

**The Efficacy of Electroconvulsive Therapy (ECT) in a perinatal population: A
Comparitive Pilot Study**

Chris Haxton, MRCPsych, MBChB

Consultant in Old Age Psychiatry, NHS Greater Glasgow and Clyde

Stephen Kelly, Registered Mental Nurse

ECT Co-ordinator, Leverndale Hospital, NHS Greater Glasgow and Clyde

David Young, PhD, MPhil, BSc, CStat

Statistician, University of Strathclyde

Roch Cantwell, FRCPsych, MBChB

Consultant in Perinatal Psychiatry, NHS Greater Glasgow and Clyde

Conflicts of Interest: None declared.

Abstract

Objectives

This study aims to investigate the effectiveness of ECT as a treatment for postnatal depression compared with a matched non-postnatal population. A secondary aim is to compare the number of ECT treatments needed to treat in both groups. As the numbers in this study are small, this would act as a pilot study, allowing a power calculation to determine the numbers needed for a more definitive study.

Methods

Cases were identified from the local Scottish ECT Accreditation Network (SEAN) database. 12 patients had received ECT and had complete data from all those admitted to the Glasgow Mother and Baby Unit (MBU) since its opening. Each case was matched to two controls who had also received ECT, and who were matched for age, sex, and severity of depressive symptoms. It was not possible to find two controls for each case and 23 controls were allocated. Severity was matched using the Montgomery-Asperg Depression Rating Scale (MADRS), which is completed for all patients receiving ECT in Scotland, at the beginning and end of their course. As all controls were matched for initial severity of symptoms using MADRS, the change in MADRS score between both groups was compared.

Results

When comparing the mean change in MADRS score between both groups, it was seen that the perinatal patients score dropped by a mean of 10.09 points more than the controls (95% CI for difference -0.54, 20.73, P-Value 0.062).

No difference was seen between the groups when comparing number of treatments (7.8 v 8).

Conclusions

Further research is required.

Key words: ECT; Electro-convulsive therapy; postnatal; perinatal; depression

Introduction

Severe postnatal mental illness is described as responding well to ECT. However, there are few studies in the literature which specifically address this issue. This study aims to compare the effectiveness of ECT in a population of women admitted to specialised inpatient mother and baby psychiatric care over a period of 9 years, with a population of women, matched for age and initial severity of depressive symptoms, who have also received inpatient ECT. This should give some information on whether ECT is more effective for postnatal depression than for other cases of depression. This project would be a pilot study to investigate whether further research into this topic is warranted.

Background Information

Untreated postnatal mental illness is associated with serious morbidity for the mother and the infant¹. Suicide is an important cause of maternal death, and self-inflicted injury is the leading cause of one-year maternal mortality in the United Kingdom². Self-inflicted injury is also the second leading cause of maternal death in high income countries throughout the world, according to the World Health Organisation, and suicide remains an important cause of death in middle-to-low income countries³. Postnatal mental illness also has a negative effect on the mother ability to interact properly with her child⁴. Infanticide due to postnatal mental illness is a rare event, however a high proportion of such incidents occur in the context of postnatal mental illness⁵. For these reasons, postnatal mental illness should be treated proactively.

ECT is recognised to be an effective treatment option for depression postnatally; as it is for depression in the non-post-natal community⁶. Studies into the use of ECT in the postnatal population however are very limited. One small study of five women receiving ECT for postnatal depression reported a 100% remission rate⁷. Another small study looked at ultra-brief pulse ECT in three postnatal women with depression and found this to be a useful treatment⁸. Anecdotally amongst those who practice ECT, ECT is felt to be more effective in the perinatal population than in the general population of depressed patients. More evidence is required to back this belief up. This study aims to provide more insight into the effectiveness of ECT in the postnatal population, particularly in comparison to the effectiveness of ECT in a non-perinatal female population.

Materials and Methods

All ECT given within Scotland is audited by the Scottish ECT Accreditation Network (SEAN). As a result, all information pertaining to a patient receiving ECT within Scotland is stored on a local SEAN database. Details collected include ICD-10 diagnoses, indication for ECT, number of treatments, as well as the patient's personal details. All patients also receive a MADRS before receiving ECT and also after their course is complete.

All patients who have received ECT whilst inpatient on the mother and baby unit at the Southern General Hospital since 2005 were identified by Stephen Kelly, ECT co-ordinator at the Leverndale ECT department using data collected on the SEAN

database. Each of these patients was then to be matched to two female patients who also received ECT at that department and who were within 5 years of age of the index patient, and also had an initial MADRS score within 5 points of their index patient. The matched control patient must not have been a postnatal patient at the time of ECT. Each control patient was only included once. Only the first episode of ECT treatment was investigated for both groups.

The machine used was a Thymatron IV ECT System, manufactured by Dantec Dynamics Limited, Garoner Way, Royal Portbury, Bristol BS20 7XE.

All patients in both groups received bilateral, modified ECT throughout their treatments. Dose titration was performed on all patients as per local protocols. The local ECT department performs both bilateral and unilateral ECT, but bilateral ECT is generally given as first line treatment, with unilateral ECT only being considered if there are concerns about significant cognitive side effects, or if this is patient preference.

All patients received ECT as per the NICE guidelines⁹.

Ethical Considerations

Ethical approval was sought via the NHS Health Research Authority, and a proportionate review was asked for. A proportionate review was sought as all information required for this study had been collected as part of routine practice and stored on the local SEAN database. We proposed that data for the study would be collected anonymously using a care report form (CRF) by Stephen Kelly. Consent was not sought from patients, as no new information was collected. The anonymised data was then analysed by Dr Haxton and Mr Young. Ethical approval was granted on these terms.

Permission was also granted for the study by NHS Greater Glasgow and Clyde, and NHS Lothian. SEAN granted permission for information to be collected from their database.

Matching

There were 14 patients identified who had received ECT whilst inpatients on the MBU since its opening. Two patients had incomplete data on SEAN and were not included in the study for this reason. This gave a total of 12 controls. It was possible to find 20 controls who met all criteria of the original design. Two controls were accepted who were within six years of age, rather than five. One control was accepted who had an initial MADRS score within 6 points of the allocated case, rather than five. There was one case where only one control was found that met the criteria. This gave a total number of controls of 23. The total number of subjects in this study was therefore 35.

Statistical Analysis

Statistical analysis was performed by David Young using Minitab (version 16) at a 5% significance level. Between group comparisons were done using two-sample t-tests on the difference in MADRS scores.

Baseline Comparison

The two groups were well matched on baseline MADRS scores and the differences in scores were normally distributed.

Table 1

Figure 1

Results

The mean difference between the MADRS scores before and after receiving ECT was compared for both groups. The perinatal cases had a mean MADRS score reduction 10.09 points greater than the control group (95% CI for difference -0.54, 20.73, P-Value = 0.062).

No statistical difference was found between groups when comparing number of treatments (7.8 v 8).

Conclusions

Although the results for this study were short of being statistically significant, they do suggest an increased efficacy of ECT for the perinatal groups when compared with controls. A larger study would be warranted to investigate these findings further. This pilot study could be used to create a power calculation to decide on the numbers required for a larger study.

Discussion

It was known from early on in this project that the number of patients being investigated was going to be small, given that the mother and baby unit has six beds, and that about 4% of patients admitted to the unit since its opening have received ECT as a treatment. The attempt to match each case to two controls was to try and increase the power of the study given these small numbers. The limits imposed on matching however made it difficult to do this however and not all cases received two controls. Despite this however, the case and control groups were well matched for both age and initial MADRS score, and the results were almost significant.

One of the difficulties encountered in the matching process was the fact that several of the perinatal cases had very high MADRS scores before receiving ECT, making it difficult to find a match with a similar initial score. This reflects the severity of symptoms experienced by the patients admitted to the mother and baby unit, and the severity of those who require treatment with ECT in this group.

The matching on age and MADRS opens up the possibility of various potential confounders. It is not possible however, given the nature of this study to measure or analyse these. These could potentially be explored in a larger study.

Patients were not matched on diagnosis as it was felt that this would add extra difficulties when it came to matching. However, as patients were matched for MADRS scores, the patients should have had similar depressive symptoms regardless

of diagnosis. Most had varying diagnoses of depression as their primary diagnosis. This is unsurprising given that the most common diagnosis treated with ECT in Scotland is depression¹⁰. There was also one patient in the control groups who had schizoaffective disorder as their primary diagnosis, and two who had persistent mood disorders as their diagnosis. Regardless of their diagnosis however, their main presentation at time of treatment would have been of depression, as backed up by their MADRS score. One patient in the perinatal group did not have a diagnosis listed on the SEAN database. Unfortunately the ethical approval granted for this study does not allow for review of the patient's notes to discover this diagnosis. However, ECT would only have been used for depressive symptoms for patients admitted to the Glasgow Mother and Baby Unit. 25 % of the perinatal group had psychotic symptoms compared to 21.7% of the control group.

Table 2

Two patients in the control group had a secondary diagnosis. One was recorded as having emotionally unstable personality disorder, whilst the other had a diagnosis of reaction to severe stress and adjustment disorder. No perinatal cases had a secondary diagnosis recorded.

There were also differences between the groups notes when comparing the severity of depressive symptoms according to their MADRS score after ECT.

Figure 2

As the groups were well matched for initial MADRS score, there is a similar spread of severity before ECT. After ECT however, 50% of perinatal patients had no symptoms according to their MADRS score, compared to 17% in the control group. There were also many more control patients who continued to have severe symptoms on the MADRS compared to the perinatal cases.

Data on the relapse rates for both groups was not collected during this study. It may be something that could be investigated in a larger project. Other data that may be useful to explore could include data on prescribed medications at time of treatment, and data on quality of life.

The results of this study have been used to complete a power calculation to guide any further studies of this area. If a repeat study were to be completed, it would be desirable to have at least 35 participants in both the case and control groups to obtain a power of 80% at 5% significance.

References:

1. Logsdon MC, Wisner KL, Pinto-Foltz MD. The impact of postpartum depression on mothering. *Journal of Obstetric Gynecology Neonatal Nursing*. 2006. 35:652–658.
2. Oates M. Suicide: the leading cause of maternal death. *British Journal of Psychiatry*. 2003. 183:279–281.
3. World Health Organization. *Women and health: today's evidence tomorrow's agenda*. Geneva: WHO Press; 2009.
4. Logsdon MC, Wisner KL, Pinto-Foltz MD. The impact of postpartum depression on mothering. *Journal of Obstetric Gynecology Neonatal Nursing*. 2006. 35:652–658.
5. Spinelli M. Maternal Infanticide Associated With Mental Illness: Prevention and the Promise of Saved Lives. *American Journal of Psychiatry* 2004. 161:1548-1557.
6. Fitelson E, Kim S, Baker AS, et al. Treatment of postpartum depression: clinical, psychological and pharmacological options. *International Journal of Women's Health* 2011. 3: 1-14.
7. Forray A, Ostroff RB. The Use of Electroconvulsive Therapy in Postpartum Affective Disorders. *Journal of ECT*. 2007. 23(3):188–193.
8. Levy Y, Austin MP, Halliday G. Use of ultra-brief pulse electroconvulsive therapy to treat severe postnatal mood disorder. *Australasian Psychiatry* 2012. 20(5): 429-32.
9. National Institute for Clinical Excellence (NICE). *Guidance on the Use of Electroconvulsive Therapy (Technology Appraisal 59)*. 2003
10. Scottish ECT Accreditation Network Annual Report 2014. A summary of ECT in Scotland for 2013.

Table 1

	Number	Mean Age	Mean Initial MADRS	Mean decrease in MADRS	St DEV	S E Mean
Case	12	35.4 (Range 28-41)	43.1 (Range 27-56)	30.8	14.5	4.2
Control	23	36.6 (Range 27-44)	41.3 (Range 31-54)	20.7	14.0	2.9