

Electroconvulsive therapy and its place in the management of depression

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Electroconvulsive therapy (ECT) is a psychiatric treatment with a controversial history. Advances in technology have led to a safer therapy, making it once again an option in very specific circumstances. Here, Dr Singhal discusses its current role in the management of depression.

Electroconvulsive therapy (ECT) continues to be one of the most amazing and controversial treatments in the psychiatric therapeutic armamentarium. Over the last few decades, it has attracted lots of media and public attention for various reasons. Although it has been found to be highly effective where indicated, its use has diminished in recent times. A plethora of literature exists on its effectiveness and adverse effect profile. After seven decades of uneven use, modern ECT has found a narrow, but crucial, niche among contemporary treatments in psychiatry. This article aims to provide a broad overview of this fascinating therapy, with particular attention to its place in the management of depression.

History

The use of camphor-induced seizures in the treatment of psychiatric conditions started as early as the 16th century. Convulsive therapy was introduced in 1934 by Hungarian neuropsychiatrist Ladislas J von Meduna, who believed that schizophrenia and epilepsy were antagonistic disorders (a view that later was found to be untrue although, interestingly, the majority of antipsychotics do lower the seizure threshold). He induced seizures first with camphor and then with metrazol (cardiazol) to treat patients with schizophrenia. Italian Professor of Neuropsychiatry, Ugo Cerletti, and his colleague Lucio Bini gave the first 'electrical treatment' for mental illness on 14 April 1938 to treat a patient with schizophrenia. Through the 1940s and 1950s, the use of ECT became widespread. At that time, ECT was usually given in an 'unmodified' form, without muscle relaxants, and the seizures resulted in full-scale convulsions. A rare but serious complication of unmodified ECT was fracture or dislocation of the bones. The introduction of muscle relaxants and short-acting anaesthetics led to more widespread use of 'modified' ECT. Nonetheless, a steady growth in the use of antidepressants, along with the negative portrayal of ECT in the mass media as dangerous and inhumane (for example, in the film

'One Flew Over the Cuckoo's Nest'), led to a marked decline in its use between the 1950s and the 1980s.

Constant advancement in technology and greater precision in the delivery of electric current led to a safer therapy. The 1985 National Institute of Mental Health Consensus Conference confirmed the therapeutic role of ECT in certain circumstances and its use increased thereafter. However, with further advancements in treatment options (psychotropic drugs like antidepressants, antipsychotics, *etc*, psychotherapeutic approaches such as cognitive behavioural therapy and other psychosocial interventions), the need for ECT was reduced. Additionally, a recent debate about its adverse effects on cognition led to a further reduction in its use. As will be discussed later, current National Institute for Health and Clinical Excellence (NICE) guidance recommends ECT in very specific circumstances.

Procedure

Informed consent is usually followed by a pretreatment evaluation (including an assessment of fitness for general anaesthesia). In the ECT suite, the patient is given a short-acting anesthetic and a muscle relaxant. Depending on the placements of electrodes, ECT can be of unilateral or bilateral type (see Table 1). The electrodes deliver an electrical stimulus in excess of an individual's seizure threshold. Most modern ECT machines deliver a brief-pulse current, which is believed to cause less cognitive impairment than the sine-wave current originally used in ECT. The recommendation remains that the optimum frequency for both bilateral and unilateral ECT is twice a week. If no clinical improvement is seen after six adequate bilateral treatments, then the course should be discontinued due to lack of efficacy.

Current clinical practice in the UK

Use of ECT is declining in the UK.¹ Between 1985 and 2002, the use of ECT in England more than halved, probably because of better psychological and drug treatments being available, improved community care,

	Bilateral ECT	Unilateral ECT
Usage	More common	Less common
Position of electrodes	Each electrode is placed on the temporal region (bitemporal ECT) or less commonly the frontal region (bifrontal ECT) bilaterally	One electrode is placed on right temporal region and the other one is placed one inch ipsilateral to the vertex
Adverse effects	More likely to cause cognitive impairment	Less likely to cause cognitive impairment
Efficacy	More effective than unilateral ECT	Less effective than bilateral ECT
Speed of response	More rapid than unilateral ECT	Slower than bilateral ECT

Table 1. Differences between bilateral and unilateral ECT

earlier detection of mental illness and better understanding of the indications for ECT and its adverse effects. In England in 1999, ECT was given to 5.8 patients per 100 000 of the total population, which decreased to 4.6 patients per 100 000 in 2002. Total ECT applications estimated over a three-month period in England have shown a progressive decline between the 1980s and recent years:² 34 485 (1985); 26 336 (1991); 16 482 (1999); 12 800 (2002) and 6782 (2006).

Guidance for use

In 2003, NICE issued guidance on the use of ECT.³ There is a special clause for ECT in the 2007 amendments of the Mental Health Act 1983, according to which ECT cannot be given against a patient’s wishes if the patient has the mental capacity to consent. If he or she lacks this capacity, ECT can only be given after a second opinion-approved doctor confirms its indication. The previous position before the 2007 amendments was that a patient could be given ECT even without his consent if a second opinion doctor agreed to it. In 2002, about one in six people who had ECT were judged unable to give consent.

Indications

The Royal College of Psychiatrists’ Special Committee consulted psychiatrists with expertise in the application of ECT, encompassing both academic and clinical experience, and involved delegates attending the ECT Practitioners’ Day at the King’s Fund under the auspices of the College in October 2002. This wider group, the Consensus Group, produced a statement on contemporary indications for the use of ECT, which was presented to NICE in October 2002.⁴ The 2003 NICE guidance on the indications for ECT are summarised in Table 2.

NICE recommendations in the 2009 Depression (update) clinical guideline⁵ add that ECT should not

be used routinely for moderate depression but should be considered if depression has not responded to multiple treatments. The guidance does not mention neuropsychiatric conditions as indications for ECT. These views differ from the 2004 Royal College of Psychiatrists’ guidance⁶ as outlined in Table 3.

The place of ECT in treatment of depressive disorder

The Royal College of Psychiatrists’ guidance on the use of ECT in the treatment of depressive illness⁶ is summarised in Table 4. It is immediately apparent that there are inconsistencies between the guidance issued by NICE and the Royal College of Psychiatrists. In fact, The Royal College appealed, unsuccessfully, against NICE recommendations and proposed that NICE guidance will exclude some patients who would benefit from the treatment. As with most policy statements, the NICE recommendations may not be applicable to all individual cases; however, clinicians are strongly advised to ensure that the clinical circumstances of any deviation are clearly documented with excellent evidence of fully informed consent. The Royal College of Psychiatrists’ Consensus Group advises that health professionals are expected to take NICE guidance fully into account when exercising their clinical judgement.

Efficacy of ECT in the treatment of depression

In contrast to its origins as a treatment for schizophrenia, ECT is now mainly used to treat depressive illness. ECT shows superior efficacy and relatively rapid onset of action in comparison to many other treatment modalities. A recent systematic review of efficacy and safety of ECT, sponsored by the Department of Health, concluded that ECT remains an important treatment option for the management of severe depressive illness.⁷ In their meta-analysis of short-term efficacy data from six randomised controlled trials of

256 patients, real ECT was significantly more effective than simulated ECT. In a meta-analysis of 18 trials involving 1144 participants, treatment with ECT was significantly more effective than pharmacotherapy, though none of these trials compared ECT with newer antidepressant medications such as SSRIs, mirtazapine or venlafaxine. Bilateral ECT was more effective than unilateral ECT in an analysis of 22 trials involving 1408 participants.

In clinical practice, ECT is sometimes administered initially three times a week to patients with more severe depression, although there is no objective evidence to support this practice. Bilateral ECT is recommended in emergencies because it is more effective and is faster acting than unilateral ECT; similarly, high-dose (greater electric current) ECT is more effective and faster acting than lower dose ECT. Given the efficacy of ECT in depression, the Royal College of Psychiatrists advises that it should not be used only as a second-line treatment, nor should it be used only as a last resort.⁶ According to NICE, a crude assessment suggests that for those with severe depressive illness, ECT and pharmacological treatment may be equally cost effective.³

The use of ECT in treatment-resistant depression

Currently there is no agreed definition of 'treatment-resistant depression'. The Royal College Consensus Group suggested that, in the absence of severe symptoms or an urgent need for treatment, treatment resistance should be considered as the failure to respond adequately to two successive courses of monotherapy with pharmacologically different antidepressants given in an adequate dose for sufficient time.

Treatment resistance does not rule out a favourable response to ECT. Patients who had failed one or more adequate medication trials had a diminished but substantial rate of response to ECT.^{8,9} In addition, recent evidence¹⁰ suggests that resistance to antidepressant medication does not influence the short-term response to subsequent ECT. Antidepressant medication treatment failure does not predict lower remission with ECT for major depressive disorder.¹¹ Even under critical evaluation, ECT can be assumed to be effective in two-thirds to three-quarters of all cases of treatment-resistant depression. ECT is a viable option for the treatment of both unipolar and bipolar depressive patients resistant to pharmacological treatment, although the unipolar patients show a better response.¹² There are also trials that have shown no difference in response to ECT in treatment-resistant depression.

ECT is used only to achieve rapid and short-term improvement of severe symptoms after an adequate trial of other treatment options has proven ineffective and/or when the condition is considered to be potentially life threatening, in individuals with:

- severe depressive illness
- catatonia
- a prolonged or severe manic episode.

NICE further adds: 'The current state of the evidence does not allow the general use of ECT in the management of schizophrenia to be recommended.'

Table 2. NICE guidance on the use of electroconvulsive therapy³

ECT should be considered in the following circumstances:

- Depressive disorder (see text for further details)
- Mania (severe mania with life-threatening physical exhaustion or treatment-resistant mania)
- Acute schizophrenia (where clozapine is intolerable or ineffective)
- Catatonia (life-threatening malignant catatonia or when lorazepam has been ineffective)
- Adjunctive treatment for both motor and affective symptoms in sufferers of Parkinson's disease with severe disability despite medical treatment
- Experimental treatment for neuroleptic malignant syndrome, Huntington's disease and treatment-resistant epilepsy.

Table 3. Royal College of Psychiatrists' guidance on the use of electroconvulsive therapy⁶

The use of ECT in elderly patients with depression

People aged over 65 years are significant users of ECT services. In England in 2002, 47 per cent of female patients and 45 per cent of male patients receiving ECT treatment were aged 65 years or over.¹ ECT is a highly effective treatment for major depressive disorder in the elderly, perhaps even more so than in younger age groups. It also appears to be well tolerated. A meta-analysis of outcome studies of use of ECT in the elderly showed that it produced a significant improvement in 83 per cent of cases and remission in 62 per cent; however, a more recent Cochrane review concluded that although ECT is effective in the acute treatment of late life depression and is generally safe, important questions such as the relative efficacy of ECT over antidepressants, the long-term efficacy of ECT, morbidity and mortality related to ECT, cost-effectiveness and the efficacy of ECT in subgroups of patients have not yet been answered and need to be studied further.¹³

Certain facts should be borne in mind when treating elderly patients with ECT: they tend to have

- ECT may be the treatment of choice for severe depressive illness when the illness is associated with:
 - attempted suicide
 - strong suicidal ideas or plans
 - life-threatening illness because of refusal of food or fluids
- ECT may be considered for the treatment of severe depressive illness associated with:
 - stupor
 - marked psychomotor retardation
 - depressive delusions and/or hallucinations
- In the absence of the above, ECT may be considered as a second- or third-line treatment of depressive illness that has not been adequately treated by antidepressant drugs and where social recovery has not been achieved
- The RCPsych adds: 'Patient choice is important. Some sufferers who have previously had a depressive illness may choose ECT because of their experience of medical treatment that was ineffective or intolerable, or previous experience of recovery with ECT'

Table 4. Royal College of Psychiatrists' guidance on the use of electroconvulsive therapy in the treatment of depressive illness⁶

higher seizure thresholds; they may be more susceptible to confusion after ECT; ECT can be given to patients with dementia and depression but these patients may be at increased risk of post-ECT delirium; and special attention should be given to underlying physical illnesses because of the associated greater risks from anaesthesia. The ECT technique should be modified as necessary to minimise any cognitive adverse effects.

The use of ECT for depression in pregnancy

In 2002, about 70 per cent of all patients receiving ECT in England were female.¹ A large number of reports indicate the efficacy of, and few complications arising from the use of, ECT in all three trimesters of pregnancy. Furthermore, there is insufficient literature on the potential for teratogenicity of newer antidepressants in combination with newer antipsychotics. Miller reviewed 300 cases of ECT in pregnancy.¹⁴ Though complications were noted in 9.3 per cent of cases, many of them did not show any temporal relationship to the administration of ECT. Foetal heart monitoring before and after each individual ECT treatment and a close liaison between the ECT team and the obstetrician are recommended. According to the NICE guidelines,³ the use of ECT during pregnancy is known to cause complications, and particular caution should be exercised in this group, but the risks associated with ECT need to be

balanced against the risks of using alternative (drug) treatments. Evidence also suggests that ECT can be an effective treatment for postnatal depressive episodes.

The use of ECT in children with depression

The use of ECT in children and adolescents remains controversial. ECT should be used with extreme caution (and very rarely as a first-line treatment) in young people because of the lack of evidence from randomised controlled trials, increased length of seizures and post-ECT convulsions, and the lower seizure threshold in young people.

Predictors of response to ECT in depression

Efforts to delineate subtypes of depression particularly responsive to ECT have yielded inconsistent results. However, many predictors of a good response to ECT have been suggested. They include an acute episode of severe depression of relatively brief duration, psychotic depression¹⁵ and psychomotor retardation. Psychotic depression probably has the strongest case for ECT as it may avoid prolonged and complicated medication trials, which may be poorly tolerated particularly in elderly patients. A past history of response to ECT can also be a good predictor of future response. Old age is another predictor of good response to ECT.¹⁶

Continuation ECT to prevent relapse of depression

'Continuation ECT' can be defined as prophylactic treatment over the first six months of remission to prevent the early relapse of the index episode of illness. 'Maintenance ECT' is delivered at intervals of usually between one week and three months to prevent further episodes or recurrences of illness.

There is little evidence that continuation ECT is more effective than continuation medication. Although few new prospective controlled studies exist in the literature, published and emerging data continue to support the use of continuation and maintenance ECT, particularly in those individuals with medication-refractory, ECT-responsive, and relapse-prone depression.¹⁷ The use of continuation ECT and medication together is more effective in preventing relapse than antidepressants on their own. However, NICE has recommended that ECT should not be used as a long-term treatment to prevent recurrence of depressive illness, stating 'as the longer-term benefits and risks of ECT have not been clearly established, it is not recommended as a maintenance therapy in depressive illness'.³

ECT in people with a physical illness

People with a wide range of physical illnesses, including cardiovascular diseases, have been successfully treated with ECT.¹⁸ Some medical problems may, however, cause particular concern, especially cardiovascular and neurological problems. Any physical illness needs to be investigated and treated or at least stabilised as far as possible before ECT is begun. Individuals with space-occupying lesions of the brain are at high risk of neurological deterioration if treated with ECT. The aggravation of already raised intracranial pressure is thought to account for the risk. The balance of risks and benefits to physical and mental health must be carefully considered for each individual. On those occasions when ECT is prescribed as a life-saving therapy, there may be no absolute contraindications to it.

The effect of ECT on cognitive function

Adverse cognitive effects are the principal concern for many patients, and so orientation and memory should be assessed before, and at intervals throughout, the course of treatment. ECT can cause changes in both short-term anterograde and retrograde memory. It remains unclear how long this may persist. The most marked cognitive adverse effects occur immediately postictally, when patients may experience a variable period of disorientation, associated with impaired attention, memory and praxis. These effects resolve over time and are generally short-lived.

There is evidence that ECT can cause persistent or permanent memory loss, especially autobiographical memory, which is difficult to distinguish from that caused by the underlying illness itself.¹⁹ It has been shown that patients with a severe depressive illness may have impaired cognitive function on recovery from an episode of illness even if they have not been treated with ECT. Tests of memory carried out before and after ECT may show improvement, presumably because the memory deficits associated with depression have improved in response to treatment. The more effective forms of ECT, *ie* higher-dose and bilateral ECT, are associated with a greater level of cognitive deficits. Patients treated with bilateral ECT take significantly longer to become reoriented after an individual treatment, and are at greater risk of prolonged disorientation.²⁰

In January 2002, as part of a review of ECT undertaken by the Department of Health, the Service User Research Enterprise (SURE) published the first-ever systematic review of patients' views on ECT. One con-

clusion was that at least one-third of patients experienced permanent amnesia.¹⁹ In fact, in 2003, in a media briefing, NICE added that 'The appraisal committee took special note of the evidence from observations of users' experiences relating to the adverse effects of ECT, particularly cognitive impairment. It was apparent that cognitive impairment often outweighed their perception of any benefit from ECT treatment. These factors featured significantly in the committee's decision to restrict the use of ECT to situations in which all other alternatives had been exhausted or where the nature of the mental illness was considered to be "life-threatening".' The finding that clinician-led surveys tend to report higher rates of perceived benefit, relative to those performed by consumers' organisations, is of particular interest.

It is well known that depressive illness and psychotropic drugs can impair memory, and it has been argued that when ECT is used, cognitive deficits tend to be blamed solely on the ECT. Thus, ECT may bear a disproportionate burden of the public fear associated with psychiatric treatment.

Measures taken to decrease adverse cognitive effects include changing to brief-pulse stimulation, using unilateral electrode placement, lowering stimulus intensity in relation to individual seizure threshold, lengthening the inter-ECT interval, decreasing or stopping concomitant drug treatments and reducing anaesthetic drug doses (where possible).

Other adverse effects and mortality

After treatment with ECT, individuals may suffer from headaches, muscular aches, drowsiness, weakness, nausea and anorexia. These side-effects are usually mild and respond well to symptomatic treatments. People who commonly experience post-ECT headaches may benefit from prophylactic treatment immediately after ECT, *eg* aspirin or an NSAID. ECT is a procedure with a mortality rate similar to that of anaesthesia for minor surgical procedures, despite its frequent use in elderly people and those with major medical problems. The American Psychiatric Association (2001) stated that a reasonable estimate of the ECT-related mortality rate is 1 per 10 000 patients or 1 per 80 000 treatments.¹⁸ According to the RCPsych, death or serious injury occurs in about one in 50 000 treatments. This must also be contextualised against the risks involved in not giving ECT to a suitable patient. In their review, Devanand *et al.* concluded that there is no credible evidence that ECT causes structural brain damage.²¹

Conclusion

ECT is an effective and rapid treatment for depression in selected patients. It is a relatively safe (compared with many antidepressant drugs) form of treatment even in the medically ill, the elderly and in pregnancy, provided that adequate precautions are taken. There are benefits in using it in emergency cases and there is compelling evidence that it should not only be considered as a treatment of last resort. The key to its success lies in the careful selection of suitable patients. ECT should be considered for a depressive episode in the following clinical situations: the emergency treatment of depression (where a rapid definitive response is needed), patients with high suicidal risk, patients with severe psychomotor retardation and associated problems of eating and drinking or physical deterioration, treatment-resistant depression, pregnant patients (where there is concern about the teratogenic effects of pharmacotherapy), patients who experience severe side-effects from medications, a past history of positive response to ECT and patients for whom it is the preferred choice of treatment.

However, the issue of the place of ECT in psychiatry is far from settled. Read and Bentall,²² in their recent literature review, heavily criticised ECT and concluded that there is no evidence that ECT has any benefit lasting beyond a few days, that it does not prevent suicide and that the short-term benefit gained by some does not justify the risks involved. They add that 'given the strong evidence of persistent and, for some, permanent brain dysfunction... and the evidence of a slight but significant increased risk of death, the cost-benefit analysis for ECT is so poor that its use cannot be scientifically justified'.²²

Literature reviews such as this help explain the reasons for the declining use of ECT. In this author's opinion, this issue will continue to be an area of debate for the next few years. The decision as to whether ECT is clinically indicated (particularly if it involves deviation from NICE guidance) should be based on a documented assessment of the risks and potential benefits to the individual, including the risks associated with the anaesthetic, contemporaneous comorbidities, anticipated adverse events, particularly cognitive impairments, and the risks of not receiving treatment. The nature of the treatment should be discussed thoroughly with patients (and their carers, if possible) before a final decision is made. Due consideration should always be given to measures to reduce any adverse cognitive effects in those who are at high risk.

Declarations of interest

None.

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