

ELECTRO-NARCOSIS IN THE TREATMENT OF SCHIZOPHRENIA.*

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I CARRIED out 2,443 treatments by electro-narcosis on 152 patients, between 29 January, 1948, and 19 February, 1949, without fatality, and without any adverse personality change attributable to the treatment. Of these patients 105 were schizophrenics, whose treatment was completed before 29 January, 1949. This series alone is considered in detail here, but the experience gained from the treatment of the remaining patients is taken into account, especially in relation to difficulties and dangers.

TECHNIQUE.

I used the Shotter-Rich electro-narcosis apparatus, and the basic technique described by Paterson and Milligan (1947), Paterson (1948*a* and 1948*b*), and Milligan (1948). Reference was also made to the following American workers, who used a somewhat different apparatus, but a similar basic technique: Frostig *et al.* (1944), Tietz *et al.* (1946) and Tietz (1947). There is no need to repeat what these authors have written, but the following technical points were stressed in the present series:

1. The standard of physical fitness required was the same as for electrical convulsion therapy without curarization.

2. Unless curare was used, or difficulties were anticipated, treatment was carried out by one doctor. It was therefore considered essential to have a good nursing team, each member being trained to report instantly any significant change in the patient's condition. The patient's pulse rate and volume were kept under constant observation.

3. The "Glissando" technique, described by Tietz (1947) and Paterson (1948*a*), was always used.

4. The experience gained from the treatment of the first forty cases led me to use preliminary thiopentone anaesthesia in all subsequent cases. Intravenous administration was the usual method, but in the few cases where this was impossible, rectal thiopentone supplemented by a small inhalation of ethyl chloride proved satisfactory. The use of thiopentone ensured amnesia for the period of treatment and diminished the violence of muscular contraction, especially as regards flexion of the spine. Protection by curarization was therefore rarely necessary and was used in only four cases in this series. When thiopentone was used I considered it important to elicit the characteristic signs of electro-narcosis, namely, flexion of the arms and inspiratory stridor, in order to be sure that an adequate dose of electricity was being administered.

5. Tietz *et al.* (1946) indicated that placing the electrodes in a forward position had an effect similar to that produced by using a relatively small dose of electricity, while a rearward position corresponded to an increased dose.

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Following this hint I adopted the practice of starting treatment with the electrodes placed frontally, and then moving them back when breathing was fully established. This manoeuvre made control more rapid and flexible. Used in conjunction with thiopentone anaesthesia, it abolished convulsive phenomena in a large proportion of cases.

6. After treating about fifty cases I made a habit of starting each patient on a short treatment of $1\frac{1}{2}$ to 2 minutes and lengthening the time on subsequent occasions in the light of the patient's reactions, to a maximum of seven minutes.

7. The number of treatments given to each patient varied according to progress, the shortest course consisting of three treatments, the longest of forty-one. Electro-narcosis was normally carried out three times a week. Many schizophrenics who showed little change after twelve treatments did well on longer courses.

In conclusion, I would emphasize that once the technical advantages of thiopentone anaesthesia, electrode movement and gradual lengthening of the treatment period were appreciated, electro-narcosis without them appeared barbarous and unjustifiable.

DIFFICULTIES AND DANGERS.

These were described and discussed by Garmany and Early (1948). Special attention was therefore paid to the points made by these authors, and the following account deals with untoward events in all 156 patients treated.

1. Cardiovascular shock occurred in one case, subsequently found to be suffering from very early pulmonary tuberculosis which had eluded discovery by physical examination. Her condition was not serious enough to cause alarm and recovery was complete in 48 hours.

2. A reactivation of the psychosis with excitement, hallucinosis and confusion occurred in 15 per cent. of cases prior to the introduction of thiopentone. In two cases this was followed by striking improvement, which had not occurred before. In no case was the patient worse after such an episode than before. In all cases the condition cleared up in periods varying from three days to three weeks. After the introduction of thiopentone this sequel was rather less frequent and no more serious in its effects.

3. Before the introduction of thiopentone, some memory of the initial shock was present in 15 per cent. of cases. Memory of a substantial part of the treatment occurred in 6 per cent., but in only one case was there serious fear of a repetition of the experience. This patient was later given a full course satisfactorily with thiopentone. After the introduction of thiopentone, this complication ceased to exist.

4. Treatment was cut short in several cases owing to weak or irregular cardiac action during treatment. All were known to have cardiovascular abnormality before treatment was started. This difficulty was therefore largely due to the acceptance of greater risks with increasing experience.

5. A fracture of the right articular process of the eighth dorsal vertebra occurred in one man, and muscular injury in two, before the introduction of thiopentone. No serious injuries occurred subsequently.

6. Four cases showed sensitivity to thiopentone itself.

7. A large swelling of the thyroid gland of sudden onset and unknown causation occurred in one woman. It subsided in ten days without ill effect.

8. Four patients refused further treatment as they felt apprehensive, even though they had been given thiopentone. Memory of the treatment could not be elicited. All were hyperanxious types liable to become apprehensive of anything, even on flimsy grounds.

9. Small burns of the forehead occurred in several cases while the electrodes were new and the plating intact. When the plating wore off the burns ceased. Removal of the plating on new electrodes prevented the occurrence of further burns.

10. One patient who had previously undergone leucotomy showed rapidity and irregularity of cardiac action at an unusually low dosage level of electricity. When this was recognized and allowed for, further treatment proceeded smoothly.

ANALYSIS OF RESULTS.

Before starting electro-narcosis, a survey was made of all cases of schizophrenia admitted to Barming Heath Hospital during a ten-year period before the introduction of shock therapy for schizophrenia. These cases had all been assessed by myself, or by one or other of two psychiatrists whom I knew well, so any personal bias operated similarly on control and treated cases. Schizophrenics transferred to other hospitals within a year of admission were excluded from the controls, as continuity of personal observation was lost. As the reason for transfer was place of residence, they presumably constituted a random sample, whose elimination had no statistical significance. Schizophrenics who died within a year of admission were also excluded, to counter-balance the fact that patients in poor physical condition were not lightly accepted for electro-narcosis. All other patients regarded as schizophrenics were included in the control series.

The exact delimitation of the boundaries of the control group was a considerable problem. In drawing a line between paranoid schizophrenia and predominantly paranoid conditions, reliance was frankly placed on personal judgment to ensure that it was drawn in the same place in the control and the treated series. It is true that, for example, affective failure, incongruous emotional responses, silly mannerisms, vagueness of thought content and impulsiveness were regarded as criteria of schizophrenia. Resentment and relative preservation of the personality were taken as indications of predominantly paranoid states. However, as these points were capable of different interpretations by different psychiatrists, it was felt that reliance on personal judgment could not be evaded. The continuity of personal viewpoint was also used to eliminate schizophrenic reactions and atypical affective disorders. In addition, all patients were eliminated from the control series who were admitted to hospital three times in the ten-year period, and achieved remission or social recovery on each occasion. The results in the control series were derived from assessment of the clinical state of the patients one year after admission.

The control series consisted of 557 patients, of whom 295 were men and 262 were women. Twenty-three patients had two attacks within the ten-year period,

so the total number of "attacks" considered was 580; 137 of the patients had had other attacks before the start of the ten-year period. The patients in the control series received all the benefits of hospital treatment accorded to the electro-narcosis cases, with the single exception of electro-narcosis itself. The results were classified in the following five categories:

1. *Complete remission*.—These patients were free from psychotic symptoms when they left hospital, but had not necessarily achieved insight. This standard was therefore lower than the "Grade A" of Tietz *et al.* (1946).

2. *Social recovery*.—These patients had left hospital with residual symptoms insufficiently severe to prevent them from doing useful work and adjusting to some degree to domestic life. Cases removed from hospital to be cared for at home were not included.

3. *Improved*.—These patients were relieved from their symptoms to some extent, but not sufficiently for the hospital to initiate their discharge.

4. *Not improved*.—This group included those who were unchanged or worse than on admission.

5. *Relapsed*.—This class consisted of patients who were readmitted after achieving complete remission or social recovery.

The important figures obtained were as follows:

1. The results at one year of all attacks—

Category.	Number of patients.	Percentage.
1	63	10.9
2	141	24.3
3	116	20.0
4	247	42.6
5	13	2.2
	580	100.0

2. The results at one year, related to the duration of illness before treatment. Admission to hospital was regarded as the beginning of treatment. Patients were divided into six duration groups:

- (1) Three months or less.
- (2) Over 3, but not more than 6 months.
- (3) Over 6, but not more than 12 months.
- (4) More than one year, but not more than 2 years.
- (5) More than 2 years, but not more than 3 years.
- (6) Over 3 years.

Category.	Duration Groups.					
	1.	2.	3.	4.	5.	6.
1	46	7	6	4	0	0
2	81	19	12	17	1	12
3	37	10	20	16	9	24
4	65	31	33	36	24	57
5	8	2	1	0	1	1
	237	69	72	73	35	94

Expressed as percentages these figures read :

Category.	Duration groups.					
	1.	2.	3.	4.	5.	6.
1	19.4	10.2	8.3	5.5	0.0	0.0
2	34.2	27.5	16.7	23.3	2.9	12.8
3	15.6	14.5	27.8	21.0	25.6	25.5
4	27.4	44.9	45.8	49.3	68.6	60.6
5	3.4	2.9	1.4	0.0	2.9	0.1

3. Average stay in hospital : The average period spent in hospital by those patients who achieved categories 1 and 2 was 28 weeks.

4. Average duration before relapse : The average period between the dates of the first and second admissions in relapsing cases was 1 year and 11 months.

The rise in the social recovery rate in the group ill for more than three years requires explanation. Many of these patients had been ill for many years with few acute symptoms. They were tolerated by relatives until an untoward incident or unpleasant personal habits made admission necessary. As soon as the crisis was over, or improvement of any kind occurred, the relatives pressed for their discharge. As most went out to resume menial farm duties, they were given the benefit of the doubt and classified in Category 2.

RESULTS ACHIEVED WITH ELECTRO-NARCOSIS.

In the year starting on 29 January, 1948, the treatment of 105 schizophrenic patients with the help of electro-narcosis was completed ; 21 other patients were considered to be schizophrenics, and electro-narcosis was contemplated in their cases, but rapid spontaneous improvement occurred, so shock therapy was felt to be unjustifiable. Although not considered in detail, these patients had a bearing on the assessment of the results of electro-narcosis.

As many of the patients treated were cases of long standing, with a very poor prognosis, a direct comparison of the overall results in the electro-narcosis series, with the results at one year of all the control cases, was felt to be misleading. Allowance was therefore made for the duration of illness before treatment, this being reckoned up to the start of electro-narcosis in the electro-narcosis series.

The method of comparison was as follows :

The 105 electro-narcosis cases were distributed as follows in duration groups :

Group.					
1.	2.	3.	4.	5.	6.
15	11	14	21	20	24

Taking Group 1 first : The expected results in 100 cases in Group 1 were known to be as follows:

Category.				
1.	2.	3.	4.	5.
19.4	34.2	15.6	27.4	3.4

The results to be expected in 15 cases were therefore these figures multiplied by 15 and divided by 100, namely—

Category.				
1.	2.	3.	4.	5.
2.91	5.13	2.34	4.11	0.51

After dealing with the other duration groups in the same way and adding the numbers falling in each category, the results were :

Category.				
1.	2.	3.	4.	5.
6.34	19.03	23.66	54.06	1.86
or 6	19	24	54	2

if expressed to the nearest integer.

These figures indicated the expected distribution in categories of the 105 patients treated, if the results were the same as in the control series.

Expressed as percentages these figures became :

Category.				
1.	2.	3.	4.	5.
5.7	18.1	22.8	51.5	1.9

Of the patients treated the numbers falling in the various categories were as follows :

Category.				
1.	2.	3.	4.	5.
15	28	20	39	3
or 14.3	26.7	19.0	37.1	2.9

For ease of comparison these figures can be tabulated together :

Category.					
	1.	2.	3.	4.	5.
Controls	5.7	18.1	22.8	51.5	1.9
Treated cases	14.3%	26.7%	19.0%	37.1%	2.9%

The expected discharge rate (Categories 1 and 2), calculated from the control group, was 23.8 per cent. The discharge rate actually achieved was 41.0 per cent.

Of the patients discharged after electro-narcosis, 17, or 39.5 per cent., had been ill for more than a year when treatment was started.

The average period from the start of electro-narcosis until discharge was 15 weeks.

In assessing these results, attention was paid to the 21 cases of schizophrenia admitted during the year in which electro-narcosis was used, but not given

shock therapy owing to the rapidity of their progress without it. Some doubt was felt as to whether 6 of these cases were strictly comparable to the control group, so the remaining 15 only were considered. It was felt that cases making rapid progress were present in the control series, but excluded from the electro-narcosis group. As these cases all left hospital, a factor raising the discharge rate in the control group, relative to the electro-narcosis group was felt to be present. It was impossible to assess how many patients in the control group improved too rapidly for hypothetical treatment by electro-narcosis, so an attempt was made to assess the importance of the issue by indirect means.

Supposing, for the sake of argument, that these 15 patients had been given electro-narcosis and that their remissions or social recoveries had been attributed to the treatment, what would the result have been? The total series would have consisted of 120 cases. The actual results achieved, and the expected results derived from the control series, expressed as percentages and compared in the manner already described would have read as follows:

	Category.				
	1.	2.	3.	4.	5.
Controls . . .	7.5	19.2	22.5	49.2	1.6
Treated cases . .	19.1	29.2	16.7	32.5	2.5

The ratio of actual results to controls in categories in this hypothetical series was 48.3 : 26.7, or 180 : 100.

The ratio of actual results to controls 1 and 2 in the real series of 105 cases was 41.0 : 23.8, or 172 : 100.

The results in the hypothetical series were better than those in the real series in the proportion of 180 : 172 or 104.5 : 100.

The fact that these 15 cases did not appear on the credit side of the electro-narcosis account had the effect of making the control series read approximately $4\frac{1}{2}$ per cent. too high in relation to the series treated by electro-narcosis. As it was no part of my programme to strain figures to the utmost to gain an effect, this fact was ignored in the final comparisons of control and treated cases.

In order to check the results more closely, assessments were made of the figures at earlier points in the series. At the time this survey was completed, 10 months had elapsed since electro-narcosis was finished in the first 43 cases; 6 months had passed since the end of electro-narcosis in the first 69 cases. Assessments were therefore made at these points.

The results in the first 43 cases were:

	Category.				
	1.	2.	3.	4.	5.
Controls . . .	4.7	16.2	23.3	53.5	2.3
Treated cases . .	18.6	20.9	11.7	46.5	2.3

Forty-seven per cent. of those in categories 1 and 2 had been ill for more than one year.

The results in the first 69 cases were :

	Category.				
	1.	2.	3.	4.	5.
Controls . . .	5·8	17·4	23·2	52·2	1·4
Treated cases . .	17·4	24·6	17·4	37·7	2·9

44·8 per cent. of those in Categories 1 and 2 had been ill for more than one year.

The ratio between treated and control cases was therefore similar at three points in the series.

DISCUSSION OF RESULTS.

Any method of comparing groups of cases of uncertain aetiology and protean clinical manifestations is open to objection. When the disorder in question affects the total personality, comparison is made doubly difficult. I therefore tried simply to be as fair as possible, without attempting mathematical accuracy.

Petrie and Sands (1948) discussed the difficulty of assessing the results of shock therapy in depressive cases. They cited Penrose (1946) as having satisfied himself by statistical enquiry that electrical convulsive therapy held no advantage over less violent procedures when a long range was taken, with a minimum of five years since treatment as a standard. They went on to say that although they hesitated to question the purely statistical validity of the finding, they felt it necessary to point out that there was little agreement between this view and the results seen day by day in hospital wards. They thus implied the existence of a cleavage between those who rely on statistics in assessing results, and those who rely on clinical judgment. Indeed, it would probably be fair to say that most psychiatrists, in using shock therapy, are backing their clinical judgment rather than relying on statistical evidence.

The difficulty facing the statistician dealing with schizophrenia lies in the absence of demonstrable aetiological factors or measurable clinical manifestations of a kind known to be significant. Academic psychologists agree about the difficulty of defining what is meant by a trait, let alone the assessment of the significance of different traits. Clinical psychiatrists do not deal with objectively demonstrable facts, but with observations and judgments coloured by the experience of the observer, and probably by his temperament. Further, it is generally agreed that the measurement of the dimensions of personality is in its infancy. Therefore, in attempting to assess the results of any form of treatment with statistical accuracy, the opportunities for false quantification are almost infinite.

I therefore attempted to use statistics simply to give more precise expression to clinical findings, and tried to prevent statistics taking leave of reality by constant reference back to the clinical foundation on which they were based.

To ensure reasonable fairness of comparison, care was taken to see that all cases in the control and treated groups fell within the same descriptive limits. All cases admitted during the period of survey were treated, except those physically unfit and those who made rapid spontaneous progress. In addition,

a number of patients previously admitted but making no progress with ordinary hospital care were also treated. It is clear, therefore, that no effort was made to choose for treatment a series of cases of better inherent prognosis than the controls.

The importance of the duration of illness before treatment in relation to the outcome in schizophrenia has often been stressed in the literature on insulin therapy. Muller (1937) claimed 73·8 per cent. of recoveries in patients who had been ill for less than six months, 63·3 per cent. in patients who had been ill for less than a year, 37·8 per cent. in those treated before the end of two years, and 15·4 per cent. in those of more than two years' duration. Ross and Malzberg (1939) claimed a recovery rate of 26·1 per cent. in cases who had been ill for less than a month. This fell to 2·1 per cent. in those with a duration of 11 to 14 years. Sargant and Slater (1948) strongly emphasized the importance of the duration of illness in choosing cases likely to respond to insulin therapy. It was therefore interesting to find the same trend reflected in the survey of the control group for the present series.

From the viewpoint of duration of illness before treatment, the electro-narcosis group was prognostically much less favourable than the control group. The percentage of cases in the duration groups described above was as follows :

	Duration Group.					
	1.	2.	3.	4.	5.	6.
Controls . . .	40·9	11·9	12·5	12·5	6·0	16·2
Electro-narcosis cases	14·4	10·5	13·3	20·0	19·0	22·8

Nevertheless, an overall comparison of the results in control and electro-narcosis cases showed a greater proportion of discharges in the latter, the actual figures being respectively 35·2 per cent. and 41·0 per cent.

Confirmation of the fairness of the method of comparison used was obtained when the 15 untreated cases were considered in relation to the 105 treated cases. In a direct comparison of the over-all results in both series, the addition of these 15 cases would have improved the treated series by 14 per cent. in relation to the controls. However, as the 15 cases were almost all of short duration, the adjusted result showed an increase of only 4½ per cent. over the controls, a remarkable absorption of a heavy and unfair load.

The fact that 39·5 per cent. of patients discharged after treatment by electro-narcosis had been ill for more than a year, indicated that the treatment did not merely pick out those of inherently good prognosis from an otherwise unfavourable group. The average stay in hospital after the start of electro-narcosis was 15 weeks, compared with an average stay in the control series of 28 weeks. Allowing 4 weeks for investigation and evaluation of cases before giving electro-narcosis, this represents a saving of two months in hospital for each patient.

To summarize, the short-term results of electro-narcosis showed a ratio of discharges in treated cases to discharges in the control series of the order of 5 : 3. A comprehensive recent study of the long-term results of

insulin therapy was published in the New York State Hospitals' Report (1944), cited by Sargant and Slater (1948). A series of treated cases was compared with a series of untreated cases of similar type and prognosis. Of the treated cases 80 per cent. were discharged, while of the untreated cases 59 per cent. were discharged, making the ratio between discharges in the two groups approximately 4 : 3.

As the figures for the present series represent short-term results I do not wish to strain comparison too far. Relapses in the cases treated by electro-narcosis will undoubtedly occur. In the control series, the average period between admissions in relapsing cases was 1 year and 11 months, with a wide scatter about that mean. Therefore a five year study at least will be required to estimate the long-term value of electro-narcosis. The short-term results, however, bear comparison with those from insulin therapy.

No detailed comparison was made of the results in schizophrenia of electro-shock and electro-narcosis. However, the first twelve electro-narcosis patients had all had electro-shock, without lasting benefit. After electro-narcosis, four achieved complete remission, and one social recovery.

CONCLUSIONS.

I do not suggest that electro-narcosis is a rival to insulin shock therapy, or liable to supersede it. I submit, however, that if insulin is not available, electro-narcosis is an equally safe alternative, which may yet prove to be in the same class. I suggest that a thorough investigation of the long-term results of electro-narcosis is both justifiable and desirable, especially in view of the contention of Sargant and Slater (1948), that the main drawback to insulin therapy is the difficulty in providing it at once for all schizophrenics coming under observation. Such an enquiry might deal with the type of case especially suitable for each method. In this connection I formed the clinical impression that the affective component of schizophrenia responded principally to electro-narcosis. It may be, therefore, that some patients, especially simple schizophrenics, may respond to electro-narcosis although resistant to insulin therapy.

I submit, therefore, that a preliminary case has been made out to show that, in present conditions, electro-narcosis has a useful place in the treatment of schizophrenia.

SUMMARY.

1. An account is given of the administration of 2,443 treatments by electro-narcosis to 152 patients, with special reference to the treatment of 105 cases of schizophrenia.
2. Points of technique found by experience to be especially important are emphasized.
3. The difficulties and dangers encountered are described.
4. A description of a survey of 559 cases of schizophrenia admitted to hospital during 10 years prior to the introduction of shock therapy is given for purposes of control.

5. The difficulties involved in comparing two groups of schizophrenics are discussed, and the reasons for the method chosen are given.

6. The results achieved after the use of electro-narcosis are compared with the control group in a manner which contrasts groups of cases of similar duration of illness before treatment.

7. The electro-narcosis group is shown to be of intrinsically worse prognosis than the control group, as regards duration of illness before treatment. Yet the percentage of discharges after electro-narcosis is shown to be greater.

8. Comparison of groups of similar duration of illness shows that the ratio of discharges after electro-narcosis to discharges in the control group is approximately 5 : 3.

9. It is emphasized that electro-narcosis should not be regarded as a rival or possible successor to insulin shock treatment.

10. It is submitted that electro-narcosis has a useful place in the treatment of schizophrenia, and that it is justifiable and desirable to undertake a survey of the long-term results of the treatment.

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