the excessive electrical over-stimulation of patients being offered preselected dosage therapy, and the possibility of increased cognitive side-effects from electrical over-stimulation,²¹ we favour the use of empirical titration in non-urgent settings.

This study was limited by its retrospective design and small sample size. Nonetheless, it described roughly the range of seizure thresholds in bilateral ECT in our early experience with empirical titration, and yielded important data when compared to preselected stimulus dosing based on MECTA Corporation advice.⁹ It also described the common side-effects experienced by our patients, adding important data to ECT practice in Chinese patients. Since our hospital was a regional hospital accepting patients from primary and secondary settings, the characteristics of our sample were similar to what might be expected in other psychiatric hospitals in Hong Kong and therefore may be generalisable to other similar local facilities.

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