

# A RETROSPECTIVE CONTROLLED STUDY OF LEUCOTOMY IN SCHIZOPHRENIA AND AFFECTIVE DISORDERS

By

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THE controlled study of the major physical treatments in schizophrenia (and other psychiatric conditions) has been retarded by the view that it is unethical to withhold treatment from the patient. Although this argument is clearly dubious until a treatment is proved, the number of forward-looking controlled studies of E.C.T., insulin coma therapy and leucotomy may nevertheless be counted on the fingers of two hands. Not all schizophrenics have, however, received every possible treatment, and if it were possible to make comparisons of treated and untreated cases retrospectively, there would be no ethical objection to overcome.

The essentials of any controlled study of treatment in schizophrenia are:

1. That the treated and untreated groups should have had the same regime apart from the treatment being examined.
2. That the treated and untreated groups should have been under care at the same time.
3. That the groups should consist of similar cases and have the same prognosis or the same tendency to "spontaneous remission".

In an earlier paper (Robin, 1958) assessing leucotomy it was shown that sex, age on admission and length of admission were prognostic factors. The method used in that study was as follows:

Each leucotomy patient was matched with a patient of the same sex, of the same age on admission (in 5-year blocks), admitted nearest to the date of admission of the leucotomized patient (in 3-month blocks) and still in hospital at the time when the leucotomized patient had the operation.

This method, it will be seen, ensured that the patients were treated at the same time. If the patients are followed up for a long enough period it can be assumed that any special treatment programme will not survive, and in this respect it has already been shown elsewhere that "total push" programmes have only a temporary and concurrent effect (Bennet and Robertson, 1955).

Penrose (1947) describes a similar method which likewise did not use diagnosis as a factor in matching. Nevertheless, Penrose (1947) shows that all three factors used are related to diagnosis. First, length of admission determines the number of schizophrenics in a group—the longer the stay in hospital the greater the chance that the diagnosis will be of schizophrenia. Secondly, age on admission may be divided into four periods—corresponding to four diagnostic groups—"epileptic-defective", "schizophrenic", "affective", and "senile-organic". Finally, sex differences are also noted in different diagnoses—schizophrenia is commoner, occurs younger and is therefore more serious in males; affective disorders in females. Groups chosen for sex, age or length of admission

do, in fact, as has been shown in the earlier paper (Robin, 1958), match well for diagnosis. If, however, diagnosis is added as a factor in matching, and pairs are now chosen not only for sex, age on admission, length of admission but also for the diagnosis of schizophrenia, matching is extremely close for many other factors. Of the 198 pairs considered in the earlier study, sixty were found to match for the four factors to be used. These cases were studied in greater detail and are presented here.

(a) 60 PAIRS MATCHED FOR SEX, AGE ON ADMISSION, LENGTH OF ADMISSION AND SCHIZOPHRENIA

A. *A Comparison of the Treatment and Control Groups*

Of the leucotomized patients, 52 had a single operation and 8 had more than one operation. The 60 pairs corresponded exactly in their sex distribution (C.1.), closely as far as age on admission (C.2) and the period of admission prior to operation (C.3) were concerned. This matching, of course, had been designed. By examination of the case records the leucotomized and control groups thus selected were, however, shown to be comparable also as far as:

1. Total length of previous admissions to Runwell Hospital (C.4).
  2. Total length of previous admissions to other mental hospitals (C.5).
  3. Civil state (single, married, etc.) (C.6)
  4. Occupational record as far as stability is concerned (C.6)
  5. Family history of mental illness and suicide (C.6)
  6. Type of school attended and progress (C.7)
  7. Heterosexual attainment—a history of heterosexual friendships, an engagement, etc. (C.7)
  8. Intemperate habits (C.7)
  9. Personality type (C.7)
  10. Age at onset of first symptoms (C.8)
  11. Type of onset of symptoms—acute or insidious (C.8)
  12. Response to electroplexy (C.8)
  13. The number of remissions in the illness (C.9)
  14. The occlusive index (C.9)
  15. The immobility index (C.9)
  16. The mean weight (in pounds) on admission and at the operation date (C.9)
- were concerned.

The “occlusive index” was designed by the Columbia Greystone second group (Mettler *et al.*, 1952) as a prognostic test, as was explained in a later paper (Mettler *et al.*, 1954), because “cases with pre-operative histories of interrupted institutionalization had better chances of post-operative release than did cases having equally long (and even shorter) histories of institutionalization without any extramural intervals”. This positive prognostic sign was called “mobility” (Crandell *et al.*, 1954) and the index was designed to measure it. The index is obtained (Mettler, 1952, p. 317) by “dividing the sum of the months all patients in a group have been institutionalized by the sum of the number of all interruptions occurring in the records of institutionalization”. An “interruption” was defined as “an absence from the hospital lasting 14

days or longer" (Crandell, 1954). The index may, of course, also be used to assess the prognostic potentiality of a control group and, indeed, Mettler (1952) used it in this way.

The "immobility index" (Crandell *et al.*, 1954) is a finer measure using the same principles but allegedly suitable for individual cases. It has been validated in a large series of patients admitted in 1939 to New Jersey State Hospital and followed to determine outcome for 13 years. "The immobility index for individuals is obtained by dividing the total number of days of hospitalization within the first two years after the first admission by the number of moves into hospital, counting the first admission as move 1". A fourteen day break again counts as a discharge. Crandell *et al.* (1956) later conceded that the index might be calculated in months and not days.

Finally a comparison of physical treatments used on the leucotomy and control groups before operation date was undertaken (C.8) and this showed similarity in the frequencies of employment of five of the six treatments considered. As far as prolonged narcosis was concerned a significantly larger number of leucotomies had thus been treated than controls. Whether this is meaningful or not it is difficult to say. Two facts should be first considered. By chance in a large number of comparisons some (1 in 20 if the 5 per cent. level of confidence is used) may be expected to appear significant.

Secondly the "operation date" for the controls was merely an arbitrary point in time. If the *total* treatment in both groups before and after operation date is examined there are no significant differences in the number treated or the type of treatment given.

#### B. Behaviour Ratings

In order that an accurate comparison might be made of behaviour in the two groups the method of time sampling was used. Each patient's behaviour was studied from the case records for three months after admission. This period was selected as the patients had then been submitted to the same procedure and therefore this period of time was equally meaningful to both groups. Secondly, psychiatric notes tend to be much more detailed in the early days after admission and to become progressively more routine thereafter.

The behaviour rating was based on the Malamud-Sands Scale (1947) but the items were adapted in the light of Runwell Hospital case records which are written according to a fairly uniform pattern and thus provide fairly uniform information.

It will be seen that this time sampled behaviour record (C.10, etc.) shows the leucotomy and control groups to be comparable in:

1. General appearance (C.10).
2. Motor activity (C.10).
3. Aggressiveness (C.10).
4. Suicidal inclination (C.10).
5. Sleep rhythm (C.10).
6. Socialization (C.11).
7. Attention (C.11).
8. Speech (C.11).
9. Nutrition (C.11).
10. Hospital work undertaken (C.12).

11. Mood (C.12).
12. Affect (C.12).
13. Awareness (C.12).
14. Presence of thought disorder (C.13).
15. All categories of thought content studied except delusions (C.13).

Delusions were expressed more frequently by the leucotomized group. Once again it must be borne in mind that this could be a chance difference.

In summary, it is clear that the two groups matched for four leading factors are closely comparable in about thirty other ways which are said to have prognostic implications.

*C. Results*

The general results (C.14) show leucotomy to offer no advantage in the treatment of schizophrenia. A larger number of discharges in the leucotomy group is counter-balanced by a larger number of re-admissions. The total period spent in Runwell (C.15) after operation and in all mental hospitals (C.16) is comparable in the treated and untreated groups. Finally (C.17) just as many leucotomized patients required physical treatments after operation as did the controls. The position of the patient from three months to ten years after operation date as far as discharge and death are concerned is shown in the histogram (Fig. 1).

NUMBERS DISCHARGED (TRACED & UNTRACED) UNDISCHARGED & DEAD IN LEUCOTOMY & CONTROL GROUPS MATCHED FOR SCHIZOPHRENIA, AGE, SEX & CHRONICITY 3/12-10 YEARS AFTER OPERATION

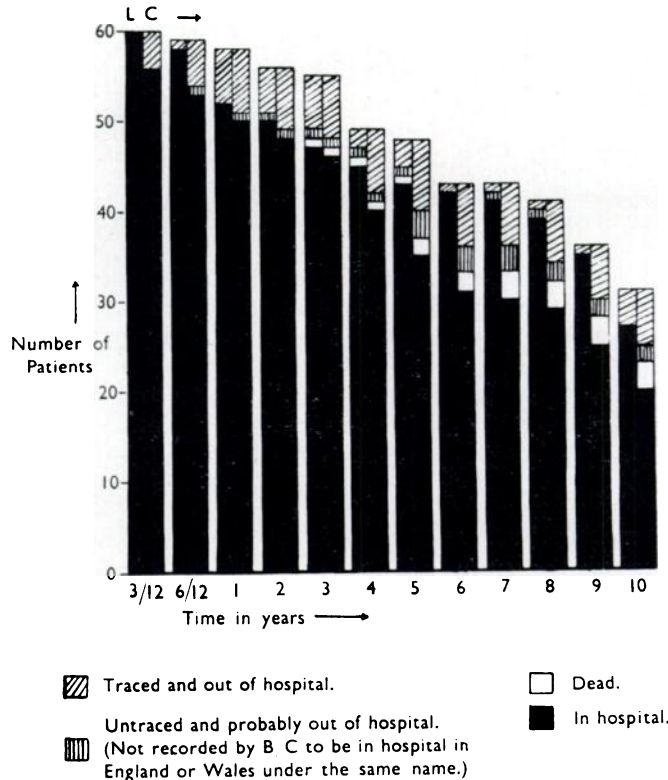


FIG. 1



#### D. *Post-operative Health*

Items considered here (C.18) have been recorded in the case sheets. It is fairly safe to assume that major illnesses are all noted. A good deal of minor ill-health is, even if discovered, often not recorded. It is clear that the epilepsy in the leucotomy series results from the operation. No other items of ill-health (and even certain obvious combinations of these) produce significant differences between the two groups. The incidence of post-operative epilepsy in this group would be 18 per cent.—a high figure reflecting the long follow up.

#### E. *Weight*

As is common in mental hospitals, patients in Runwell Hospital have their weight recorded on admission and thereafter monthly. It has already been stated that the leucotomy and control groups had comparable mean weights on admission and at the operation date. The patient's weight was now extracted from the record from six months to ten years after operation depending on how long the patient remained resident, and expressed as a percentage of the weight at the date of operation. An arbitrary percentage (105 per cent.) was chosen (1) on the basis of inspection of the tables, and (2) because gains greater than this represented roughly a gain of more than 6 pounds on the basis of the mean weights recorded. The results are presented in detail (C.19) and for easy inspection (C.20). It is clear that for roughly two years in diminishing degree larger numbers of the leucotomy patients show significant gains in weight. Thereafter there is no difference in the evidence collected in the two groups. This might have been because the fat leucotomies are discharged and corpulence is a peculiarly favourable prognostic sign of leucotomy. In fact, the evidence (C.21) is against this and patients who showed a significant gain in weight six months post-operatively were equally divided between the never-discharged and discharged groups. By the falling away of the effect after the lapse of time from operation it looks as if the gain in weight is related to the operation.

Experience with insulin (Lipschutz, 1939) is apposite here and while the gain may be some physical (?hypothalamic) effect it may equally be due to special nursing in the period after operation.

#### F. *Hospital Behaviour*

Hospital behaviour has been studied by using the rating scale already described. Initial ratings were made from the case records as before. Ratings of current behaviour were made by the charge nurses of the patient's ward in June, 1957. To obviate bias here, the rating scales were issued through the psychology department where some totally different research on schizophrenia, quite unconnected with leucotomy, had been in progress for over a year. The charge nurses were led to believe that the rating scale was part of this project. Forty-three leucotomy patients and 38 controls were still in hospital on the date mentioned. The ratings show that leucotomy does not appear to alter:

1. General appearance (C.22).
2. Motor activity (C.22).
3. Aggressiveness (C.22).
4. Suicidal inclinations (C.22).
5. Socialization (C.22).
6. Attention (C.23).

7. Speech (C.23).
8. Nutrition (C.23).
9. Sleep (C.23).
10. Mood (C.23).
11. Affect (C.24).
12. Awareness (C.24).
13. Thought disorder (C.24).
14. Thought content (C.24).

More leucotomized patients, however, were employed in occupational therapy and fewer controls were so employed. (For  $n=1$ ;  $\chi^2=4.6$ ;  $p < .05$ .) This may be a chance finding, an isolated improvement resultant on leucotomy or perhaps the continuation of a habit established in the period of rehabilitation. At any rate, the control patients who no longer attend occupational therapy appear to have been directed into ward work and into the utility departments, both of which, being remunerative employment, are rated as better adjustments than occupational therapy in the hospital.

(b) 19 PAIRS MATCHED FOR SEX, AGE ON ADMISSION, LENGTH OF ADMISSION AND AFFECTIVE DISORDERS

There is no significant difference in the results (C.28) of two groups matched as above (C.25 et seq.).

(c) 12 PAIRS MATCHED FOR SEX, AGE ON ADMISSION, LENGTH OF ADMISSION AND DEPRESSIVE REACTION

There is no significant difference in the results (C.32) of two groups matched as above (C.29 et seq.).

C.1

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

(a) Sex Distribution

	Single Leucotomies	Controls	Multiple Leucotomies	Controls	Total Leucotomies	Total Controls
Men .. ..	15	15	1	1	16	16
Women .. ..	37	37	7	7	44	44
Total .. ..	52	52	8	8	60	60

C.2

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

(b) Age Distribution

Age on Admission	Single Leucotomies	Controls	Multiple Leucotomies	Controls	Total Leucotomies	Total Controls
16-20 .. ..	5	2	2	2	7	4
21-30 .. ..	24	24	6	6	30	30
31-40 .. ..	20	23	0	0	20	23
41-50 .. ..	2	2	0	0	2	2
51-60 .. ..	1	1	0	0	1	1
61-70 .. ..	0	0	0	0	0	0
Total .. ..	52	52	8	8	60	60

## C.3

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## (c) Chronicity

Period from Admission to Operation Date	Single Leucotomies	Controls	Multiple Leucotomies	Controls	Total Leucotomies	Total Controls
<1/12 ..	2	1	0	0		
3/12 ..	0	0	0	0		
6/12 ..	2	3	0	0	15	16
1 year ..	1	5	2	1		
2 years ..	7	4	1	2		
3 years ..	5	4	1	1		
4 years ..	5	5	0	0		
5 years ..	5	2	0	0	45	44
10 years ..	22	25	2	2		
+10 years ..	3	3	2	2		
Total ..	52	52	8	8	60	60

## C.4

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## (c) Chronicity

Total Period	Previous Admissions to Runwell Hospital		Controls	Total
	Leucotomies	Total		
<1/12 ..	0		2	
3/12 ..	0		2	
6/12 ..	4	14	3	18
1 year ..	4		7	
2 years ..	6		4	
3 years ..	0		1	
4 years ..	0		0	
5 years ..	0	0	0	1
10 years ..	0		0	
+10 years ..	0		0	
Not previously admitted		46		41
Total ..		60		60

## C.5

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## (c) Chronicity

Total Period of Admission	Prior Admissions to Other Hospitals		Controls	Total
	Leucotomies	Total		
<1/12 ..	1		3	
3/12 ..	1		3	
6/12 ..	0		3	
1 year ..	5		7	
2 years ..	4		4	
	-	11	-	20
3 years ..	4		1	
4 years ..	3		2	
5 years ..	1		0	
10 years ..	7		11	
+10 years ..	4		4	
	-	19	-	18
Not previously admitted		30		22
Total ..		60		60

C.6

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

Material Excerpted from Case Records

	Leucotomies	Controls
<b>Civil State:</b>		
Single .. .. .	46	49
Married .. .. .	14	9
Separated .. .. .	0	2
<b>Occupational Record:</b>		
Stable .. .. .	22	19
Unstable .. .. .	16	14
No information .. .. .	22	27
<b>Family History:</b>		
Parents ill and in mental hospital .. .. .	5	5
Parents ill and no mental hospital .. .. .	7	6
Suicide .. .. .	1	1
"Others" ill and in mental hospitals .. .. .	6	8
"Others" ill and no mental hospitals .. .. .	5	8
Suicide .. .. .	1	1
No family history .. .. .	25	22
No information .. .. .	6	9
1st degree relatives in mental hospital or suicide .. .. .	10	6
2nd degree relatives in mental hospital or suicide .. .. .	4	7

C.7

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

Material Excerpted from Case Records

	Leucotomies	Controls
<b>School attended:</b>		
Elementary .. .. .	35	36
Central .. .. .	2	4
Grammar .. .. .	7	5
Private tutor, "Special", Orphanage, etc. .. .. .	7	7
No information .. .. .	9	8
"Backward" .. .. .	7	9
<b>Heterosexual attainment:</b>		
Friendship .. .. .	10	10
Engagement .. .. .	3	2
Marriage .. .. .	14	11
No friendships .. .. .	19	18
No information .. .. .	14	19
<b>Habits:</b>		
Intemperance mentioned, sexual licence, alcohol .. .. .	7	4
<b>Personality:</b>		
Extraverted .. .. .	18	12
Introverted .. .. .	30	30
No information .. .. .	12	18

C.8

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

Material Excerpted from Case Records

	Leucotomies	Controls
<b>Age at onset of first symptom:</b>		
Less than 20 years .. .. .	17	11
21-30 years .. .. .	32	38
31-40 years .. .. .	11	8
No information .. .. .	0	3

## C.8 (continued)

	Leucotomies	Controls
Type of onset:		
Acute (symptoms less than 3/12 duration) .. .. .	15	9
Insidious .. .. .	31	33
No information .. .. .	14	18
Physical treatments before operation:		
Electroplexy .. .. .	38	35
Leptazol .. .. .	23	20
Insulin shock .. .. .	29	23
Modified insulin .. .. .	3	5
Prolonged narcosis .. .. .	17	6
Drugs, etc. .. .. .	4	7
E.C.T. Response:		
Good .. .. .	6	5
Fair .. .. .	8	14
Poor .. .. .	25	22
Not used .. .. .	22	19

## C.9

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## Material Excerpted from Case Records

	Leucotomies	Controls
Remissions in history:		
0 .. .. .	35	34
1 .. .. .	13	14
2 .. .. .	5	6
3 .. .. .	2	1
>3 .. .. .	3	2
No information .. .. .	2	3
Occlusive index .. .. .	135.5	131.1
Immobility index (in months) .. .. .	17.87 ± 9.05	17.87 ± 7.47
Mean weight in lbs.:		
On admission .. .. .	117.4 ± 20.6	122.0 ± 26.6
At date of operation .. .. .	116.9 ± 20.0	119.5 ± 18.6

## C.10

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## Time Sampled Behaviour Record

## (Behaviour exhibited in first 3 months after admission)

	Leucotomies	Controls
Appearance:		
Neat .. .. .	30	35
Untidy .. .. .	30	25
Motor Activity:		
Excited .. .. .	15	17
Normal .. .. .	28	34
Stuporose .. .. .	17	9
Aggressiveness:		
Aggressive .. .. .	32	24
Normal .. .. .	9	19
Withdrawn .. .. .	9	17
Suicidal:		
Attempt .. .. .	3	3
Ideas .. .. .	0	1
Nil .. .. .	57	56
Sleep:		
Insomnia .. .. .	10	6
Normal .. .. .	50	54

## C.11

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## Time Sampled Behaviour Record

(Behaviour exhibited in first 3 months after admission)

								Leucotomies	Controls
<b>Socialization:</b>									
Mixing	..	..	..	..	..	..	..	7	15
Solitary	..	..	..	..	..	..	..	53	45
<b>Attention:</b>									
Alert	..	..	..	..	..	..	..	27	24
Dull	..	..	..	..	..	..	..	33	36
<b>Speech:</b>									
Garrulous	..	..	..	..	..	..	..	10	11
Normal	..	..	..	..	..	..	..	31	31
Mute	..	..	..	..	..	..	..	19	18
<b>Nutrition:</b>									
Bulimia	..	..	..	..	..	..	..	2	0
Normal	..	..	..	..	..	..	..	44	51
Anorexia	..	..	..	..	..	..	..	12	9
No information	..	..	..	..	..	..	..	2	0

## C.12

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## Time Sampled Behaviour Record

(Behaviour exhibited in first 3 months after admission)

								Leucotomies	Controls
<b>Hospital work:</b>									
Occupational therapy	..	..	..	..	..	..	..	21	19
Ward	..	..	..	..	..	..	..	10	14
Utility department	..	..	..	..	..	..	..	1	3
Unemployed	..	..	..	..	..	..	..	23	18
No information	..	..	..	..	..	..	..	5	6
<b>Mood:</b>									
Euphoric	..	..	..	..	..	..	..	8	7
Normal	..	..	..	..	..	..	..	35	32
Depressed	..	..	..	..	..	..	..	17	21
<b>Affect:</b>									
Apathy	..	..	..	..	..	..	..	26	34
Normal	..	..	..	..	..	..	..	15	14
Tension	..	..	..	..	..	..	..	17	12
No information	..	..	..	..	..	..	..	2	0
<b>Awareness:</b>									
Confusion	..	..	..	..	..	..	..	30	31
Sensorially clear	..	..	..	..	..	..	..	27	25
No information	..	..	..	..	..	..	..	3	4

## C.13

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## Time Sampled Behaviour Record

(Behaviour exhibited in first 3 months after admission)

								Leucotomies	Controls
<b>Thought disorder:</b>									
Present	..	..	..	..	..	..	..	56	49
Absent	..	..	..	..	..	..	..	2	9
No information	..	..	..	..	..	..	..	2	2
<b>Content:</b>									
Hallucinations	..	..	..	..	..	..	..	42	37
Delusions	..	..	..	..	..	..	..	44	28
Ideas of reference	..	..	..	..	..	..	..	12	9
"Dilapidation"	..	..	..	..	..	..	..	6	8
Hypochondriasis	..	..	..	..	..	..	..	0	2



## C.14

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## General Results

	Single Leuco- tomies	Con- trols	Multiple Leuco- tomies	Con- trols	Total Leuco- tomies	Total Con- trols
<b>Never Discharged*:</b>						
Men .. .. .	10	14	1	1	11	15
Women .. .. .	24	25	4	5	28	30
	—	—	—	—	—	—
Total .. .. .	34	39	5	6	39	45
<b>Discharged and Re-admitted†:</b>						
Men .. .. .	2	0	0	0	2	0
Women .. .. .	6	2	2	1	8	3
	—	—	—	—	—	—
Total .. .. .	8	2	2	1	10	3
<b>Discharged and out of Runwell Hospital:</b>						
Men .. .. .	2	1	0	0	2	1
Women .. .. .	7	8	1	1	8	9
	—	—	—	—	—	—
Total .. .. .	9	9	1	1	10	10
<b>Transfers:</b>						
Both sexes .. .. .	1	2	0	0	1	2
	—	—	—	—	—	—
Grand Total .. .. .	52	52	8	8	60	60
<b>Died:</b>						
1st admission* .. .. .	1	4	0	1	1	5
Subsequent admission† .. .. .	1	0	0	0	1	0

## C.15

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

## Total Period Spent in Runwell Hospital since Operation Date

Total Period	Leucotomies	Total	Controls	Total
<1/12 .. .. .	1		2	
3/12 .. .. .	1		2	
6/12 .. .. .	1	10	2	13
1 year .. .. .	2		4	
2 years .. .. .	5		3	
3 years .. .. .	4		3	
4 years .. .. .	3		8	
5 years .. .. .	3	50	4	47
10 years .. .. .	18		13	
+10 years .. .. .	22		19	
	—	—	—	—
Total .. .. .		60		60

C.16

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

Total Period Spent in Mental Hospitals since Operation Date

	Total Period	Leucotomies	Total	Controls	Total
1/12 .. ..	1	2			
3/12 .. ..	0	2			
6/12 .. ..	0	2	7		12
1 year .. ..	2	2			
2 years .. ..	4	4			
3 years .. ..	3	3			
4 years .. ..	3	7			
5 years .. ..	4	5	53		48
10 years .. ..	18	13			
+10 years .. ..	25	20			
Total .. ..			60		60

C.17

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

Post-operative Results During Further Stay in Runwell Hospital

	Treatment	Leucotomies	Controls
E.C.T. .. ..		23	17
Leptazol .. ..		9	6
I.S.T. .. ..		0	0
M.I. .. ..		0	1
P.N. .. ..		0	3
Drugs, etc. .. ..		8	1

C.18

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

Post-operative Results During Further Stay in Runwell Hospital

	Health	Leucotomies	Controls	n=1 $\chi^2$
Epileptic seizures .. ..		11	0	9.9
Chronic suppurative otitis media .. ..		3	1	1.2
Cellulitis .. ..		3	1	
T.B. cervical glands .. ..		1	0	
Pulmonary abscess: bronchopneumonia .. ..		1	1	
P.T.B. .. ..		0	4	2.25
Appendicitis .. ..		1	1	
Impetigo .. ..		0	1	
Enuresis .. ..		1	0	
Anaemia .. ..		2	3	
Infestation—worms .. ..		0	3	1.4
Rectal prolapse .. ..		1	0	
Megacolon .. ..		0	1	
Syncope .. ..		1	1	
Herpes zoster .. ..		1	0	
Hypertension .. ..		1	1	
Glaucoma .. ..		1	0	
Fibroids .. ..		0	1	
Carcinoma .. ..		1	1	
Osteoarthritis .. ..		1	1	

C.19  
*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*  
 Post-operative Results During Further Stay in Runwell Hospital

Weight Per cent.	Leucotomies					Controls				
	6/12	1 Year	2 Years	5 Years	10 Years	6/12	1 Year	2 Years	5 Years	10 Years
<80	0	0	0	1	0	1	0	1	1	0
-85	0	0	1	0	1	0	2	1	0	1
-90	3	1	3	1	0	2	2	2	6	0
-95	4	4	6	2	1	3	3	9	3	1
-100	8	8	5	6	2	20	19	16	5	5
-105	11	11	6	3	4	17	11	3	6	5
-110	9	7	3	6	2	7	8	9	5	0
-115	7	10	10	6	4	1	4	5	3	1
-120	6	3	5	3	1	2	0	1	3	1
-125	2	5	3	3	1	0	1	2	0	0
+125	3	3	7	7	7	0	1	0	4	5
No information	7	8	11	22	37	8	9	11	24	41

*Weight:* Post-operative weight of each patient expressed as percentage of weight at date of operation:

$$\frac{\text{Post-operative weight (lbs.)}}{\text{Operation weight (lbs.)}} \times 100$$

C.20  
*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*  
 Post-operative Results During Further Stay in Runwell Hospital  
 Extract to Show Significant Gains in Weight

Period After Operation	Percentage Change	Leucotomies	Controls	n	$\chi^2$	p
6/12 after operation	<105	26	42	2	13	<0.001
	>105	27	10			
	No information	7	8			
1 year after operation	<105	24	37	2	7.49	<0.02
	>105	28	14			
	No information	8	9			
2 years after operation	<105	21	32	1	4.1	<0.05
	>105	28	17			
	No information	11	11			
5 years after operation	<105	13	21	1	3.4	>0.05
	>105	25	15			
	No information	22	24			
10 years after operation	<105	8	12	1	2.32	0.3
	>105	15	7			
	No information	37	41			

C.21  
*Significant Weight Gain at 6/12 Post-operation in Relation to Discharge in 60 Schizophrenics Treated with Leucotomy*

	<105% Weight at Operation	>105% Weight at Operation	Total
Discharged at some time from hospital	10	10	20
Never discharged	16	24	40
<b>Total</b>	<b>26</b>	<b>34</b>	<b>60</b>
n=1	$\chi^2=0.2$	P=0.9	

## C.22

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

Results as far as Behaviour Rating is concerned in Survivors in Hospital (in June, 1957), Comparing 43 Leucotomy Patients with 38 Controls and Showing Change in Behaviour from Admission ("Before Operation") to June, 1957 ("After Operation"). Ratings in June, 1957 Estimated by Nursing Staff. Ratings on Admission from Case Records by Author

Behaviour Rating	Leucotomies		Controls		For n=1 $\chi^2$
	Before Operation	After Operation	Before Operation	After Operation	
<b>Appearance:</b>					
Neat .. ..	20	17	21	15	0.2
Untidy .. ..	23	26	17	23	
<b>Motor Activity:</b>					
Excited .. ..	12	24	11	17	0.2
Normal .. ..	22	17	21	15	
Stuporose .. ..	9	2	6	6	
<b>Aggressiveness:</b>					
Aggressive .. ..	23	29	15	14	0.75
Normal .. ..	15	7	12	11	
Withdrawn .. ..	5	7	11	13	
<b>Suicidal:</b>					
Attempt .. ..	1	0	1	0	
Ideas .. ..	0	0	0	0	
Nil .. ..	42	43	37	38	
<b>Socialization:</b>					
Mixing .. ..	5	11	6	5	0.8
Solitary .. ..	38	32	32	33	
<b>Attention:</b>					
Alert .. ..	20	18	13	10	
Dull .. ..	23	25	25	28	

## C.23

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

Behaviour Rating	Leucotomies		Controls		For n=1 $\chi^2$
	Before Operation	After Operation	Before Operation	After Operation	
<b>Speech:</b>					
Garrulous .. ..	8	14	6	9	
Normal .. ..	23	22	19	18	
Mute .. ..	12	7	13	11	
<b>Nutrition:</b>					
Bulimia .. ..	2	0	0	0	
Normal .. ..	33	42	31	37	
Anorexia .. ..	8	1	7	1	
<b>Sleep:</b>					
Insomnia .. ..	8	8	2	3	
Normal .. ..	35	35	36	35	
<b>Hospital Work:</b>					
<b>Occupational</b>					
Therapy .. ..	15	19	13	3	4.6
Ward .. ..	8	14	10	17	
Utility .. ..	0	0	3	8	
Unemployed .. ..	18	10	11	10	0.2
No information	2	0	1	0	

## C.23 (continued)

Behaviour Rating	Leucotomies		Controls		For n=1 $\chi^2$
	Before Operation	After Operation	Before Operation	After Operation	
Mood:					
Euphoric ..	8	14	5	9	
Normal ..	23	21	18	18	
Depressed ..	12	8	15	11	
Affect:					
Tension ..	11	10	5	5	
Normal .. ..	22	11	8	10	
Apathy ..	18	22	25	23	
No information	2	0	0	0	

## C.24

*Sixty Pairs Matched for Sex, Age, Chronicity and Schizophrenia*

Behaviour Rating	Leucotomies		Controls		For n=1 $\chi^2$
	Before Operation	After Operation	Before Operation	After Operation	
Awareness:					
Confusion ..	21	15	20	19	
Sensorially clear	19	28	18	19	
No information	3	0	8	0	
Thought Disorder:					
Present ..	42	34	31	34	0.6
Absent .. ..	0	9	5	4	
No information	1	0	2	0	
Content:					
Hallucinations	31	21	27	22	0.1
Delusions ..	35	19	17	17	1.3
Ideas of reference	5	5	5	1	
Hypochondriasis	0	2	1	0	
Phobias ..	0	2	0	2	
Obsessions and compulsions	0	8	0	7	

## C.25 AND C.26

*Nineteen Pairs Matched for Sex, Age on Admission, Length of Admission and Affective Disorder*

## C.25 Sex Distribution

	Sex					Leucotomies	Controls
	Male	Female	..	..	..		
Male .. ..	..	..	..	..	..	2	2
Female .. ..	..	..	..	..	..	17	17
Total .. ..	..	..	..	..	..	19	19

## C.26 Age Distribution

	Age on Admission					Leucotomies	Controls
	-40	-50	-60	+60	..		
-40 .. ..	..	..	..	..	..	2	4
-50 .. ..	..	..	..	..	..	0	1
-60 .. ..	..	..	..	..	..	12	10
+60 .. ..	..	..	..	..	..	5	4
Total .. ..	..	..	..	..	..	19	19

C.27

*Nineteen Pairs Matched for Sex, Age on Admission, Length of Admission and Affective Disorder*

Length of Admission to Operation Date

Length of Admission						Leucotomies	Controls
-1/12	..	..	..	..	..	8	7
-3/12	..	..	..	..	..	1	3
-6/12	..	..	..	..	..	1	0
-1 year	..	..	..	..	..	3	1
-2 years	..	..	..	..	..	2	2
-3 years	..	..	..	..	..	2	3
-4 years	..	..	..	..	..	1	2
-5 years	..	..	..	..	..	0	1
-10 years	..	..	..	..	..	0	0
+10 years	..	..	..	..	..	1	0
Total	..	..	..	..	..	19	19

C.28

*Nineteen Pairs Matched for Sex, Age on Admission, Length of Admission and Affective Disorder Results*

Results						Leucotomies	Controls
Never discharged	..	..	..	..	..	5	7
(Died during 1st admission)	..	..	..	..	..	(2)	(3)
Discharged	..	..	..	..	..	11	12
Re-admitted	..	..	..	..	..	5	5
Not re-admitted	..	..	..	..	..	6	7
(Died on subsequent re-admission)	..	..	..	..	..	(1)	(0)
Transferred	..	..	..	..	..	3	0
Total	..	..	..	..	..	19	19

C.29 AND C.30

*Twelve Pairs Matched for Sex, Age on Admission, Length of Admission and Depression*

C.29 Sex Distribution

Sex						Leucotomies	Controls
Male	..	..	..	..	..	1	1
Female	..	..	..	..	..	11	11
Total	..	..	..	..	..	12	12

C.30 Age Distribution

Age on Admission						Leucotomies	Controls
-40	..	..	..	..	..	0	2
-50	..	..	..	..	..	2	1
-60	..	..	..	..	..	7	6
+60	..	..	..	..	..	3	3
Total	..	..	..	..	..	12	12



## C.31

*Twelve Pairs Matched for Sex, Age on Admission, Length of Admission and Depression*

Length of Admission to Operation Date						Leucotomies		Controls	
Length of Admission									
-1/12	..	..	..	..	..	6		5	
-3/12	..	..	..	..	..	1		3	
-6/12	..	..	..	..	..	1	10	0	11
-1 year	..	..	..	..	..	1		1	
-2 years	..	..	..	..	..	1		2	
-3 years	..	..	..	..	..	2		0	
-4 years	..	..	..	..	..	0	2	1	1
Total	..	..	..	..	..	12	12	12	12

## C.32

*Twelve Pairs Matched for Sex, Age on Admission, Length of Admission and Depression Results*

Results						Leucotomies		Controls	
Never discharged	..	..	..	..	..	3		3	
(Died during 1st admission)	..	..	..	..	..		(1)		(1)
Discharged	..	..	..	..	..	9		9	
Re-admitted	..	..	..	..	..	4		2	
Not re-admitted	..	..	..	..	..	5		7	
(Died on subsequent re-admission)	..	..	..	..	..		(1)		
Transferred	..	..	..	..	..	0		0	
Total	..	..	..	..	..	12		12	

## SUMMARY AND CONCLUSIONS

A. (i) Groups matched for schizophrenia, sex, age on admission and length of admission are also shown to be comparable as far as:

1. Total length of previous admissions to Runwell Hospital.
2. Total length of previous admissions to other mental hospitals.
3. Civil state (single, married, etc.).
4. Occupational record as far as stability is concerned.
5. Family history of mental illness and suicide.
6. Type of school attended and progress.
7. Heterosexual attainment—a history of heterosexual friendships, an engagement, etc.
8. Intemperate habits.
9. Personality types.
10. Age at onset of first symptoms.
11. Type of onset of symptoms—acuteness, etc.
12. Response to electroplexy.
13. Number of remissions in the illness.
14. Occlusive index.
15. Immobility index.
16. Mean weight (in pounds) on admission and at operation date.

(ii) A behaviour rating scale also showed the leucotomy and control groups to be comparable as far as 15 items of behaviour were concerned.

(iii) The therapeutic results of leucotomy in schizophrenia comparing treatment and control groups matched as above are shown as temporary.

(iv) The incidence of epilepsy after leucotomy is markedly higher than in the control group.

(v) The gain in weight following leucotomy appears to disappear about two years post-operatively and is not an indication of prognosis.

(vi) Leucotomy does not significantly improve hospital behaviour in schizophrenia as measured by a behaviour scale, comparing periods before and after operation in leucotomy and control groups.

B. Leucotomy does not appear to benefit affective disorders and in particular depression, when groups are compared, matched for diagnosis, sex, age on admission and chronicity.

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