Brit. J. Psychiat. (1975), **127**, 604–8

Intravenous Tranquillization with ECT

By JOAN GOMEZ and PETER DALLY

Summary. Forty depressed in-patients for whom electro-convulsive therapy had been prescribed were rated before treatment on depression and anxiety scales. Side effects, post-operative agitation and retrograde memory impairment were assessed in each patient after each of several treatments. Results were compared when no tranquillizer was given and when either diazepam or haloperidol was administered intravenously immediately before the anaesthetic. It was found than when ECT was given without tranquillization, the incidence and severity of post-operative agitation and of side effects were significantly greater in those patients with a high level of anxiety before treatment. Both diazepam and haloperidol were found to be effective in subduing agitation and side effects in anxious, depressed patients, but with diazepam recovery time was longer.

Introduction

ECT is the treatment of choice for severe depression and for those depressed patients who fail to respond satisfactorily, within a reasonable time, to antidepressant drugs and other therapies. Many therapeutically-resistant patients are anxious as well as depressed, and it is this feature which seems to limit the efficacy of ECT in such cases and leads to unpleasant side effects. Unless special precautions are taken, such as giving it in combination with semi-narcosis, ECT may increase anxiety and cause secondary hysterical reactions. Tranquillizers given in the usual dosage, regularly, to agitated patients are ineffective. Complaints of memory disturbance are not uncommon, even years after receiving treatment. Attempts to reduce anxiety levels by giving, orally, large doses of tranquillizing or sedative drugs an hour or so before treatment are not always reliable, and they are in any case difficult to administer to out-patients. For some years it has been the practice in this department to give intravenous diazepam to anxious patients immediately before anaesthesia and ECT. Some patients remain sleepy for several hours afterwards, a disadvantage with out-patients and in nursing time. Haloperidol given intravenously is also effective in allaying anxiety and is used for this purpose in anaesthetic practice (Haslett, 1968); and its sedative effect is not so prolonged as that of diazepam. Orally, it has also been found useful in reducing anxiety (Fyrö, 1974). This paper describes the use of both these drugs in patients receiving ECT and attempts to compare their efficacy. It also attempts to delineate which patients are likely to benefit from their use.

Trial Patients

The study involved forty depressed in-patients, consecutively admitted during the first part of 1974, for whom ECT was prescribed by their consultants on the indications outlined in the introduction. The only exclusions were six depressed in-patients, who were either too disturbed or too sedated to complete a simple rating scale before starting ECT.

Of the forty patients, eleven were men and twenty-nine women, and their ages ranged from 24–79, with a mean age of 51 years. Fourteen were classed as suffering from reactive depression: in these, anxiety was prominent and depression of mood more labile and superficial than in the 26 patients considered to have 'endogenous' depression. The criteria for diagnosis are those described earlier (Dally, 1967).

https://doi.org/10.1192/bjp.127.6.604 Published online by Cambridge University Press

TABLE I

Description of patients

Diagnostic category	Sex	Age range	Mean age
Reactive depression	M (n = 4)	34–50	43
	F (n = 10)	24–53	40
Endogenous: agitated depression	M (n = 5)	36–71	59
	F (n = 11)	38–79	64
Endogenous: retarded depression	M (n = 2)	46–64	55
	F (n = 8)	28–63	49
Total	M (n = 11)	34–79	51
	F (n = 29)		

METHOD

On the day before the first ECT each patient completed self-rating anxiety and depression scales (Zung, 1972) and a hand preference scale (Annett, 1970).

Three hours before ECT, which was always administered between 2 and 3 p.m., twice weekly, two visual and two auditory learning tasks were given (see Appendix 1).

ECT was given with atropine premedication, thiopentone and succinylcholine, and pre- and post-oxygenation. Thirty patients had unilateral ECT to the non-dominant hemisphere and ten had bilateral ECT. The latter were severely depressed and bilateral ECT was preferred because of its possibly greater speed of action (d'Elia, 1975).

Administration of tranquillizers. Diazepam 20 mg. or haloperidol 20 mg. was given intravenously immediately before thiopentone. 10 mg. procyclidine was given with the haloperidol to lessen the possibility of dystonic side-effects.

Thirty minutes after ECT agitation, manifested by restlessness and talkativeness, was assessed on a 4-point scale (see Appendix 2).

Three hours after ECT patients were asked to repeat the visual and auditory material they had learned before ECT, by marking on paper or verbally respectively. After this they were asked about headache, giddiness and nausea and each symptom was scored on a 4-point scale.

Allocation to treatment

Pilot part of the study. Of the first 10 patients, 5 received diazepam with their second and fourth ECT and 5 patients with the third ECT only. The next 6 patients were given haloperidol with the second and fourth ECT, or the third only, in a similar alternation. The rater did not know which treatment the patients had received.

Second part. Twenty-four patients were given diazepam, haloperidol or no tranquillizer, according to a randomization table, with their second, third and fourth ECTs.

Apart from the initial ratings for anxiety and depression before treatment began, assessments were only made with the second, third and fourth ECTs. Patients are often particularly anxious before their first treatment, while by the fifth or subsequent sessions many have recovered.

RESULTS

As expected, patients with reactive depression generally had higher pre-treatment anxiety scores than those with either retarded or agitated types of endogenous depression. The mean anxiety score for those with reactive depression was 50·3, significantly higher than the scores for agitated or retarded 'endogenous' cases, at 43·6 and 31·4 respectively. However, there was no statistically significant difference in the mean depressive scores between any of these categories.

From the assessments made when no tranquillizer was given, it is apparent that patients with high anxiety scores before ECT also have more frequent and more severe side-effects, such as headache, giddiness and nausea and post-treatment agitation; they also have more difficulty in recalling material learned before treatment.

Mean scores for agitation assessed 30 minutes after treatment, without tranquillizer, were 0·6 for those patients with anxiety scores of less than 40 before treatment and 1·4 for those scoring 40 or more; this difference is significant at the 1 per cent level.

Use of tranquillizers. The incidence and severity of agitation assessed 30 minutes after ECT, and the side effects of headache, giddiness and nausea assessed three hours after ECT, were considerably reduced when either diazepam or haloperidol was given intravenously before treatment. The mean agitation score was 1·25 with no tranquillizer, significantly greater, at the 1 per cent level, than the score when diazepam or haloperidol was given (0·36 and 0·27 respectively). Side-effects mean scores also

https://doi.org/10.1192/bjp.127.6.604 Published online by Cambridge University Press

TABLE II

Side-effects and memory deficit scores three hours after ECT according to anxiety rating
No tranquillizer given

Anxiety score	Side-effects (mean score)	Significance of difference between side-effects scores	Memory deficit (mean score)
Less than 40 (n = 17)	1·9	P = <0·05	Unilateral ECT 12·9 (n = 15) Bilateral ECT 17·0 (n = 2)
40 or more	3·0		Unilateral ECT 19·5 (n = 15) Bilateral ECT 24·3 (n = 8)

Differences between memory deficit scores according to anxiety rating do not reach statistical significance

differed significantly, reaching the 5 per cent level, the mean scores being 2·4 with no tranquillizer, 0·75 with diazepam, and 0·72 with haloperidol.

Two patients reacted differently from the rest, one with diazepam, one with haloperidol, possibly examples of the occasional paradoxical reactions described with tranquillizers *B.M.J.*, 1975). One man with an agitated depression was disorientated, anxious and restless for 40 minutes after ECT and diazepam, while a woman with reactive depression felt headachey and 'muzzy' with haloperidol, but not with diazepam or no tranquillizer.

MEMORY EFFECTS

Patients receiving diazepam showed greater memory impairment than those in the other groups. Retrograde amnesia is, of course, a well-known characteristic of treatment with intravenous diazepam. With haloperidol memory impairment was less than when no tranquillizer was given, but a larger sample would be required to establish whether the difference might be statistically significant.

Recovery period after ECT. Patients who had received diazepam took longer in general to come round than those receiving haloperidol or no tranquillizer. In this trial the average time from ECT to the patient's being able to give his name and address was 6 minutes for those patients having haloperidol, 20 minutes for those given diazepam, and 4½ minutes with no tranquillizer.

TABLE III

Scores for memory deficit in various treatment groups
Three hours after treatment

Treatment group		Memory deficit: Mean	Memory deficit: Range (total possible: 38)
No tranquillizer	(n = 40)		
Bilateral ECT	(n = 10)	19·2	5–36
Unilateral ECT	(n = 30)	15·8	3–31
Diazepam	(n = 34)		
Bilateral ECT	(n = 9)	30·5	9–38
Unilateral ECT	(n = 25)	25·9	10–32
Haloperidol	(n = 30)		
Bilateral ECT	(n = 6)	18·2	3–36
Unilateral ECT	(n = 24)	11·9	1–29

DISCUSSION

The presence of persistently high levels of anxiety in depressive illnesses makes treatment more difficult and the prognosis less certain (Kerr *et al.*, 1974). In spite of the advent of antidepressant drugs many patients are refractory to treatment with them or improve only partially, and may have to be given long and repeated courses of ECT.

Side-effects from ECT, particularly in the more anxious patients, can be distressing and result in some patients feeling even worse after it. In many cases it seems that extreme anxiety prevents depression from responding to treatment and resolving. Table II shows how the incidence and severity of side-effects after ECT

https://doi.org/10.1192/bjp.127.6.604 Published online by Cambridge University Press

increases in proportion to the pre-treatment level of anxiety of the patient. Post-treatment agitation and anxiety is similarly related to pre-treatment anxiety levels. This picture is reversed when either haloperidol or diazepam is given intravenously at the time of treatment. Side-effects and post-ECT agitation fall by more than two-thirds after either drug.

The majority of patients are composed after treatment when this is accompanied by intravenous tranquillization, and many of the trial patients remarked spontaneously on how much more pleasant they felt after the tranquillized treatments than after the others. Intravenous diazepam is known to reduce rapidly symptoms of anxiety, having its maximum effect within 30 minutes of administration (Kelly, 1973). Both diazepam and haloperidol have been used to mitigate the apprehension associated with minor surgical procedures.

Neither diazepam nor haloperidol seems to diminish the effectiveness of ECT or the convulsive response. If anything, they probably reduce the number of ECT needed, though this needs to be confirmed by further trials. Anxious patients in this study, whose side effects were subdued when a tranquillizer was given with ECT, showed a return of these unwanted symptoms when no tranquillizer was given. A striking case was that of a woman with reactive depression who felt aggressive and was noisy after each of two untranquillized treatments, but calm with either tranquillizer. Similarly, a man with agitated depression developed mild laryngospasm when no tranquillizer was administered. Post-ECT memory recall is not altered by haloperidol (see Table III), but intravenous diazepam is liable to cause a characteristic short retrograde amnesia (Greenblatt, 1974). This effect is considered to be an advantage when intravenous diazepam is used during unpleasant minor operations and investigations like gastroscopy. It is indeed sometimes an advantage with ECT. Diazepam does not interfere with retention and recall, and memory functions return to normal within four to six hours of intravenous administration without ECT. Long-term memory disturbances of the kind which seem to be directly related to anxiety bear no relationship to this retrograde amnesia. In such cases the abnormality is probably related to recall, though retention may also be impaired. Not one of thirty patients outside the trial treated with ECT plus tranquillizer has complained of long-term memory upset. Further tests on anterograde effects are in progress.

Conclusions

Patients who are very anxious as well as depressed are more likely than others to be troubled by post-ECT side-effects. Both diazepam and haloperidol given intravenously immediately before the anaesthetic effectively reduce anxiety, agitation, and side-effects such as headache, giddiness and nausea. Haloperidol is preferable to diazepam in out-patients since it does not appreciably prolong the recovery period. Neither tranquillizer appears to diminish the effectiveness of ECT in lifting depression.

Acknowledgements

We wish to thank the anaesthetists and nursing staff of the Westminster Hospital for their help throughout this study.

References

Annett, M. (1970) A classification of hand preference by association analysis. *British Journal of Psychology*, **61**, 303–21.

British Medical Journal (1975) Leader: Tranquillizers causing aggression. *i*, 113–14.

Dally, P. (1967) *Chemotherapy of Psychiatric Disorders*, p. 14, Table 1. London: Logos.

d'Elia, G. & Raotma, H. (1975) Is unilateral ECT less effective than bilateral ECT? *British Journal of Psychiatry*, **126**, 83–9.

Fyrö, B., Beck-Friis, J. & Sjöstrand, I. G. (1974) A comparison between diazepam and haloperidol in anxiety states. *Acta Psychiatrica Scandinavica*, **50**, 586–95.

Greenblatt, D. J. & Shader, R. I. (1974) *Benzodiazepines in Clinical Practice*. Chapter 6. U.S.A.: Raven Press.

Haslett, W. H. K. & Dundee, J. W. (1968) Studies of drugs given before anaesthesia. *British Journal of Anaesthesia*, **40**, 250–8.

Kelly, D., Pik, R. & Chen, C. (1973) A psychological and physiological evaluation of the effects of intravenous diazepam. *British Journal of Psychiatry*, **122**, 419–26.

Kerr, T. A., Roth, M. & Shapira, K. (1974) Prediction of outcome in anxiety states and depressive illness. *British Journal of Psychiatry*, **124**, 125–33.

Zung, W. (1972) A rating instrument for anxiety disorders. *Psychosomatics*, **12**, 371–9.

—— (1965) A self-rating depression scale. *Archives of General Psychiatry*, **12**, 63–70.

https://doi.org/10.1192/bjp.127.6.604 Published online by Cambridge University Press

APPENDIX 1

Memory Tests

Each task was given to the patient three hours before treatment, and recall tested three hours post-operatively. Material was similar but of different content for each session.

Visual: 90 seconds exposure to each

1. *Octagon test*
   Patients were shown three octagons with 1, 2 and 3 sides respectively marked in green and were then invited to mark in the green sides on three blank octagons.
   Maximum score 6

2. *Letters and numbers*
   Patients were shown three rows of mixed letters and numbers and were asked to visualize and then reproduce them.
   Maximum score 9

Auditory

1. *Address*
   A 16-item name, address and telephone number was taught to the patient in up to six verbal repetitions.
   Maximum score 16

2. *List*
   A list of seven items: flower, food, animal, town, colour, occupation and abstract word, was read to the patient who was then asked to repeat the item on hearing the cue, e.g. flower.
   Maximum score 7

Before ECT, the patient was helped to learn the material by repetition as necessary. After ECT he was asked to reproduce it.

Total score possible: 38.

Deficit scores were made by calculating the difference between the patient's post-ECT score and the total possible.

APPENDIX 2

Post-ECT agitation scoring: 0–3
0 Calm and composed
1 Talkative, unable to relax
2 Restless, pressure of talk
3 Very restless, noisy

Post-ECT side-effects scoring
Headache: 0–3
0 No headache
1 Admits to slight discomfort on enquiry
2 Spontaneous mention of headache, or definite agreement on enquiry
3 Severe headache, patient requesting analgesic

Nausea: 0–3
0 No nausea
1 Slight queasiness, on enquiry
2 Definite nausea, patient unable to eat tea
3 Severe nausea, feeling the need of a vomit bowl at hand, which may be used

Giddiness: 0–3
0 No giddiness
1 Feels steadier sitting down
2 Prefers to lie down because of unsteady feeling
3 Must lie down, too giddy to stand or walk

Total side-effects score: 0–9

Joan Gomez, M.B., M.R.C.Psych., *Registrar, Department of Psychiatry, Westminster Hospital, S.W.1*
Peter Dally, M.D., F.R.C.P., F.R.C.Psych., *Senior Consultant Psychiatrist, Westminster Hospital, S.W.1*

(*Received 27 February, 1975*)

https://doi.org/10.1192/bjp.127.6.604 Published online by Cambridge University Press