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Review

Efficacy of ultrabrief pulse electroconvulsive therapy for depression: A systematic review

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ABSTRACT

Background: Ultrabrief pulse electroconvulsive therapy (ECT) is increasingly used in daily practice when treating depression despite doubts about its efficacy compared to standard techniques.
Method: Using electronic search techniques, we collected all studies on the comparison between ultrabrief pulse (UBP) versus brief pulse (BP) ECT in depressed patients which reported validated rating scales as outcome measures. The Jadad scale was used to evaluate the quality of the studies.
Results: Two randomized and one non-randomized prospective study using unilateral (UL) ECT, and two randomized and one retrospective study using bilateral (BL) ECT were identified comparing UBP with BP ECT. One UL randomized high quality study and one non-randomized study suggest an equal response and remission for both conditions. The number of treatment sessions to achieve remission using UBP is equal in one study and is higher in the second. Both BL studies, one of high quality, point to a lower efficacy for UBP ECT with a lower speed of remission.
Limitations: We restricted our review to the efficacy of UBP vs. BP ECT in depressed patients and did not address other clinically important issues such as the cognitive adverse effects. A statistical meta-analysis was not possible, because of the heterogeneity of outcome measures and the small amount of studies.
Conclusion: The literature shows no clear advantage for the efficacy of ultrabrief pulse over brief pulse ECT using unilateral as well as bilateral electrode placement. The increasing use of unilateral brief pulse ECT as first line method for depression is not supported by the current evidence.

Contents

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1. Introduction

ECT is an effective treatment for depression (Kho et al., 2003; Pagnin et al., 2004; UK ECT Review Group, 2003). We still do not know how the therapeutic effect of ECT is achieved, but soon after the introduction of ECT the paradigm shifted from evoking a shock including confusing, regressing, resetting, to the most effective ways to produce a general convulsion (Goldman, 1949; Liberson, 1944). Shortening the pulse wave closer to the chronaxia of the neurons is an effective way to increase the epileptogenicity of the stimulus which results in a lowering of the initial seizure threshold (Liberson, 1944, 1945; Loo et al., 2007; Sackeim et al., 2008). Changing the name from 'electroshock' to electroconvulsive therapy reflected the physicians' perception of the therapy rather than merely a response to the public's opinion (Shorter and Healy, 2007). Since the original alternating sine wave current for the induction of a convulsion, several changes have been introduced in ECT techniques aiming to maximize the therapeutic effect and to minimize the adverse effect. These changes include the use of unidirectional current, varying pulse width, pulse frequency, stimulus duration, amplitude, and electrode positioning from bitemporal to bifrontal and unilateral (Prudic, 2008).

ECT with bilateral (BL) electrode placement is reported to be equally efficacious or superior to unilateral (UL) ECT (Kellner et al., 2010; UK ECT Review Group, 2003) also in respect to speed of response and remission, but carries an increased risk for memory problems (Sackeim et al., 2008; Semkovska et al., 2011).

The efficacy of UL (BP) stimulation is related to the relative strength of electrical stimulation above the seizure threshold and has to be taken into account in comparison studies (Kellner et al., 2010; McCall et al., 2002; Sackeim et al., 1993; Sackeim et al., 2000; Sackeim et al., 2008). Electrical stimulation with smaller pulse width, the so called UBP stimulation with a pulse width of less than 0.5 ms, lowers the seizure threshold. As a result UBP could theoretically match the efficacy of BP stimulation and is expected to have a lower risk of adverse cognitive effects (Loo et al., 2008; Sackeim et al., 2008; Sienaert et al., 2010). Pulse width though, is only one of the factors determining therapeutic and cognitive effect. Other factors include the amplitude, frequency, duration, and directionality of the stimulus current and electrode positioning (Peterchev et al., 2010).

In 1998 modern ECT machines became available and a few years later many clinicians started to use UBP stimulation as their preferred stimulus setting (Galletly et al., 2012; Loo et al., 2007; McCormick et al., 2009; McCormick et al., 2011; Niemantsverdriet et al., 2011; van Waarde et al., 2009). At the same time doubts have been cast upon the increasing use of UBP stimulation because of limited evidence for its efficacy (Cronholm and Ottosson, 1963b; Galletly et al., 2012; McCormick et al., 2011; Niemantsverdriet et al., 2011; Sackeim et al., 2008; Wiwanitkit, 2011).

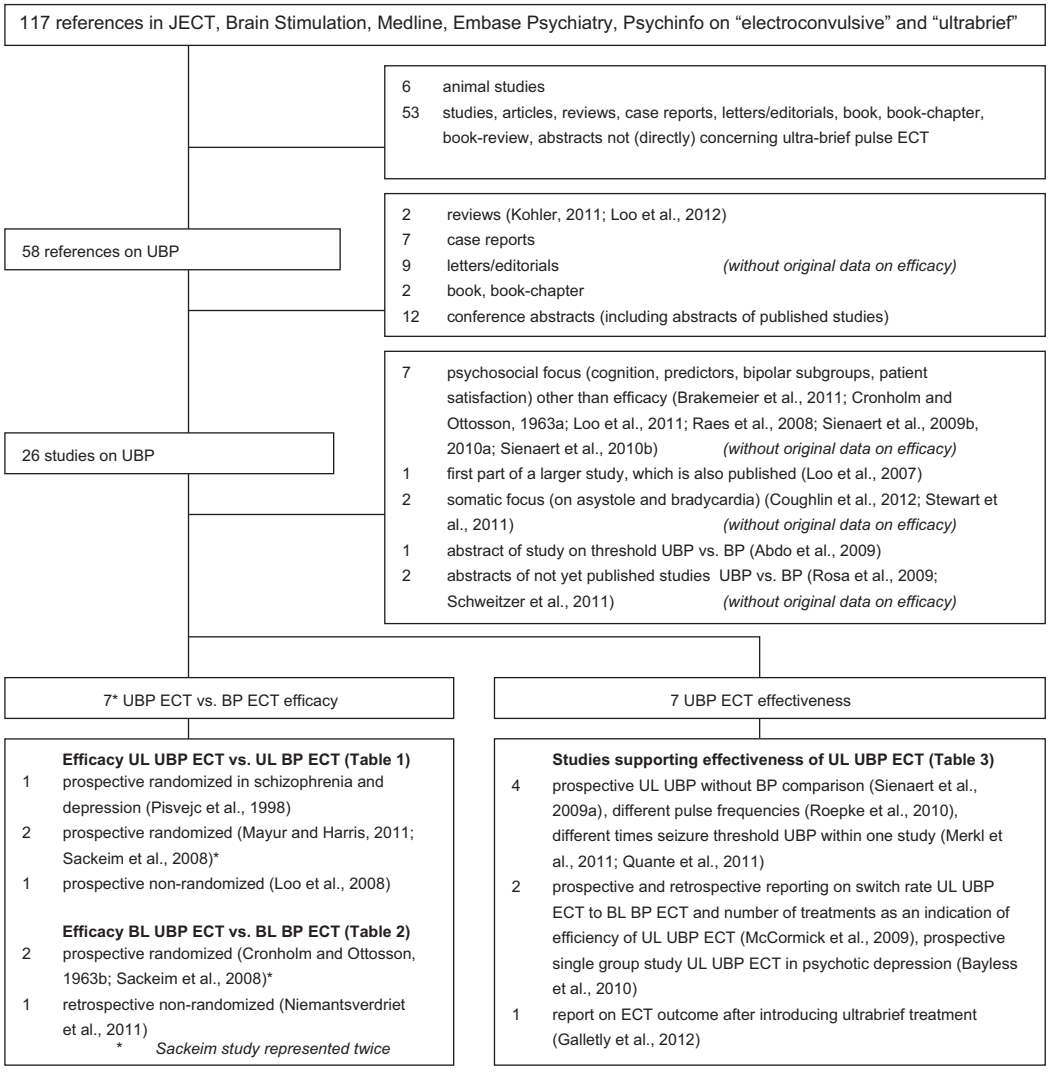

Fig. 1. Flow chart