THE ELECTROENCEPHALOGRAM, OBSESSIONAL ILLNESS AND OBSESSIONAL PERSONALITY

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INTRODUCTION

A CLINICAL relationship between obsessional illness and epilepsy is unusual, but the few electroencephalographic (EEG) investigations of obsessional patients which have been published claim a high incidence of abnormal electrical activity. Records of twenty-six neurotic and five schizophrenic patients, all with obsessional symptoms, were examined by Pacella *et al.* (13), who found twenty-two of the thirty-one EEGs to be abnormal. Fourteen showed definite convulsive patterns with frequent 2–4 c.p.s. activity and increased high voltage waves after overbreathing. Rockwell and Simons (14) found only two abnormal records in eleven uncomplicated obsessional neurotics, using Gibb's criteria of normality, but of ten patients classified as psychopathic personalities with obsessional symptoms, all had abnormal EEGs although two were borderline. Their definition of psychopathic personality is not made explicit and the clinical distinction between their two groups is unclear. Jarvie (4) reports a case in which slow activity on hyperventilation in the EEG was associated with phobias and obsessional impulses preceded by a two-year history of episodes of rage.

These findings, if valid, are important and exceptional, because in neurosis in general such a high incidence of EEG abnormality has not been found. The relationship has therefore been investigated again in a series of obsessional patients, all of whom had been admitted to a mental hospital. Such a sample comprises severe and often chronic cases and would be expected to show EEG abnormalities more often and obviously than a less biased sample of obsessional patients in the general population.

Other work suggested that the relationship between the obsessional personality and EEG variables was equally worth investigating. Attempts to correlate EEG variables with personality traits have had limited success (Mundy-Castle, 12; Saul, 16; McAdam *et al.*, 8, 9, 10). Mundy-Castle (12) used the terms primary and secondary functioning in considering personality and related them to high and low alpha frequencies respectively. People with "primary functioning" are said to be quick, impulsive, variable and highly stimulable, while those with "secondary functioning" are slow, cautious and steady. McAdam and Orme (9), working with a group of alcoholics, found an activity-passivity dichotomy corresponding to low and high alpha index, and found a positive correlation between low alpha frequency and high alpha index, thus relating their findings on both EEG and personality grounds to

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those of Mundy-Castle. Saul *et al.* (16) studying patients in the course of psychoanalysis considered a high alpha index to be associated with a passive, submissive, dependent and receptive attitude; while a low alpha index was associated with a consistent, directed drive to activity. McAdam (10) has suggested that "secondary functioning" would imply a tendency to rumination and perhaps to obsessional thinking. If this is so a series of obsessional patients would be expected to contain a preponderance of records with low alpha frequencies and high alpha indices, or if underlying personality were to be more important than symptoms, this trend would be seen in those patients of markedly obsessional personality.

In the dichotomies described above there is a rough agreement that activity and passivity are important distinguishing features in relation to the type of EEG. It is of interest that Lewis (6), dissatisfied with the conventionally described personality traits of the obsessional, observed two types of personality in chronic severe obsessionals who had had symptoms since childhood. One he described as "submissive, vacillating, uncertain", the other as "obstinate, morose, irritable". It is clear that these two types of personality can be regarded as closely connected with the dichotomies just discussed.

To summarize, it was expected from previous findings that a group of obsessional in-patients would show a high incidence of EEG abnormalities, and would show a tendency to high alpha index, or that those with markedly obsessional personalities would show such a tendency. Those patients with the obstinate, morose, irritable traits described by Lewis should have a low alpha index and those in his second group (submissive, vacillating, uncertain) should have a high alpha index.

Method

The thirty subjects were in-patients showing predominantly obsessional symptomatology: obsessional states in the broadest sense. The absence of out-patients implies that the cases were of some severity; in fact, many were chronic. They were divided into five diagnostic categories:

1. Obsessional-compulsive neurosis. A classical or nuclear group, typifying the textbook description and showing obsessional and compulsive symptoms in a sustained symptom complex with no evidence of psychotic disturbance of thought or mood, organic nervous disease or other neurotic symptoms. Cases in any way atypical were automatically and strictly excluded from this group.
2. Obsessional-ruminative neurosis. Those cases with predominantly phobic and ruminative symptoms with minimal or absent motor signs and no psychotic or organic signs. As in (1) atypical cases were excluded.
3. Doubtfully schizophrenic. Those cases in which symptoms suggestive of schizophrenia were found in combination with obsessional symptoms. Many such diagnostic problems arise in the obsessional states found in mental hospital practice and the diagnosis is only clarified by the passage of time. The category has a precedent in the work of Rüdin (15).
4. With affective features. Those cases in which obsessional symptoms were associated with a sustained mood change, invariably depressive. The category was designed to explore the borderland between obsessional illness and endogenous depression: the "endogenous obsessional neurosis" of Mayer-Gross *et al.* (7).

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5. Miscellaneous. This group contained one patient with epilepsy, one with arteriosclerotic dementia and one with hysterical symptoms.

Twenty-two of the patients belonged to groups 1 and 2 and were therefore typical cases of obsessional neurosis, while the remaining eight were atypical.

In assessing obsessional personality seven features mentioned by Lewis (6) as characteristic of the obsessional personality were taken into account: excessive cleanliness, orderliness, pedantry, conscientiousness, uncertainty, inconclusive thinking and acting, and fondness for collecting things. "Marked obsessional traits" represent the presence of five or more of these, "slight" the presence of two to four, and "not obsessional" less than two. The two clusters of traits described by Lewis were scored as present or not applicable.

The recordings were made on a standard 8-channel machine, the only refinement being the use of a band-pass filter (Morris and Dawe, 11) to obtain a more accurate measurement of alpha activity than would have been possible by visual analysis alone. Microvoltage, frequency and distribution were estimated for slow activity (delta—less than 4 c.p.s., and theta—4–7 c.p.s.), alpha activity (8–13 c.p.s.) and fast activity (beta—14–30 c.p.s.). Using the band-pass filter an estimate was made of alpha index. This index expresses as a percentage the duration of time in which alpha activity is apparent; an index of 100 would signify continuous alpha and an index of zero that no alpha activity was visible.

The clinical and electroencephalographic investigations were made independently by the authors and the findings of one were not known to the other until the series was completed.

Results

1. *EEG Abnormalities*

Twenty-three of the 30 records were within normal limits (Table I). In

Table I

Incidence of EEG Abnormalities

Diagnostic Group	Normal	Mildly Dysrhythmic	Abnormal	Total
Compulsive neurosis ..	15	2	1	18
Ruminative neurosis ..	3	1	0	4
Doubtfully schizophrenic ..	0	0	1	1
Affective	2	0	0	2
Miscellaneous	3	0	2	5
Total	23	3	4	30

the three cases termed mildly dysrhythmic the abnormality in each case was the appearance of slow, generalized dysrhythmic bursts on hyperventilation. These were all minimal and were considered to be borderline.

In four cases definite abnormalities were found. In the miscellaneous group, one case was known to suffer from major epilepsy and the other showed signs of moderate arteriosclerotic dementia clinically and on psychological testing. The EEG of the epileptic unexpectedly showed a petit mal variant, that of the arteriosclerotic patient an abnormal amount of generalized slow activity and slowing of all frequencies, consistent with an organic dementia.

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The patient in the doubtfully schizophrenic group was obviously schizophrenic at follow-up two years later. The EEG showed one generalized synchronous burst of "sharp" waves in the resting record. There was no clinical evidence and no family history of epilepsy.

Among the typical patients in the first two diagnostic groups only one definitely abnormal EEG was found. The patient concerned, a woman of 43, had a long-standing obsessional compulsive neurosis which had its onset in adolescence and had run an unremitting course. The only atypical feature was her considerable irritability which frequently led to outbursts of temper when her rituals were interfered with in any way. The EEG showed several bursts of synchronous, generalized delta waves. Again there was no clinical or family history of epilepsy. The history and EEG findings are reminiscent of the case described by Jarvie (4).

2. *Alpha Index, Diagnostic Grouping and Personality Traits*

In Table II "high index" indicates an index between 55 and 100; "low index" one between 0 and 45. Two cases in which the index was between 45 and 55 have been omitted. In the group as a whole the results are quite contrary to hypothesis as low index cases are more common than high index cases. This finding is more pronounced in the typical compulsive neurotics.

TABLE II
Diagnostic Group and Alpha Index

Diagnostic Group	Alpha Index High	Alpha Index Low
Compulsive neurosis	5	12
Ruminative neurosis	2	1
Doubtfully schizophrenic	1	0
Affective	3	2
Miscellaneous	1	1
Total	12	16

In considering the relationship between personality traits and alpha index only those with normal records were included and the two cases with alpha index between 45 and 55 were again omitted. The results using all 30 cases and records do not, in any case, differ from those found with this more careful selection.

Inspection of Table III shows no correlation between obsessional personality and high or low alpha index, but in the two types of Lewis there is a tendency for the first to have a low alpha index and the second a high index, both as predicted. The correlation is small (phi-coefficient=0·34) and does not reach statistical significance (p=0·2).

TABLE III
Personality and Alpha Index

	Alpha Index High	Alpha Index Low
A. Obsessional Personality:		
Marked	4	5
Slight	4	4
Not present	2	2
B. Lewis Types (6):		
Obstinate, morose, irritable	2	5
Submissive, vacillating, uncertain	5	3
Neither applicable	3	3

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Attempts to correlate personality factors with other EEG variables, such as the presence and amount of slow and fast activity, gave negative results.

Discussion

Borderline and definite abnormalities were found in only seven of the thirty patients and if the borderline cases are rejected the number of definitely abnormal records is four or 13 per cent. of the group. To arrive at a true incidence of EEG abnormality in typical cases of obsessional neurosis it is necessary to exclude the atypical diagnostic categories, where the abnormalities were associated with clinical dementia, epilepsy and schizophrenia. There remains one abnormal record in the 22 typical cases of compulsive and ruminative neurosis, despite the fact that all these patients had symptoms severe enough to require hospital treatment. This figure suggests that the incidence of electrical abnormality in obsessional states is no different from that in other neurotics or indeed in the normal population (Lennox, Gibbs and Gibbs, 5; Hill and Watterson, 3; Williams, 17).

Our findings contradict those of the two previous series and it is pertinent to seek other evidence for or against them. No figures for the frequency of the association between epilepsy and obsessional illness have been traced. Garmany (2) reported a single case and Brickner (1) two unusual histories. In the first an epileptic's seizures were ushered in by phobias, and in the second compulsive swallowing movements were noted in the post-ictal period in a patient who had suffered from compulsive swallowing twenty years earlier. These few reports are the sole evidence for a clinical association. One of us (I.M.I.) in a series of 105 obsessional states has found only two cases of epilepsy (both grand mal). In neither was any connection between the epilepsy and the obsessional symptoms apparent and the association in each case seemed to be a chance one. The low incidence, less than 2 per cent., which compares with an incidence of approximately 0·5 per cent. in the general population, also suggests that the association is a chance one. These two observations lend support to the negative EEG findings in the present group of patients.

No connection has been found between the EEG variable chosen (alpha index) and either obsessional illness or the conventionally described obsessional personality. The suggestion that "secondary functioning" would imply a tendency to rumination and obsessional ways of thinking is unfounded, the results being contrary to those expected from this argument. The two types of personality formulated by Lewis (6), roughly corresponding to an activity-passivity division, did tend to have the predicted types of alpha index. Our results imply that specifically obsessional traits and symptoms have no relation to EEG variables but that further investigations of personality in relation to electroencephalography should continue to explore activity-passivity differences.

Summary

1. Four out of 30 patients with predominantly obsessional symptoms had definite EEG abnormalities; when atypical cases were excluded only one of twenty-two typical cases of obsessional neurosis had an abnormal record.

2. No correlations were found between alpha index and either obsessional symptoms or traits, but active personalities tended to have a low alpha index and passive personalities a high index.

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3. The relationship between obsessional illness and both epilepsy and EEG abnormality is considered to be a chance one.

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