UNILATERAL ELECTRO-CONVULSIVE THERAPY*

By

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Previous Work

Introduction

Electro-convulsive therapy was first introduced by Cerletti and Bini in 1938, and has now become the principal physical method of therapy in psychiatry.

Unhappily, whilst this method of treatment is at present enjoying such deserved popularity, it is not without undesirable effects, some of which may be quite insidious.

Modification by relaxants has resulted in a change in importance of its complications and now in a well-organized unit the old complications of dislocation of bones, crush fracture of vertebrae, broken teeth, aspiration pneumonia, and lung abscess, are rarely encountered. There are, however, other complications, some theoretical, though with possibilities that cannot be ignored, and others of major practical importance.

Cerebral Impairment

Of practical importance is the finding that when an electric current is passed through the brain in the conventional manner, severe mental impairment occurs.

Pacella *et al.* (1942), showed that the electroencephalograph develops abnormalities consisting of 3–6 cycle/sec. slow activity of moderate to high voltage, which may persist for several weeks, depending on the amount of treatment given.

Juba (1948), described Gerstmann syndrome, consisting of finger agnosia, acalculia, agraphia, and disturbances of right and left laterality, being often encountered for a short period after the shock.

Stengel (1951), draws a parallelism between repeated shocks and head injury, and during his condemnation of intensive electro-shock therapy as a method of treatment, states that amnesia can be gross, extending over several years.

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Anderson (1951), states that electro-convulsive therapy should be avoided if possible in very superior intellectuals. He cites examples of poets who ceased creative work following electro-convulsive therapy, and professors and students who forgot large parts of their knowledge.

Hafner (1951), believes that after eight or even less shocks, early organic syndromes may commence. These manifest themselves as apathy and confusion. He states that to prevent amnesia must be a major objective of therapy.

These memory disturbances may have a legal significance in that patients may forget for a time that they "want to go home" and therefore the treatment may constitute a means of restraint, whilst the disorientation and confusion increase significantly the observation needed of patients given treatment on an out-patient basis.

Stengel (1951), showed psychoneurotics and Taylor and Pacella (1948), showed arteriosclerotics particularly susceptible to memory disturbances after electro-convulsive therapy.

One theoretical complication which is little known, and we feel must be stressed, is that of eye lesions.

Eye Changes

Duke Elder (1954), states that lenticular opacities have occurred following exposure to high voltage alternating current, direct current, and electro-shock therapy. He stresses the following points:

1. After injuries due to lightning, opacities develop in 1 to 7 days. After strong industrial currents an average of 2–4 months with extremes of days to years —cases after 3, 6, and 11 years are reported.
2. The strength of current has varied from 500 to 50,000 volts, though the development of cataract seems to bear no definite relationship to the strength of current.
3. If bilateral cataract follows one-sided contact points, then changes in the proximal eye precede those in the contralateral eye by several months.
4. Other eye disturbances associated with the passage of electric current include skin burns and necrosis—painless and aseptic, hair singeing, spasm of accommodation, photophobia and blepharospasm, contraction of visual fields, and retinal and corneal lesions.

Though we personally have never witnessed any serious eye lesions following electric shock therapy, photophobia, accommodation difficulties, and skin burns have frequently been noted. The long latent period of cataract means that it will be many years before a verdict of innocence can be given.

It was with the object of reducing the confusion and memory disturbances and preventing the passage of the current through the orbits, that the unilateral application of E.C.T. was started by us.

Induced Focal Fits

There are some previous references in the literature to induced focal fits—Kalinowsky (1952), states that if focal fits occur during the application of conventional E.C.T. they are not as therapeutically effective, but there is a much quicker return to consciousness than when a generalized convulsion occurs.

Pacella and Impastato (1954), used unilateral application of the electric

current but used continuous current gradually increasing until the contralateral seizure commenced. They stimulated first one side of the brain and then the other. They thought focal seizures were less therapeutically effective than generalized, but were useful in poor risk patients, the elderly and paranoid cases who need less confusion of consciousness.

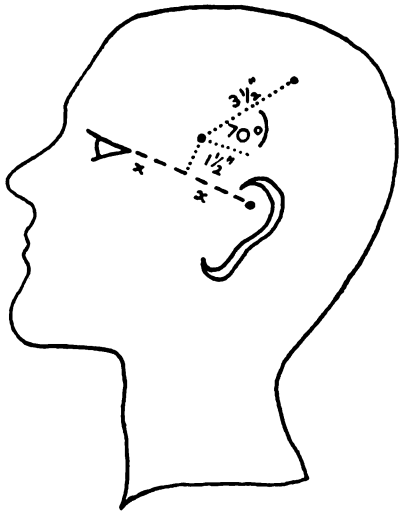
Experimental Technique

1. Method of Application

All patients were premedicated with oral atropine 1/75th about 45 minutes previous to intravenous pentothal 150 mg. and Brevidil E 50 mg.

The electroplexy machine used had electrodes about 1¼ in. diameter and was of the type where discharge of a condenser gave a constant amount of current to each patient.

The electrodes were lubricated with Cambridge electrode jelly as also was the scalp at the points of application. The non-dominant side of the skull was chosen since it was felt that damage here would not be as important as on the dominant side. The lower electrode was midway between the lateral angle of the orbit and the external auditory meatus and 1½ in. above this line. The upper electrode was 3 in. higher than the lower and at an angle of 70° to the line. (Slight deviations from these points do not materially affect the result.)



After the passage of the current, an air way was inserted. Usually respiration commenced again within 90 seconds, but if this was not so, positive pressure insufflation by means of a Beaver respirator was given.

2. (*a*) Assessment of Undesirable Effects

This involved the use of three assessors, each provided with a clock or watch zeroed just previous to commencing each day's procedure.

1st Assessor

Showed the patient a card on which was written a short memory test sentence containing four items. He read the sentence to the patient and got him to repeat it. He then recorded:

Name of Patient.
Time of Injection of Pentothal and Relaxant.
Time of applying the electric shock.
Details of method of application, i.e. Unilateral or Bilateral.
Result, i.e. Subshock, Focal Fit, or Generalized Fit.

2nd Assessor

Recorded:

Name of Patient.
Time of first attempting to swallow.
Time of first attempting to breathe.

3rd Assessor

Recorded:

Name of Patient.
Orientation in Ego, i.e. Time of knowing Name and Age.
Orientation in Place, i.e. Time of knowing where he was.
Orientation in Time, i.e. Time of knowing Day and Date.
Memory test, i.e. If he could remember the sentence he was shown just prior to the treatment.

Due to practical considerations, the maximum time for observation was 15 minutes in each case and if a particular faculty had not returned in that time it was recorded as 15 minutes+.

2. (*b*) ASSESSMENT OF DESIRABLE EFFECTS

1. Patients for whom E.C.T. was recommended were carefully assessed prior to commencing therapy and a rating on a 4 scale grade (0=Nil, 1=Slight, 2=Marked, 3=Extreme) given for each of the following symptoms:

Stupor	Misery
Anorexia	Feelings of Unreality
Insomnia	Retardation
Weeping	Hallucinations

Ideas of guilt, worthlessness, and general worries.

The score of the individual items for each particular patient was then summated and this total became "the depressive quotient" for that particular patient.

2. Particular care was taken that the assessing doctor was not aware whether unilateral or bilaterally induced E.C.T. was given. This was done by means of a draw system and a series of cards in which the nursing staff played a prominent role.

3. A total of four E.C.T.s were then given and the depressive quotient again determined in a similar manner as previously.

RESULTS

Undesirable Effects

A total of 135 electric shocks were analysed. These consisted of:

39 cases of Bilateral E.C.T.
31 cases of Unilateral E.C.T. with generalized fit.
33 cases of Unilateral E.C.T. with focal fit.
32 cases of Unilateral subshocks.

TABLE A

Type of Fit	No. of Cases	Arithmetic Mean in Minutes: Preceding Passage of Current	Following Passage of Current					Memory Recall Test
		Injection	Commenced to Swallow	Commenced to Breathe	Orientated for: Name	Place	Time	
Bilateral induced fit ..	39	0·62	0·82	1·08 s=0·57	9·83 s=4·28	13·86 s=2·38	14·47 s=1·26	1
Unilateral induced general fit	31	0·64	1·18	1·28 s=0·76	6·07 s=3·59	8·07 s=5·26	8·68 s=5·2	19
Unilateral induced focal fit ..	33	0·67	1·07	1·59 s=0·87	4·36 s=3·38	5·05 s=4·36	6·17 s=4·5	27
Unilateral induced subshock	32	0·63	1·06	1·6 s=1·00	3·0 s=1·78	3·0 s=1·97	4·41 s=4·16	24

Whilst certain of the above clinical impressions could not be confirmed statistically (because of high values of standard deviation and small differences in arithmetic mean necessitating larger number of cases), the following results were noted:

1. The breathing commences quicker after a generalized fit induced either bilaterally or unilaterally than after a unilateral subshock or focal fit. (Strong clinical impression.) Probably due to greater anoxia and accumulation of carbon dioxide after vigorous muscle jerks.

2. Orientation for name and age returned quicker after a unilaterally induced generalized fit than after a bilaterally induced one. (Highly statistically significant.)

3. Orientation for time and place returned quicker after a unilaterally induced focal fit than after a unilaterally induced generalized fit. (Statistically significant.)

4. There was a definite order for return of orientation in all spheres. (Strong clinical impression.)

Subshock earliest.
Unilaterally induced focal next.
Unilaterally induced generalized.
Bilateral induced generalized last.

5. Recall of the test item was much higher in all the unilaterally induced cases than in the bilaterally induced ones. (Highly statistically significant.)

6. After a bilaterally induced convulsion features of cerebral concussion, such as automatic behaviour, dazed expression, and restlessness were more prominent than after a unilaterally induced one. (Clinical impression.)

Desirable Effects

A total of 43 patients were studied and each given a course of four electric shocks.

They consisted of 15 patients given bilaterally induced generalized fits, 21 patients given unilaterally induced generalized or focal fits, and 7 patients given unilaterally induced subshocks.

On analysis these results show:

1. No statistical significant difference between the improvement caused by bilaterally induced generalized fits and unilaterally induced fits. (There was however, a clinical impression of slightly better improvement and more complete remission with the bilaterally induced fits.)

TABLE B

Type of Fit	No. of Cases	Arithmetic Mean of Depressive Quotient		
		Before Treatment	After Treatment	Improvement
Bilateral generalized	15	7·8 (s=3·8)	2·3 (s=2·5)	5·5 (s=3·9)
Unilateral generalized or focal fits	21	8·4 (s=3·5)	3·9 (s=3·3)	4·5 (s=2·8)
Unilateral subshocks	7	9·1 (s=3·2)	7·1 (s=5·5)	2·0 (s=2·8)

2. Cases treated with Sub-Convulsive Therapy showed a statistically significant less improvement than those treated with bilaterally or unilaterally induced generalized or focal fits. (Statistically significant.)

DISCUSSION

The above are the facts and one has now to consider what deduction can be drawn from them.

The indication for unilateral E.C.T. is when one needs minimal side effects with not maximum therapeutic response at first. It would seem that a large percentage of cases would fit into the category and include the following:

1. Elderly patients with severe arteriosclerosis who are depressed and difficult with food.

2. Patients of very superior intelligence, and especially those who have to earn their livelihood with retained knowledge.

3. Young patients under the age of 40 years who show predominant neurotic features and yet who are depressed sufficiently to warrant E.C.T.

Patients to whom we would give bilateral E.C.T. are:

1. Involutional depressives of average intellect.

2. Severe depressives who are actively suicidal (on Suicide Caution Cards).

3. Any patient who after six unilateral treatments is still being difficult with food and showing other features of depression.

4. Catatonic Schizophrenics who are dangerously impulsive.

Future Trends

Two particular lines on which further research would appear to be fruitful are:

(*a*) Close studies of patients having had E.C.T. several years before for eye lesions. This point should be definitely cleared up one way or the other as soon as possible.

(*b*) Finding of a slightly larger number of Unilateral E.C.T.s has the same effect as slightly less number of Bilateral treatments.

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