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Electroconvulsive Therapy in Denmark

By J. HESHE and E. ROEDER

Summary. During the fiscal year 1 April 1972 to 31 March 1973, 22,210 ECT treatments in 3,438 series were given in Denmark (6·46 treatments per series). Indications for treatment were: endogenous depression, acute delirium, mania, hysterical psychosis, reactive depression and schizophrenia. Unilateral ECT was used in more than half of the departments concerned. Two treatments were given weekly. The types of apparatus and anaesthesia techniques used are described. One death, which had questionable relation to the ECT, was reported, and other complications were few and mild. The advantages of ECT compared to tricyclic antidepressants are described, including the higher percentage of remissions or improvements in the treatment of endogenous depressions (about 80 per cent for ECT compared to about 60 per cent for tricyclic antidepressants). Little risk was found in out-patient administration of ECT. With present techniques and unilateral placement of electrodes out-patient ECT may be recommended for wider use than before.

Introduction and Method

Until recently inadequate information has been available about certain aspects of electroconvulsive treatment (ECT) in Denmark, particularly about the extent to which the treatment is used, the number of complications which occur, and the generally accepted indications for this treatment. We felt that it would be important to clarify these issues. Furthermore, we wanted to study the extent to which anaesthesia is administered by anaesthesiologists, by anaesthetist nurses, or by psychiatrists themselves under the supervision of an anaesthesiologist. One of the motives for this study was to introduce more facts into the debate concerning the use of ECT versus the use of tricyclic antidepressants in the treatment of depression. It is our impression that many patients as well as doctors have mistaken ideas concerning ECT. For example, some people appear to have the idea that it is an almost barbaric method and may cause brain damage. It is also our impression that many doctors are hesitant to use this form of treatment because of insufficient knowledge about the technique of administration and about the electrical factors involved in the treatment. Treatment with tricyclic antidepressants does not have the same aura of extraordinariness that ECT has. The drug treatment seems to be more readily available. Furthermore, it has received considerable commercial support from the drug industry. In recent years, there has been an increase in the use of tricyclic antidepressants in Denmark; in the year 1971, the consumption of these drugs resulted in sales of the equivalent of about £1·4 million (for a population of about 5 million).

In December 1973, a questionnaire together with a letter describing its purpose and guidelines for answering the questions was sent out to 55 psychiatric departments in Denmark. These departments included all adult psychiatric departments—state hospital departments, as well as psychiatric departments in municipal hospitals. The study took place during the fiscal year 1 April 1972 to 31 March 1973. The 55 departments have a total capacity of 8,400 beds.

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Results

Satisfactory replies to the questionnaire were received from 51 departments, so that the reply percentage was 93. Of these, 48 departments, with a total of 7,892 beds (or 93·5 per cent of all psychiatric beds in Denmark), and a total of 33,997 admissions during the year, reported that they used ECT. From 32 departments came reports of the number of individual treatments as well as the number of series of treatments. In these departments 13,004 treatments were given in 2,013 series of treatments. An average of 6·46 treatments per series were given. Twelve departments reported either the number of series of treatments or the total number of treatments, but not both. Using a correction factor of 6·46 for these departments, it was estimated that 22,210 electroconvulsive treatments in 3,438 series were given in these departments. This figure does not correspond to the number of patients treated during the year, as it must be assumed that a small number of patients received more than one series of treatments during the course of the year. Since the main indication for ECT is a depressive phase of a manic-depressive psychosis, it should be pointed out that during the same year 1,176 patients were admitted to the 51 departments for the first time under the diagnosis of manic-depressive psychosis and a total of 5,673 were admitted under this diagnosis.

Indications

Table I presents the disorders considered by Danish psychiatric departments to be indications for ECT and the number of departments which considered a given condition to be an indication for this form of treatment. The indications are rank-ordered, so that the disorder agreed upon by all departments to be an indication for ECT is listed first. The figures in the table refer to the number of departments that ever consider a particular disorder to be an indication for ECT, not the number of departments that consider ECT to be the treatment of choice for the disorder. It can be seen from the table that all departments agree that endogenous depression may be an indication for ECT. Other disorders considered to be indication for ECT, in decreasing order of frequency are: acute delirium, mania, hysterical psychosis (psychogenic psychosis with disturbances of consciousness), reactive depression, hebephrenic depression, catatonic states, and the group of other conditions which includes obsessive-compulsive neuroses, depressive neuroses, and symptomatic psychoses.

Table I
Indications for ECT

Diagnosis	Number of departments 48 = 100%	Percentage
1. Endogenous depression	48	100
2. Acute delirium ..	42	87·5
3. Mania	37	77·1
4. Hysterical psychosis ..	34	70·8
5. Reactive depression ..	29	60·4
6. Hebephrenic depression	24	50
7. Catatonic stupor ..	24	50
8. Catatonic excitement	20	41·7
9. Others	9	18·8

Placement of electrodes

Since the mid-1960s, unilateral placement of electrodes over the non-dominant hemisphere has been increasingly used (3, 4, 12). Table II presents the number of departments that use the different types of placement of electrodes. Unilateral treatment is the routine method in 37 departments. Of these, 21 use unilateral ECT exclusively, while 12 departments use unilateral or bilateral ECT, depending on the patient's condition.

Frequency of treatment

Forty-seven departments routine give ECT twice a week for endogenous depressions. One department gives three treatments per week. Thus on the average a series of treatments is usually given over a period of a little more than three weeks. The frequency of treatment for disorders other than endogenous depression was not studied.

Types of apparatus

There are three main types of apparatus used for giving electroconvulsive treatments—apparatus that delivers unmodified alternating

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TABLE II

Use of different types of placement of electrodes

	Number departments	Percentage departments	Number ECT	Number series	ECT series
Exclusively bilateral placement of electrodes	21	43·8	8,426	1,326	6·19
Exclusively unilateral placement of electrodes	12	25	6,420	1,005	6·39
Both bilateral and unilateral placement of electrodes depending on condition of patient ..	15	31·3	7,364	1,071	6·88
Total	48	100	22,210	3,438	

current, apparatus that delivers unidirectional pulsating current, and apparatus that delivers impulses with a duration of less than one millisecond and with 'sharp wave-front' (6). The amount of electrical energy required to induce a seizure is greatest when unmodified alternating current is used, and least when the ultrashort, steep-fronted impulses are used. The importance of these electrical factors has been dealt with in detail by Cronholm and Ottosson (1960), and by Liberson (1948) and Maxwell (1968). We will here briefly stress that the *antidepressant* effect of ECT is dependent on the induction of the grand mal seizure. Side effects in the form of memory impairment are particularly dependent on the amount of current used. It is therefore essential to elicit a seizure with the smallest possible dose of electricity (2, 7, 8). When ECT is used for conditions other than depressions the therapeutic effect may be contingent on both the seizure and the dosage of electricity (3, 7, 8).

It can be seen from Table III that the majority of departments use an electroconvulsive apparatus that delivers unidirectional impulses. Today this type of apparatus must be considered somewhat out of date. It should be replaced by apparatus that can deliver both unidirectional impulses (for use when maximum effect, including antipsychotic and anticonfusional effect, is wanted—for example, in cases of acute delirium), and ultrashort stimuli, which are probably to be preferred when maximum antidepressant effect is desired. These recommendations apply only if the electrical dosage is individualized and not if, as happens in some places, a standard dose is used, which in many instances is too high.

Anaesthesia and complications

All departments administer ECT under narcosis and muscle relaxation with suxamethonium (*narco-curare-electroshock: NCE*). The combination of atropine, a short-acting barbiturate, and suxamethonium is standard with all departments. In most cases thiopentone is used, but a few departments give some other short-acting

TABLE III

Types of ECT apparatus in use in Danish psychiatric departments

	Number of departments using apparatus	Number of apparatus
Siemens K622 (½ sinus wave according to v. Braunmühl) ..	43	42
Siemens K3 (earlier model of K622 — ½ sinus wave) ..	2	2
Elema Järnh (sinus waves, unmodified)	2	2
Ectron Duopulse ('ultra-short stimuli'/ ½ sinus wave) ..	1	1
Total		47

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barbiturate. Artificial ventilation with oxygen is routine in all departments.

In some departments the anaesthesia is always administered by an anaesthesiologist, in other departments the anaesthesia is given by an anaesthetist nurse, and in still other departments the entire treatment procedure is administered by the staff of the psychiatric department, a consultant anaesthesiologist instructing and supervising the psychiatric staff in the procedure of administering routine NCE to physically healthy persons. In all cases of doubt the anaesthesiologist is called and administers the anaesthesia. Table IV shows that in 11 departments (which account for about 20 per cent of the treatments) the anaesthesia is administered by an anaesthesiologist and in 11 other departments by anaesthetist nurses. In the remaining 26 departments (which account for 60 per cent of the treatments) the anaesthesia is administered by the staff of the department under the supervision of an anaesthesiologist. The literature indicates that complications from ECT are rare and that mortality is under 1 per thousand (9, 11). It can be seen from Table IV that very few complications occurred during the electroconvulsive treatments reported. In six cases intubation was necessary because of secretion problems. Other complications reported included: one fracture of a tooth, one case of phlebitis, and a few cases of spasms of the larynx, observed in one department during the recovery phase, which disappeared with the administration of oxygen.

One death was reported. However, the cause of this death was described by the department concerned as having doubtful relationship to the ECT. Thus, one death occurred in 22,210 treatments or 3,438 series of treatments, so that a mortality rate of 0·029 per cent per electroconvulsive series was found.

No complications were found in out-patient ECT.

Conclusions and Discussion

This investigation shows that ECT in Denmark is a frequently used and safe treatment with a well-established technique of administration, and with relatively well-defined indications. ECT is furthermore an effective treatment, particularly in endogenous depressions, where it is superior to drug treatment (1, 10).

Table IV
Complications resulting from 22,210 ECT treatments

Anaesthesia administered by	Number of departments 48 = 100%	%	Number of treatments 22,210 = 100%	%	Complications	Number of complications
Only by anaesthesiologist	11	22·9	4,357	19·6	Deaths	0
					Circulatory complications	0
					Fractures/dislocations	0
					Apnoea	0
					Intubation required	5
					Other (phlebitis)	1
Only by anaesthetist nurses	11	22·9	4,404	19·8	Deaths	1
					Circulatory complications	0
					Fractures/dislocations	1
					Apnoea	0
					Intubation required	1
					Other	1
Psychiatrist ..	26	54·2	13,449	60·6	Deaths	0
					Circulatory complications	0
					Fractures/dislocations	0
					Apnoea	0
					Intubation required	0
					Other	0

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We think it important to point out these facts. Although some of the questions they raise fall outside the framework of this study, we will attempt to consider some of their practical implications.

As mentioned, no complications were found in out-patient ECT. We think that the overall small risk of ECT ought to lead to consideration of more frequent use of this form of treatment in out-patient and day-hospital settings, especially when unilateral treatment and low electrical dosage are given, since this form of treatment is least likely to result in disturbances of cognitive function. It is of course presupposed that the patient is otherwise suitable for out-patient treatment. From an anaesthesiological point of view it should be emphasized that the out-patient administration of anaesthesia, combined with a subsequent stay of suitable duration in a recovery ward, causes no difficulty if the patients have previously been examined and prepared. In comparison with out-patient treatment with tricyclic antidepressants, ECT has the advantage that the patients are not provided with a drug which can be used for committing suicide.

ECT is an inexpensive form of treatment compared to drug treatment. The cost of the treatment of an endogenous depression is about £5 and about £40 respectively for the two methods of treatment. In addition, the percentage of patients receiving ECT who experience remission or improvement is about 85, falling to about 75 after three months of observation (1, 10), whereas about 60–65 per cent of patients treated with tricyclic antidepressants experience remission or improvement (10). Furthermore, with ECT the misgivings which one must have about the long-term use of psychopharmacologic agents are eliminated.

References

1. Bratfos, O. & Haug, J. O. (1965) ECT and antidepressant drugs in manic-depressive disease. *Acta Psychiatrica Scandinavica*, **41**, 588–96.
2. Cronholm, B. & Ottosson, J. O. (1960) Experimental studies of the therapeutic action of ECT in endogenous depression. *Acta Psychiatrica Scandinavica, Supplementum 145*.
3. d'Elia, G. (1970) Unilateral electroconvulsive therapy. *Acta Psychiatrica Scandinavica, Supplementum 215*.
4. Lancaster, N. P., Steinert, R. R. & Frost, I. (1958) Unilateral ECT. *Journal of Mental Science*, **104**, 221–7.
5. Liberson, W. T. (1948) Brief stimulus therapy. *American Journal of Psychiatry*, **105**, 28–39.
6. Maxwell, R. D. H. (1968) Electrical factors in ECT. *Acta Psychiatrica Scandinavica*, **44**, 436–48.
7. Ottosson, J. O. (1960) Experimental studies of the action of ECT. *Acta Psychiatrica et Neurologica Scandinavica, Supplementum 145*.
8. —— (1968) Psychological or physiological theories of ECT. *International Journal of Psychiatry*, **5**, 170–3.
9. Perrin, G. M. (1961) Cardio-vascular aspects of ECT. *Acta Psychiatrica et Neurologica Scandinavica, Supplementum 153*.
10. Rafaelsen, O. J. (1974) Manic-depressive psychosis or manic-melancholic mode. *Danish Medical Bulletin*, **21**, 81–7.
11. Spencer Paterson, A. (1963) *Electrical and Drug Treatments in Psychiatry*. Amsterdam: Elsevier.
12. Strömgren, L. S. (1973) Unilateral versus bilateral ECT. *Acta Psychiatrica Scandinavica, Supplementum 240*.

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