

Mental aspects of temporal lobe epilepsy

Follow-up of 74 patients after resection of a temporal lobe

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SUMMARY Psychiatric disorders were investigated in 74 patients with drug-resistant temporal lobe epilepsy (complex partial epilepsy). In all cases unilateral anterior temporal lobectomy had been performed during the period 1960–69. At follow-up in 1970–71, 45 patients were free from seizures, and in a further group of 15 patients seizure frequency had been substantially reduced. There were four postoperative deaths. Six patients were psychiatrically normal and had no history of any such disorder. Behavioural disturbances were observed in 55 patients. Before operation 11 patients displayed schizophrenia-like psychoses, and nine others became psychotic during follow-up. Fourteen patients attempted suicide on one or more occasions. Half the patients had diminished sexual drive. Improvement in psychiatric status was clearly correlated with relief from seizures and, in those cases with only a few or no seizures after operation, led directly to social rehabilitation. The presence or absence of a psychiatric disorder was not useful as a criterion for or against surgery.

Temporal lobe epilepsy (complex partial epilepsy) is a syndrome from the borderland of psychiatric and neurological disorders—only a few patients with temporal lobe epilepsy are without psychopathological signs. In his survey of 120 patients with epilepsy, Landolt (1960) observed that while 23% (12/52) of the patients with generalised epilepsy were completely normal psychiatrically all 68 patients with psychomotor epilepsy suffered from various psychiatric disorders such as psychopathic personality, neurotic, depressive, and schizoid conditions. However, in 19 of these the changes were not permanent.

Psychiatric interest has usually focused on a possible relationship between schizophrenia and temporal lobe epilepsy. This interest was heightened by comprehensive studies (Beard, 1963; Glithero and Slater, 1963; Slater and Beard, 1963a, b; Slater and Glithero, 1963; Taylor, 1972) which showed that schizophrenia-like psychoses were found frequently in patients with temporal lobe epilepsy although only a limited number of such patients display overt psychotic symptoms. Taylor (1972) found that out of 100 patients with temporal lobe epilepsy 16 were psychotic and 13 were nor-

mal, the rest being either neurotic or psychopathic, or at least showing some psychopathic symptoms. On the other hand, in his 54 epileptic patients with temporal EEG foci, but without tumour, Bingley (1958) observed only seven patients with paranoid tendencies of whom none were described as psychotic. Twenty-eight of these patients had no observable mental disorders.

The purpose of this investigation was firstly to describe in traditional terms the categories of psychopathology related to temporal lobe epilepsy, and secondly to record the results of temporal lobectomy. The influence of aetiology, genetics, pathology, and intellect on the clinical course before and after operation was studied, and a search was made for prognostic signs which might help in making a decision for or against surgery.

Patients and methods

The present study includes 74 consecutive patients with drug-resistant temporal lobe epilepsy who, during the years 1960–1969, were submitted to unilateral anterior temporal lobe resection. They had been referred to the University Clinic of Neurosurgery, Rigshospitalet, Copenhagen, from neurological clinics all over Denmark, and from Kolonien Filadelfia, the only Danish hospital for

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the long-term treatment of epilepsy. Neither tumour nor macroscopic vascular malformation was found in any patient either at operation or during preoperative investigation. All had psychomotor attacks, with or without focal seizures, arising in the temporal lobe, and 55 of the 74 patients also had grand mal (tonic-clonic seizures). Their epilepsy was severe and, before operation, all were socially handicapped by frequent and severe seizures with or without psychiatric disturbances. In all patients a unilateral, or a predominantly unilateral, temporal spike focus was found by routine EEG scalp records, both waking and sleeping, or by records using sphenoidal electrodes.

The operation was an anterior temporal lobectomy, usually extending 55–70 mm backwards to the vein of Labbé. All operations but one were performed by the same surgeon (K. Værnet) who followed the principles laid down at the Guy's Maudsley Hospital by Falconer (Falconer *et al.*, 1955; Falconer, 1965), resecting the tip of the lobe en bloc including the mesial structures so that the whole specimen was available for histological examination.

The sample contains 43 male and 31 female patients. At the time of operation their ages ranged from 4–54 years, including 14 patients who were aged 15 years or less. The mean postoperative duration of epilepsy was more than four years.

Retrospective follow-up was carried out during 1970–71, and covered clinical, aetiological, genetic, social, neuropathological, and neuro-ophthalmological aspects (Jensen, 1975a,b,c, 1976a,b,c, 1977; Jensen and Klinken, 1976; Jensen and Seedorff, 1976; Jensen and Værnet, 1977).

PSYCHIATRIC ASSESSMENT

Psychiatric assessment was undertaken by one of the authors (IJ). The preoperative assessments were based exclusively on earlier and current case records including records from the psychiatric department of other hospitals. The postoperative assessment was a subjective evaluation by one of the authors (IJ) which was later confirmed by the other (JKL).

Various psychiatric symptoms have been grouped into clinical syndromes according to the criteria of Mayer-Gross *et al.* (1969).

Behavioural disturbances

These disturbances ranged from hyperactivity to severe aggression, and were not all identical with the definition of psychopathy described by Schneider (1971).

Patient 14, a man, aged 33 years at follow-up, had a family history of epilepsy, psychiatric disorder

(suicide, alcoholism, criminal behaviour), and mental deficiency. He had been born out of wedlock. There were several complications at birth including bleeding and premature placental separation. He was retarded and had nocturnal enuresis until he was 5 years old. He had epilepsy from the age of 19 years—both tonic-clonic and psychomotor seizures. After right temporal lobectomy at 24 years of age his epileptic seizures continued but diminished slowly during the next six years. At follow-up he had had only a few attacks in the previous two years. He was brought up in poor circumstances, and was taken into care at a very young age. He was unreliable, a liar and a thief, who played truant and was cruel to animals. At 16 years of age he killed a calf with a hammer for which he was placed in detention for several years, and later he was imprisoned for arson, embezzlement and theft. After temporal lobectomy he was repeatedly admitted to a mental hospital where his behaviour was marked by theft, arson, and assault on male nurses. With decreased frequency of his fits he became more approachable and less disturbed, and his clinical behaviour ceased.

Patient 68, a man, aged 21 years at follow-up, had a family history of neurological and psychiatric disorders (epilepsy, encephalopathia, and chronic insanity). His epilepsy—grand mal and psychomotor seizures—began at the age of 4 years, after a severe fever. After right temporal lobectomy when he was 18 years old the frequency of his fits decreased markedly, and at follow-up he had only minor psychomotor attacks at intervals of three to four months. His psychomotor development had been normal until the onset of epilepsy. At that time he was found to be mentally impaired and his behaviour became more and more deviant. He was hyperkinetic, destructive and a bully, showed a severe affective reaction, and attempted arson. At follow-up he had been psychiatrically stable for two years and had worked as a gardener's assistant for more than a year.

Schizophrenia-like psychoses

These psychoses were characterised by paranoid delusions. A detailed report is being published separately (Jensen and Larsen, in press).

Patient 11, a man, aged 19 years at follow-up, had no family history of neurological or psychiatric disease. He was born two weeks before term, labour being complicated by secondary uterine inertia. Psychomotor development was retarded, and he was 4–5 years old before he could talk. Epilepsy began at 1½ years with daily psychomotor seizures. After right temporal lobectomy at the age of 11 years he became free of seizures and anticonvulsants were discontinued when he was 13. From the age of 4 years he showed a behavioural disorder, being hyperkinetic and hot-tempered. Six years after operation he started talking to himself, became

suspicious, and lacked emotional rapport. Persecutory paranoid delusions became continuous and were interspersed with depressive episodes, followed on one occasion by a determined attempt at suicide.

Patient 44, a woman, aged 44 years at follow-up, had no family history of neurological or psychiatric disease. Her birth was normal. She had a normal psychomotor development, did well at school, and completed her education as a receptionist. Epilepsy began when she was 8 years old with petit mal attacks. From the age of 15 years she had grand mal and psychomotor seizures. After right temporal lobectomy at 38 years of age she became seizure-free. She showed no psychopathological signs until she was 34 years. Thereafter she became apathetic, lacked rapport, and was obsessed with the idea that everyone was lying to her. At 37 years she was described as psychotic with persecutory and religious delusions, aggressive behaviour, and visual and auditory hallucinations. After temporal lobectomy her psychotic symptoms improved, and disappeared after the age of 40 years.

Patient 72, a woman, aged 26 years at follow-up, had a family history of Huntington's chorea and epilepsy. Birth and psychomotor development were normal initially. From 7 to 18 years of age she had nocturnal enuresis. From the onset of epilepsy at 10 years she had increasingly frequent grand mal and psychomotor attacks, and from the age of 18 years she had many admissions to hospital because of epilepsy and psychiatric illness. After left temporal lobectomy when she was 25 years old the frequency of her fits decreased markedly, and she had no more grand mal attacks. She did well at school but, from the age of 17 years, had increasingly severe paranoid delusions which followed a period of withdrawal and depression. She believed that people were spying on her in the street and that she was receiving divine messages. She felt compelled to repeat every word that she heard spoken and to declare what she believed God was saying to her. Finally she believed that she was betrothed to Jesus and began writing long letters to him. A year after temporal lobectomy she was discharged from hospital to her parent's care, still psychotic but less troubled by her delusions.

Attempted suicide

Although a suicidal attempt is not proposed as a formal psychiatric diagnosis, it seems to us important to consider under this heading all patients with a psychiatric disorder who had made one or more attempts at suicide. The methods used included (a) self-poisoning, by drugs prescribed for epilepsy or psychiatric disease, other drugs (mostly hypnotics and minor tranquillisers), alcohol, or carbon monoxide; (b) self-inflicted arterial wounds; (c) drowning; and (d) strangulation.

Sexual aggression

This varied from mild exhibitionism to attempted rape.

Patient 15, a man, 27 years old at follow-up, had been born out of wedlock two months before term. His twin was a stillborn girl. Development was delayed, and he had nocturnal enuresis until he was 14 years old. Epilepsy started when he was aged 3 years: he had both grand mal and psychomotor seizures which ceased after operation at 19 years. Psychiatrically he was deviant and hot-tempered with aggressive and destructive behaviour. From early schooldays he was sexually active. He was an exhibitionist and masturbated in front of female schoolmates and later with male patients in hospital. He was treated with stilboestrol for 1½ years. During the first year or two after temporal lobectomy he had to be treated repeatedly for rectal and urethral bleeding, the result of self-inflicted wounds caused by the introduction of thermometers, glass tubes, and other available instruments. Later his sexuality decreased and was followed by total loss of libido.

Patient 41, a man, aged 24 years at follow-up, had a family history of epilepsy, migraine, and cerebral palsy. When he was five months old he had pneumococcal meningitis and at 18 months a minor head injury. Temporal lobe attacks began at 12 years, and at 17 years of age he underwent left temporal lobectomy. Thereafter he was seizure-free. As a small child he was hot-tempered, and from the age of 11 years he became deviant, pilfering, telling lies, and displaying affective reactions which were followed by attempted suicide. He was placed in an institution for a few years but did well at school. A year after his operation, when he was 19 years old, he was working as a baker's apprentice when he suddenly attacked his employer's wife and attempted rape. He was sentenced to custody in a mental hospital but within a year this was altered to detention for psychiatric treatment. At follow-up he was considered psychiatrically normal and stated that his sexual life was normal. He had almost completed his training as a sewage contractor.

Drug or alcohol abuse

These disorders were mild and affected only three patients.

Miscellaneous

All psychiatric abnormalities which did not fit into one of the above groups were classified as miscellaneous. These included dementia, reactions of self-reference and paranoid temper, episodes of dysphoria, and other mental instabilities not resulting in behavioural disturbance. We should emphasise that in this, as in other recent Danish surveys, congenital impairment of intellect is not considered a psychiatric abnormality.

Examination of the patients' sexual behaviour revealed impaired sex life in the majority both before and after operation. A total of 11 patients was excluded from this particular analysis—seven children under 18 years of age with no history of abnormal sexual behaviour, and four patients who died after operation. Of the remaining 63 patients (37 males and 26 females), thirty-one (19 males and 12 females) displayed sexual dysfunction either as children or as adults. Four patients had an abnormal sex life before and six after operation, and 21 both before and afterwards. One of the six with postoperative abnormality was under 18 years of age before surgery.

Lack of sexual drive was the predominant dysfunction in 23 patients (15 males and eight females). Free and undisguised masturbation was shown by three males, two of whom also displayed sexual aggression accompanied in one by marked exhibitionism. Both of these patients complained of loss of libido after operation. A total of six patients (three males and three females) including these two demonstrated excessive sexual aggression, and two others, one of each sex, were sexually aroused without demonstrable provocation. None of the Danish patients displayed homosexual tendencies or other sexual deviations.

Results

TYPE OF PSYCHIATRIC DISORDER

Most patients (68/74) displayed one or more types

of psychiatric disorder. Although a third had been considered abnormal before the onset of epilepsy, the only important psychiatric finding was a behavioural disturbance (Table 1).

In the preoperative period (from onset of epilepsy to operation) half of the patients (39/74) became psychiatrically ill, and during this time all 68 deteriorated. After surgery five patients previously healthy from the psychiatric point of view became ill, and 16 with psychiatric symptoms improved. When the types of psychiatric disorder were examined, the number of patients with behavioural disturbance or with a history of attempted suicide was seen to decrease, whereas the number of those with psychosis increased markedly. All suicidal attempts were made in the first month after operation.

PSYCHIATRIC RESPONSE TO OPERATION

Tables 2 and 3 show that patients with drug-resistant temporal lobe epilepsy who underwent unilateral anterior temporal lobectomy experienced psychiatric improvement. The patients were classified initially in six groups, based on their postoperative assessment: (1) normal before and after operation; (2) normal after operation; (3) markedly improved; (4) improved; (5) unchanged/deteriorated (abnormal before operation); (6) deteriorated (normal before operation). In order to compare this with previous studies, cases placed in group 4 (improved) were combined with cases in groups 5 and 6 (unchanged/deteriorated and de-

Table 1 *Psychiatric disorders*

Type of psychiatric disorder	Before onset of epilepsy (n=74)	Preoperative period (n=74)	Follow-up period (n=72)*	Total (n=74)
Behavioural disturbance	23	54	33	55 (74%)
Psychosis	0	11	20	20 (27%)
Suicidal attempt	0	11	6	14 (19%)
Neurosis	1	7	5	7 (9%)
Sexual aggression	1	4	5	6 (8%)
Drug or alcohol abuse	0	3	3	4 (5%)
Miscellaneous	2	27	29	35 (47%)
Total	24 (32%)	63 (85%)	50 (69%)	68 (92%)

*Two patients are excluded who died within three months after the operation.

Table 2 *Effect of operation on seizures correlated with psychiatric status at follow-up*

Psychiatric status	Effect on seizures					Total
	Seizure-free	Marked reduction	Some reduction	No change	Death	
Normal	15	6	0	1	0	22 (30%)
Abnormal						
Markedly improved	13	5	1	1	0	20 (27%)
Improved	3	1	1	0	0	5 (7%)
Unchanged/deteriorated	14	3	3	3	4	27* (36%)
Total	45 (61%)	15 (20%)	5 (7%)	5 (7%)	4 (5%)	74 (100%)

*Includes five patients normal before operation

Table 3 Prognostic importance of initial psychiatric status on status at follow-up, and effect of temporal lobectomy on seizures

	Psychiatric status			Surgical results			Total
	Normal	Improved	Unchanged or deteriorated	No seizures	Marked reduction	No change	
Behavioural disturbance	16	17	21	34	9	11	54 (73%)
Psychosis	1	5	5	5	3	3	11 (14%)
Suicidal attempt	5	4	2	5	3	3	11 (14%)
Neurosis	2	3	2	7	0	0	7 (9%)
Sexual aggression	0	1	3	2	0	2	4 (5%)
Drug or alcohol abuse	1	1	1	2	1	0	3 (4%)
Miscellaneous	4	10	13	13	8	6	27 (35%)
None	6	0	5	7	2	2	11 (14%)
Total	22 (30%)	20 (27%)	32 (43%)	45 (61%)	15 (20%)	14 (19%)	74 (100%)

teriorated). Thus, following the practice of recent Danish surveys, the total of 74 patients was finally divided into three groups as follows: *group 1 normal*—22 patients were psychiatrically normal at follow-up regardless of their status before operation; *group 2 markedly improved*—20 patients, despite remaining abnormal, showed marked improvement on their condition before operation; *group 3 unchanged/deteriorated*—32 patients (including the four who had died after operation) were either no better or were worse.

Psychiatric status was the most important factor in determining the duration of postoperative hospital care. Apart from the first postoperative year, patients psychiatrically normal at follow-up spent 3.4% of their postoperative lives in hospital compared with 22.8% for patients psychiatrically abnormal.

RESPONSE OF EPILEPSY TO OPERATION

Twenty-five patients were regarded as completely free from seizures immediately after unilateral anterior temporal lobectomy. At follow-up, however, 45 patients (61%) were seizure-free 15 (20%) had obtained a reduction of at least three out of four expected fits (75% reduction), and 14 (19%) were unchanged (Table 2). This last group consisted of five patients with a 50–75% reduction in frequency, five patients with slight or no improvement, and the four patients who had died. This grouping was based on data obtained at follow-up for the previous 12 months. A good prognosis for seizure frequency was indicated preoperatively by (1) single type of epileptic fit, (2) epilepsy of less than four years' duration (and with grand mal for less than one year), and (3) an anterior temporal or sphenoidal electrode EEG focus, or both types of focus (Jensen, 1975a,b; Jensen and Værnet, 1977).

When the psychiatric condition at follow-up was correlated with the effect of lobectomy on seizures (Table 2) it was found that return to normal, or

improvement in the psychiatric state, followed closely on the degree of success in relieving the frequency of seizures. On the other hand 15 of the 20 psychotic patients were free, or nearly free, from seizures at follow-up.

SOCIAL REHABILITATION

At the time of operation all patients, regardless of sex and age, were socially incapacitated by their epilepsy. Total, or near total, relief from seizures was the most important factor in regaining a normal capacity for work. At the same time the psychiatric status of patients with minimal epilepsy largely determined their degree of social independence. Whereas 67% (14/21) of psychiatrically normal patients were working full-time at follow-up, only 36% (14/36) of the abnormal were as fortunate. In addition, only psychiatrically abnormal patients required long-term treatment in a hospital or institution (Jensen, 1976c).

PROGNOSTIC IMPORTANCE OF INITIAL PSYCHIATRIC STATUS

When the preoperative psychiatric diagnosis was contrasted with the psychiatric status at follow-up and with the effect of operation on the frequency of seizures (Table 3) no significant trend could be discerned. All neurotic patients became seizure-free, and those with psychosis before operation seemed to fare worse, but these trends were not statistically significant. Of 11 psychotic patients, all with paranoid delusions, only one was normal at follow-up (patient 9), having recovered some years earlier. In addition, nine patients (Table 1) became psychotic during follow-up: of these six had their initial psychotic symptom after cessation of their epilepsy. Before their schizophrenia-like psychosis became evident all but one had displayed severe behavioural disturbances including sexual aggression. A fifth of all the patients had attempted suicide (Table 1) on one or more

occasions; two patients made their attempt immediately after operation but were considered psychiatrically normal at follow-up.

NEUROPATHOLOGY

Apparently, the final result is better the more specific the histological abnormality (Jensen and Klincken, 1976). With regard to cessation of seizures this is merely a trend, while the differences are statistically significant at the 5% level with regard to psychiatric normalisation or improvement (Rank-sum test, $t=2.22$). Preoperative psychiatric disorders could not be correlated with neuropathological groups. On the other hand, 11 psychotic patients, diagnosed before surgery, showed a significant preponderance of focal lesions—five out of 13 patients with focal lesions (39%) compared with six of the remaining 61 (10%). These findings also were significant at the 5% level (Table 4).

GENETIC AND AETIOLOGICAL FACTORS

Examination of the genetic background (Table 5)

revealed a massive hereditary burden in 76% of the patients (56/74), as only 18 patients had no predisposition to neurological or major psychotic diseases. The recent Danish investigation (Jensen, 1976c) showed that predisposition to epilepsy and other neurological disorders had no bearing on the results of temporal lobectomy, although patients with a strong family history of such disorders did badly after surgery: 34 patients (46%) had a history of severe psychiatric disorder on both sides of the family, with a total of 81 close relatives thus afflicted. Similarly, a bad family history indicated a poor psychiatric prognosis: at follow-up only one of the 24 patients (4%) with such a background was found to be psychiatrically normal, compared with 21 of the remaining 50 patients (42%).

As becomes apparent from Table 5 no statistically valid conclusion can be drawn from a comparison of psychiatric diagnosis and genetic background, with one exception. Thirteen (65%) psychotic patients had a family history of psychiatric disorder compared with the 21 (39%)

Table 4 *Neuropathology related to psychiatric disorders*

	Focal lesion (n=13)	Gliosis* (n=21)	Perivascular infiltration (n=10)	Equivocal lesions (n=17)	Previous operation† (n=13)	Total (n=74)
Behavioural disturbance	12	15	6	12	9	54 (73%)
Psychosis preoperatively	5	2	1	1	2	11 (15%)
Psychosis postoperatively	6	5	3	3	3	20 (27%)
Suicidal attempt	2	2	2	4	4	14 (19%)
Neurosis	1	2	0	0	4	7 (9%)
Sexual aggression	0	0	1	2	1	4 (5%)
Drug or alcohol abuse	0	1	1	0	1	3 (4%)
None	0	2	1	2	1	6 (8%)

*Comprises seven cases of nodular gliosis and 14 of gliosis/satellitosis (mesial temporal sclerosis).

†Stereotactic coagulation of amygdaloid nucleus or another previous operation in this area.

Table 5 *Genetic and aetiological factors*

	Genetic factors				Aetiological factors				
	Epilepsy (n=22)	Neurological diseases (n=36)	Psychiatric diseases (n=34)	No predisposi- tion (n=18)	Prenatal abnormality (n=27)	Birth trauma (n=28)	Postnatal head trauma (n=26)	Infection (n=28)	No extrinsic aetiology (n=12)
Behavioural disturbance (n=54)	17	27	24	12	19	23	20	14	6
Psychosis preoperatively (n=11)	2	5	7	2	5	6	4	1	2
Psychosis postoperatively (n=20)	3	8	13	4	7	10	5	3	5
Suicidal attempt (n=14)	6	4	5	5	6	7	6	2	1
Neurosis (n=7)	4	3	5	1	3	5	3	0	1
Sexual aggression (n=4)	0	3	2	0	4	3	2	1	0
Drug or alcohol abuse (n=3)	1	2	1	0	0	1	0	0	2
None (6)	1	3	0	3	1	1	2	3	1

of the remaining 54 non-psychotic patients.

In the recent Danish study (Jensen, 1976a) the record of possible aetiological factors revealed a high incidence of birth injuries, postnatal head trauma, and infections of the central nervous system compared with the general population, but this was equivalent to the incidence in published surveys of epileptic patients. These factors did not appear to influence the prognosis although a prenatal abnormality has been shown to affect the ultimate psychiatric status unfavourably. Examination of Table 5 suggests that perinatal injury may be correlated with a behavioural disorder as 23 (82%) of the 28 patients in this category contrasted with 31 (67%) of the remaining 46 patients with behavioural disorder but without recognised perinatal trauma.

INTELLECTUAL STATUS

All the patients were assessed psychologically before operation, most on more than one occasion. Before the onset of their epilepsy 60 of the patients were considered bright or normally endowed, nine were retarded, while five were regarded as oligophrenic or imbecile. In general, intellectual function decreased in the period before surgery, an observation which was confirmed in several patients by repeated testing. After unilateral

anterior temporal lobectomy an improvement in intellect was often observed (Jensen and Værnet, 1977).

Normal or above normal intellect at operation indicated a good psychiatric prognosis as 33% (17/51) of such patients were normal at follow-up compared with 22% (5/23) of the retarded or oligophrenic patients. This trend, however, was not statistically significant. Similarly the intellectual level was found to be unrelated to the prognosis for epilepsy (Table 6).

The relationship between intellect and post-operative psychiatric disorder is evaluated in Table 7. The psychoses and neuroses are shown to affect predominantly those with normal or superior intellect whereas the behavioural disorders seem to be found more frequently in retarded or oligophrenic patients. These trends, however, are not statistically confirmed.

Discussion

Most patients with temporal lobe epilepsy also suffer from a variety of psychiatric disorders. All surveys agree on this association although the reported percentages of affected patients are widely divergent. The surveys also agree in showing that psychopathological symptoms are more frequent

Table 6 Intellectual level at operation correlated with psychiatric status at follow-up, and effect of temporal lobectomy on seizures

Intellectual level at operation	Psychiatric status			Surgical results			Total
	Normal	Improved	Unchanged or deteriorated	No seizures	Marked reduction	No change	
Bright	3	2	4	7	1	1	9 (12%)
Normal	14	11	17	25	9	8	42 (57%)
Retarded	2	7	5	6	5	3	14 (19%)
Oligophrenic and/or imbecile	3	0	6	7	0	2	9 (12%)
Total	22 (30%)	20 (27%)	32 (43%)	45 (61%)	15 (20%)	14 (19%)	74 (100%)

Table 7 Postoperative psychiatric disorders related to intellectual status

Psychiatric disorder	Intellectual status			
	Bright (n=9)	Normal (n=42)	Retarded (n=14)	Oligophrenic and/or imbecile (n=9)
Behavioural disturbance (n=33)	3	17	8	5
Psychosis (n=20)	2	14	3	1
Suicidal attempt (n=6)	0	4	1	1
Neurosis (n=5)	0	5	0	0
Sexual aggression (n=4)	0	3	1	0
Drug or alcohol abuse (n=3)	0	3	0	0

before than after surgery.

Behavioural disturbances are numerically the most common type of psychiatric disorder in patients with temporal lobe epilepsy. In agreement with results from published surveys (James, 1960; Taylor and Falconer, 1968; Taylor, 1972; Serafetinides, 1975; Van Buren *et al.*, 1975) most Danish patients displayed behavioural disturbances, the highest incidence being among the intellectually retarded and oligophrenic patients. Similarly, in agreement with the findings of previous studies (Green *et al.*, 1951; James, 1960; Falconer and Serafetinides, 1963; Taylor, 1972; Talairach *et al.*, 1974; Serafetinides, 1975) we found a significant improvement in behavioural disturbances after unilateral anterior temporal lobectomy, especially in those of an aggressive temperament.

The observation that a majority of Danish patients suffered from absent or diminished sexual drive agrees with the findings of Blumer and Walker (1967) and of Walker (1972). We consider that loss of libido is a sequel to a specific type of epilepsy and is not the consequence of temporal lobectomy. It appears to be an important cause of celibacy and divorce.

The percentage of Danish patients with psychoses, 15% before operation and 27% at follow-up, is equal to or higher than the 12% recorded before surgery by Falconer and Serafetinides (1963), the 16% by Taylor (1972) and the 2% by Van Buren *et al.* (1975), and the 19% recorded after surgery by Taylor (1972). We were unable to find reasons for this discrepancy but it may be the result of preoperative selection.

The psychoses will be discussed at length in a separate communication (Jensen and Larsen, *in press*). Among our more important observations, we found, in agreement with Falconer and Serafetinides (1963) and Taylor (1972), that temporal lobectomy did not influence the course of paranoid or schizophrenia-like psychoses. Only one of 11 patients who were psychotic before surgery was normal at follow-up, and nine other patients became psychotic during the follow-up period although six of them had experienced a cessation of their seizures.

Unlike other authors (Sano and Malamud, 1953; Falconer *et al.*, 1964; Falconer, 1965, 1968, 1970, 1974) in the recent Danish survey (Jensen and Klinken, 1976) we were unable to demonstrate any correlation between mesial temporal sclerosis and behavioural disturbances, or between hamartomas and psychoses as reported by Cavanagh and Meyer (1956), Cavanagh (1958), Falconer and Cavanagh (1959), and Falconer (1970). On the other hand, we found a positive correlation between a family

history of severe psychiatric disorder and mesial temporal sclerosis.

A family history of severe psychiatric disorder has not been emphasised in the literature on temporal lobe epilepsy, apart from the report by Taylor (1972) in which he recorded a predisposition in nearly half his cases; a frequency similar to that found by Jensen (1975c). Most of the English patients were referred for surgical treatment at the Guy's-Maudsley Hospital from a psychiatric hospital.

The most important aspects of the surgical treatment of patients with drug-resistant temporal lobe epilepsy are relief of their seizures and improvement of their psychiatric status. Social rehabilitation should be the expected sequel to successful surgery. As relief from seizures was unrelated to psychiatric status, the latter should not be used as an indication for surgery.

Improvement in the psychiatric state and a return to normal was closely related to the extent of relief from seizures. Ictal affective symptoms and complex automatisms were unfavourable prognostic indices (Jensen and Værnet, 1977). On the other hand we found that schizophrenia-like psychoses did not respond to temporal lobectomy (Falconer and Serafetinides, 1963; Taylor, 1972; Serafetinides, 1975). These psychoses may occur in the follow-up period in patients previously normal despite a good response of their epilepsy to the operation.

Correlation between surgical results and post-operative social rehabilitation clearly indicated that complete, or nearly complete, relief from seizures was all important in regaining a normal working capacity, whereas the psychiatric status of patients with a low seizure frequency determined the extent of their independence. The age at which temporal lobe resection was performed was important: 61% of the patients aged 17 years or less at operation were working full-time compared with 30% of older patients (Jensen, 1976c).

Conclusions

All types of psychopathology are associated with temporal lobe epilepsy, behavioural disturbances, schizophrenia-like psychoses, and certain types of sexual deviation being the most common. Whereas anterior temporal lobectomy tends to improve behavioural disturbances, the course of psychoses and of sexual deviations is generally uninfluenced. This differential response suggests that psychiatric disorder is *not* a symptom of temporal lobe epilepsy or of temporal lobectomy. There is in fact no immediately obvious correlation between

the neurological, neuropathological, and psychopathological findings in patients with temporal lobe epilepsy.

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