Psychiatric aspects of epilepsy

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THE LAST 10 years have been marked by progress in the study of epilepsy. A new international classification of epilepsy has been put forward (Gastaut *et al.*, 1964). Succinamides have been introduced for the treatment of petit mal (Heathfield & Jewsbury, 1961) and have become an established treatment, while sulthiame (Fenton, Serafetinides & Pond, 1964; Liu, 1966) and carbamazepine (Bird *et al.*, 1966) have been tried though their final place in therapy is uncertain. The social aspects of epilepsy have become more important and have been investigated thoroughly (Juul-Jensen, 1963). There has been an improvement in the attitude of the general public to epileptic patients. This hopeful trend was noted by Caveness *et al.* (1965) in the U.S.A. They found a decreasing incidence of prejudice not only in relation to employment but also to social intercourse in general over the years 1949-64. A full and coherent account of all aspects of epilepsy is given in the two-volume work by Lennox, *Epilepsy and Related Disorders*, published in 1960. However, this condition still presents many problems, particularly in relation to its psychological aspects and it is some of these that are chosen for discussion here. In the chapter 'The Epilepsies' in *Clinical Psychiatry* by Mayer-Gross, Slater & Roth (1960) many aspects are discussed but here attention is placed on the following themes: psychiatric and psychological effects of ictal disturbances, the schizophrenia-like psychoses, non-psychotic disorders, temporal lobectomy for psychiatric disorder and some aspects of brain damage and epilepsy in childhood.

Psychiatric disorders related to ictal disturbance

Pond (1957) suggested a logical classification of psychiatric disorders associated with epilepsy which essentially can be split into two groups: firstly, symptoms directly correlated with the clinical epileptic attack, that is pre-ictal, ictal, and post-ictal manifestations; secondly, disorders not clearly associated with overt seizures, for example psychosis and personality disorder.

Considering first the symptoms directly connected with the clinical epileptic attacks, it is an old-established observation that epileptic patients may 'work up to a fit'. This is often seen in institutionalized epileptics, though it may be missed at out-patient consultations. There is a state of increasing tension and irritability, sometimes with depression and less frequently with elation, for all of which there is no known neurophysiological basis. However, another pre-ictal phenomenon has more recently been described; it consists of a wide variety of stimuli which may precipitate an epileptic attack. This form of epilepsy has been labelled 'reflex' (Goldie & Green, 1959; Servit, 1962). Included in the wide variety of stimuli are music (Daly & Barry, 1957) and reading (Bickford *et al.*, 1956).

Perhaps even more interesting from a psychiatric point of view are the series of cases reported by Sherwood (1962) which have been labelled 'self-induced epilepsy'. This could be regarded as a special form of reflex epilepsy in which 'light sensitive' patients could induce fits by such means as waving the hands, fingers wide open, in front of the eyes when looking at the sun, for example, in this way producing an interrupted stream of light not dissimilar to that used by the electro-encephalographer for photic stimulation. The patients are often children who are intellectually below average and their EEGs usually reveal spike-and-wave discharges.

The motor and sensory ictal disturbances in temporal epilepsy (Penfield & Jasper, 1954) and other forms are well known. However, ictal emotional disturbances are less clearly known, a subject reviewed by Williams (1956). He examined 100 patients personally who had elaborate epileptic experiences and noted that sixty-one experienced fear, particularly when they had an epileptic discharge involving the anterior half of either temporal lobe. Twenty-one patients suffered from depression and nine from either pleasant or unpleasant feelings. Surprisingly the only other emotion noticed was

anger in one aggressive patient. Ictal discharges involving the temporal lobe often lead to amnesia. This has recently been studied by Jasper (1964) using micro-electrode techniques. He observed that when the ictal epileptic discharge remains localized amnesia will not occur. However, if the discharges extend, for example, from the amygdala to the temporal cortex or the brain stem then amnesia occurs. This type of spread, Jasper concluded, was typical of a temporal-lobe automatism accompanied by amnesia.

Psychological investigations of epileptic patients

It is known that psychological function is disturbed during seizure discharges. Studies by Tizard & Margerison (1963) investigated specifically the effect of spike-and-wave discharges. They used a series of simple repetitive tasks presented either by vision, by hearing or by touch. The following is an example: a series of numbers recorded on tape was played over to the patient and he was asked to press a key when the number '6' was heard. These authors found all patients tended to work more slowly or ceased to work during bursts of spike-and-wave activity lasting more than 1 sec. However, there were responses even if bursts were longer than this though there was considerable individual variation. In addition the longer the bursts of spike-and-wave activity on the EEG trace the more likely were recognizable fits to be observed (usually with symmetrical eye fluttering). If these occurred then no response was obtained. Thus it can be concluded that whether or not a fit occurred, spike-and-wave activity was still associated with the change in the function of the patient.

Scott *et al.* (1967) continued this line of investigation further by trying to establish associations between interseizure EEG abnormalities and learning and memory tasks. While the patient's EEG was being monitored for standard intervals he was asked to learn a series of simple sensory discriminations, e.g. the association of a particular shade of grey with a particular shape of triangle; another similar task using touch was also presented. The performance of a group of epileptic patients on these tasks was compared with a group of normal subjects matched for age and intelligence. The epileptic patients were then divided into 'high' and 'low' active, using two parameters considered independently: fit frequency prior to testing, and EEG abnormality during testing. The patients who had brain damage on the basis of clinical or neuroradiological investigation or who had fits beginning before the age of 8 years were excluded. How-

ever, no particular type of epilepsy was excluded. On the basis of this investigation no consistent differences were found between the control and the epileptic groups or between the high and low active groups on the basis of fit frequency or EEG abnormality.

Deutsch (1953) using similar techniques was able to show a difference between the control and the epileptic group but in that study the EEG activity was not monitored during presentation of the tasks.

Mirsky *et al.* (1960) showed differences between 'focal' and 'non-focal' epileptic groups on a series of memory and learning tasks. The differences in these results and the findings of Stevens (1966) indicate that selection and matching is important, and certainly studies of unilateral temporal foci indicate how circumscribed the psychological disturbance may be.

The effect of unilateral temporal foci has been studied in considerable detail over the past 15 years. The subject is reviewed by Meyer (1960) and Denneril (1964). Among the first in this field were Quadfasel & Pruyser (1955) who studied nineteen patients with anterior temporal lobe foci on the EEG; their findings are similar to those of Meyer & Jones (1957) and have a particular relevance in the assessment of patients with temporal-lobe epilepsy. If the patient has a dominant hemisphere lesion then he tends to perform less well on the verbal part of an intelligence test than on the non-verbal or performance items. This information may be valuable to the neurosurgeon in conjunction with clinical and electro-encephalographic evidence to determine the site of the 'firing' lesion in patients with temporal-lobe epilepsy and thus the side for operation.

The schizophrenia-like psychosis of epilepsy

Although psychosis has been reported in association with epilepsy since the end of the nineteenth century, Hill (1953) in a brief reference to the disorder and later Pond (1957) described in more detail schizophrenic-like psychotic states with paranoid ideas, auditory hallucinations and other features such as 'thought disorder' which characterize schizophrenia. However, the epileptic patient's emotional response remained warm and there was no inappropriate affect, unlike the situation in schizophrenics. The patients described by Pond (1957) all had temporal-lobe epilepsy with complex auras. In addition the patients had temporal-lobe foci on the EEGs. Particularly important in relation to the later discussion is the fact that though the epilepsy had begun years before, and the attacks

were often infrequent, the patients were usually under the control of anti-convulsants when the psychosis began.

Slater, Baird & Glithero (1963), in their detailed review of sixty-nine patients with schizophreniform psychosis began by examining the incidence of epilepsy and schizophrenia together. They calculated that the likely expectation of the combination of epilepsy plus schizophrenia in the London area would be four to five new cases per annum. They then examined the records of the National Hospital and the Maudsley Hospital and were able to find sixty-nine patients with epilepsy and a schizophrenia-like psychosis in the period 1948–59. They concluded that 'patients suffering from epilepsy developed schizophrenia-like psychosis with a frequency much greater than chance expectation would permit'.

Another of their conclusions was that the mean age of onset of the psychosis was 29.8 years, significantly different from the age of onset of both epilepsy and schizophrenia. They did not notice a close relationship between fit-frequency and the onset of psychosis, but in some instances psychotic symptoms appeared first in association with diminishing fit-frequency.

The onset of the psychosis was subacute in twenty-nine patients but it could also be either episodic or acute; on the other hand, in thirty-one patients it took a fluctuating course. In addition to the typically schizophrenic hallucinatory experiences there were a great variety of emotional disturbances including mania. The observation of Pond (1957) that patients may maintain their warm rapport was confirmed in a majority of patients though Slater *et al.* (1963), did note that twenty-eight showed the characteristic 'flatness' that occurs in schizophrenia. Electro-encephalographic studies were carried out on all the patients and it was found that 80%, i.e. fifty-five patients, had temporal lobe foci. The importance of the sphenoidal wire electrodes in association with pentothal activation was emphasized, for in ten cases there was EEG evidence of such foci though the clinical history was in no way distinctive. These foci may be amenable to surgical operation and therefore thorough clinical and electro-encephalographic study is essential. In seven patients temporal foci were not demonstrated and the EEG appearances were of centrencephalic epilepsy.

In this series eleven patients were submitted to temporal lobectomy and one to frontal lobectomy. The results were reported by Serafetinides & Falconer (1962) and will be described later.

A study of the genetic aspects of the

psychotic patients were carried out. It was noted that for a parent or sibling of an epileptic with a schizophrenia-like psychosis the risk of schizophrenia was no greater than for a member of the general population. However, Slater *et al.* (1963) considered that there was an increased risk of epilepsy, so that psychosis was linked with epilepsy rather than schizophrenia.

A novel investigation was carried out by Dongier (1960) into epilepsy and psychosis by means of questionnaires. These were distributed to thirty psychiatrists in several countries. The main results of this investigation were as follows: from the clinical point of view those who suffered from centrencephalic epilepsy exhibited confusional states, while the affective and schizophrenic forms of psychosis were associated with temporal-lobe epilepsy. Another study of psychosis was carried out by Glaser (1964); he was unable to establish any relationship between the psychotic state and fit-frequency, a point which was investigated by Flor-Henry (1967).

A further study on the relationship between temporal-lobe epilepsy and psychosis was carried out using material from the Maudsley Hospital (Flor-Henry, 1967). In this a group of fifty patients with temporal-lobe epilepsy and psychosis were compared with a similar group without psychosis. Some seventy items were examined in an attempt to determine how the two groups differed. Two main findings emerged from this study; firstly that the psychotics as a group had less frequent seizures than the non-psychotic group, and in particular psychomotor seizures were less frequent; secondly, that psychotics had a gross excess of epileptic activity related to the dominant hemisphere. The important negative finding (Flor-Henry, personal communication) was that there was no difference in the duration of epilepsy in the psychotic and the non-psychotic group and no significant differences in the anti-convulsant medication.

As early as 1954 Badenoch, among others, had noted the rare association of megaloblastic anaemia with anti-convulsant medication. Both serum folate and vitamin B₁₂ levels were subnormal and there was a good response to treatment with folic acid (Klipstein, 1964). Reynolds *et al.*, (1966) in a survey of sixty-two out-patients at the National Hospital, found that fifty-four of the patients were receiving treatment with anti-convulsants and eight were untreated. None of the patients was anaemic yet seventeen of the fifty-four showed megaloblastic haemopoiesis on sternal marrow examination. In addition, low serum folate and vitamin B₁₂ levels were noted. In this study it appeared that phenobarbitone, pheny-

toin and primidone could all be responsible for this alteration in vitamin blood-levels and could lead to serious side-effects. Another interesting observation concerning toxicity was made by Kutt *et al.*, (1964) who examined the metabolism of phenytoin. They could relate particular blood levels of this substance to specific toxic effects such as nystagmus and ataxia. They also observed that liver disease which hindered metabolism might increase the risk of toxicity.

Reynolds *et al.* (1966) raised the possibility that psychiatric disorders could be related to the lowered blood folate and vitamin B₁₂ levels, while in a survey Shulman (1967) had found significant lowering of the vitamin B₁₂ level in 8.5% of 117 psychiatric patients. Strachan & Henderson (1965) had noted the association of mental symptoms with vitamin B₁₂ deficiency even in the absence of anaemia. These symptoms included paranoid psychosis, depression and memory impairment among others and were all reversible. Together these observations raise the possibility that psychosis observed in epileptic patients could be due to anti-convulsant medication. In favour of this would be the long duration of epilepsy before the occurrence of psychosis (Slater *et al.*, 1963). This was not the view of Flor-Henry (1967) who, however, observed that fits were infrequent in the psychotic group. Further, Landolt (1958) has noted the presence of what he called 'forced normalization' of the EEG in epileptic patients during psychosis.

In a further paper, Reynolds (1967) examines in detail four patients who had a schizophrenia-like psychosis occurring in association with disturbances of folate and vitamin B₁₂ levels; two of the cases in particular show a striking time-relationship between the onset of psychosis and the administration of anti-convulsant drugs. It seems unlikely, however, that this is the complete explanation of the schizophreniform psychosis since it seems much more frequent in temporal-lobe epilepsy than in other forms, a finding supported both by Slater *et al.* (1963) and by this study of Reynolds (1967), in which all four patients had temporal-lobe epilepsy. Other questions remain unanswered; is the occurrence of anaemia linked to control of the epilepsy and in a more general context could the psychiatric disorders of the puerperium or of pregnancy be in any way linked with the disturbance of folic acid levels seen in pregnancy?

Non-psychotic disorders in epileptic patients

The occurrence of personality disorder in epileptic patients is frequently recorded in older accounts of epilepsy. However, 'not more than a

minority of patients show this change and they are in the greater part severe and long-standing cases', comment Mayer-Gross *et al.* (1960). Whether this is a specific change or not is difficult to determine since many factors are active in chronic epileptic subjects. However, Pond (1957) does not believe that there is any close association between epilepsy and personality disorder. Prolonged medication with anti-convulsants, and the ill-effects of fits themselves in producing prolonged social isolation, curtailment of leisure and in some patients institutionalization may well contribute to deterioration of personality. If chronic institutionalized epileptic patients are studied, abnormality of personality may well be detected, but such changes are much less obvious if an out-patient population is considered.

Information is forthcoming about psychological disturbance in epileptic children following a detailed study on the Isle of Wight, when the psychiatric and neurological status of a sample of school children was examined by Rutter and Graham and their colleagues. Their results are not yet available in detail but three groups of patients suffering from different types of disorder are compared, the asthmatic, the physically handicapped including the epileptic, and the general population. Graham *et al.* (1967) found that 10.5% of both the asthmatic group and the physically handicapped group had psychiatric disorders, while the figure for the general population was 6.3%. The average age of all groups was about 10 years. A further point of interest was that 38.6% of the asthmatic children were unable to show affection according to their parents, compared with 29.8% of the physically handicapped and 17.2% of the neuro-epileptic group. These figures suggest a fairly high incidence of psychiatric abnormality in those handicapped whether from epilepsy or not. An earlier study by Cooper (1965) showed that those children who had fits with obvious illness before the age of 2 years did less well than expected at school at the age of 6 years. However, he also noted that this effect was less marked at the ages of 11 and 15.

An additional problem which has received inadequate attention in this connection is that of sampling. Epileptic patients attending a neurological or psychiatric institute or psychiatric hospital are likely to differ from those attending general hospitals and further from those seen only by their general practitioners. A survey of epilepsy in fourteen general practices (Pond & Bidwell, 1960) indicated that the patients seen at hospital tended to have more psychological disturbance than those cared for by their general

practitioners. Pond & Bidwell considered that about 29% of their group showed psychological difficulties while a comparable study carried out in Iceland by Gudmundsson (1966) showed an almost identical proportion with neurotic symptoms.

The view that patients with psychomotor epilepsy suffer from more psychiatric disturbance than those without is strongly challenged by Stevens (1966). In particular she makes the point that a confusion exists between temporal-lobe epilepsy and psychomotor epilepsy. Psychomotor disturbances occur in those with a temporal-lobe focus, but they may also occur in patients with disturbances elsewhere in the brain. However, after the study of 100 patients it was concluded that 'there is an augmented risk of mental illness in patients with epilepsy in comparison with the general public but we fail to show a difference in risk between psychomotor and grand mal groups'.

Tizard (1962) reviewed the evidence that personality disorders occurred in epileptic patients. In particular the methodology of the studies was critically examined. The justified conclusion was reached that on the basis of existing investigations already carried out the results were contradictory and in particular there had been a failure to recognize the complex environmental and patho-physiological factors involved. Thus the work of the past 10 years is inconclusive.

Brief mention will now be made of special aspects of personality change ascribed to epilepsy. Sexual disturbances have been described and the association of impotence and epilepsy has been illustrated recently (Johnston, 1965). One patient, a 43-year-old man with epilepsy and impotence, was found to have a frontal oligodendroglioma, and the second patient, a 36-year-old man, did not have epilepsy but was impotent and had an astrocytoma in the temporal lobe. Two other case reports are of interest. Hunter, Logue & McMenemey (1963) described a patient with long-standing fetishism who developed temporal-lobe epilepsy. When this was treated by an anterior temporal lobectomy the patient was not only freed from his epilepsy but also his fetishism. Mitchell, Falconer & Hill (1954) described a patient who received 'erotic gratification' when contemplated a safety-pin and this precipitated an epileptic seizure. Again, a left anterior temporal lobectomy in this case relieved both epilepsy and fetishism. The neuro-physiological interest of sexual anomaly and the temporal lobe stems from the now well-known observations of Klüver & Bucy (1939) that excessive sexual activity in monkeys followed bilateral temporal resections. Reeth, Van Dier-

kens & Luminet (1958) reported a series of patients with epilepsy and temporal lobe tumours who showed increased sexual activity.

The possible association of depersonalization and temporal-lobe epilepsy was discussed by Kenna & Sedman (1965). In particular they regard depression and 'sensitive personality' as important aetiological factors. However, direct association of depersonalization and temporal-lobe epilepsy seems unproven, though it is possible that the occurrence of depression reported in late-onset epilepsy by Dominian, Serafetinides & Dewhurst (1963) could be the link between these conditions.

Epilepsy and criminality

In spite of recent studies, the relationship between criminality and epilepsy requires further careful investigation. Despite the popular view to the contrary there is much evidence that murder during or after an epileptic seizure is a comparative rarity. Alström (1950) studied the incidence of criminal behaviour in 345 adult male epileptic patients and found no case of homicide; in a 10-year period 17% of the patients committed crimes of violence while 11% of a control group were likewise involved. However, all the crimes were of a minor nature and none appeared to have been committed during a seizure. Scott (1966) notes that 'epileptics are not particularly prone to crime and when they do commit crime they do not (despite the teaching of the older textbooks) show any particular predilection to murder, rape or arson. Most very destructive or aggressive crimes including arson and murder are not committed by epileptics'. Juul-Jensen (1963) using a sample of epileptic patients from a department of neurology found the frequency of crimes was identical with that encountered in the general population and again he concluded that there was no particular association of sexual and violent crime with epilepsy. Again Lennox (1960), in his survey of 5000 epileptic patients noted that not a single one had been involved in a serious crime of violence. However, if imprisoned men selected by the criterion of serious aggressive offences with inadequate motivation are considered the incidence not only of epilepsy but also of abnormal electro-encephalograms and of frank mental disorder does significantly increase (Scott, 1966). Fenton & Udwin (1965) report the interesting case of a patient who violently murdered his wife and attacked his daughter. He then threw himself from a window, and fractured his skull as a result of the fall. There were three things of interest in his past history: firstly, he had had a mastoiditis

treated by mastoidectomy some 14 years before the murder; secondly, depression with loss of weight and anxiety had been noted for about a year prior to the murder; and thirdly, on the day before the crime he had had two brief episodes of loss of consciousness, lasting 2 or 3 min, when he had fallen as if in a faint. Two years after the crime the patient fell to the ground and was unconscious for 60 sec, an attack without warning. On investigation 5 years later a left temporal focus was indicated on both neuroradiological and electro-encephalographic investigation. Fenton & Udwin conclude that the temporal-lobe epilepsy did not play any direct role in the homicide though it probably played some part in the genesis of the patient's depressive illness. This would be in keeping with a study of Dominian *et al.* (1963), who found that depression was a prominent symptom in a series of patients with late-onset epilepsy.

Surgical treatment of epilepsy and psychiatric disorder

In the last 10 years temporal lobectomy has become a recognized treatment for patients with temporal-lobe foci, whatever type of fit pattern predominates. The criteria of selection of patients were reported by Falconer *et al.* (1955). The main group of patients in whom operation is contemplated have frequent epileptic fits in spite of adequate medication, with normal or only slightly abnormal neuro-radiological studies, and on the electro-encephalographic studies a predominantly or exclusively unilateral anterior temporal focus. Some patients exhibited psychiatric disorder, there were twelve with psychosis included in the first 100 consecutive patients operated upon at the Guy's-Maudsley Neurosurgical Unit, and a follow-up study was carried out (Serafetinides & Falconer, 1962). The follow-up period was from 2 to 8 years. Five were completely fit-free, five had a greatly reduced incidence of fits and in the remaining two patients their epilepsy was improved by at least 50%. Pre-operatively seven patients had a chronic paranoid state with emotional disturbance, usually depression, three patients had a schizophrenia-like psychosis, and five had acute confusional episodes, of whom three also suffered from chronic paranoid symptoms. The confusional psychosis did not recur in those patients who were free from epilepsy, but the schizophrenia-like states persisted with some relief of florid features. It was uncertain if improvement of epilepsy had yielded any benefit for the patients with paranoid psychosis. In general, therefore, psychotic patients only show

limited benefit from operations. An earlier study by Hill *et al.* (1957) had suggested that mentally disturbed patients without psychosis were not usually benefited by temporal lobectomy.

Though Bates (1962) questioned the role of surgery in the treatment of temporal lobe epilepsy there is no doubt that fits themselves are ameliorated. However, to assess other factors Taylor & Falconer (1968) carried out a detailed study. Of the 200 patients operated on at the Guy's-Maudsley Neurosurgical Unit since 1952, 100 were selected. A careful rating was made of clinical, socio-economic and psychological adjustment before operation and afterwards, mainly by personal interview. The length of follow-up was from 2 to 12 years. The incidence of pathological findings and relief of fits was similar to that reported in earlier studies. The social background of these patients was generally disturbed; 40% had a family history of mental illness, 31% had been separated from at least one parent before the age of 15 and 45% had had experience of an institution, and 37% had been unemployed pre-operatively. At the time of follow-up 51% had a good social adjustment, 29% had usefully improved but 12% had deteriorated. The most consistently good effect from operation was in employment and inter-personal relationships, while use of leisure and of social adjustment were less markedly changed. Perhaps the most striking finding of all in this survey was that 32% were psychiatrically normal at follow-up compared with 13% pre-operatively. Those who had improved most were relieved of their epilepsy. Those retaining good adjustment showed the lowest rate of mental illness in the family. Poor adjustment at follow-up was correlated with high rates of psychosis and psychopathy and least improvement of epilepsy. It seems, therefore, that temporal lobectomy has a place in the management of temporal-lobe epilepsy and that the improvement in social adjustment is mediated through relief of epilepsy rather than the amelioration of psychiatric symptoms as such.

The result of these findings is interesting in the light of the work of Margerison & Corsellis (1966) in which clinical and electro-encephalographic and neuropathological studies were made of the brain and in particular the temporal lobes. The striking finding in these studies was the presence of extremely widespread anoxic lesions. Admittedly, hippocampal sclerosis, the most common finding at temporal lobectomy, was noted in two-thirds of the sample, but, in addition, anoxic damage was found in sites such as the thalamus and cerebellum and other areas of

the cortex apart from the temporal lobe. However, Margerison & Corsellis observe that 'it is not suggested nor should it be inferred from the present data that because hypoxic damage tends to be disseminated rather than strictly focal the ablation of a particular area of damage might not be of crucial importance to the patient'. They continue that 'there is evidence that the removal of one sclerotic lobe is followed by a complete or almost complete cessation of fits, more often and for a longer period than would otherwise be expected'.

Brain damage and epilepsy in children

The problem of the relationship between epilepsy and mental subnormality is still uncertain. Lennox (1960) considered genetic factors as important because he observed a higher incidence of epilepsy in the relatives of mentally defective epileptics. Mayer-Gross *et al.* (1960) observe that 'the more random the sample (of epileptic patients) the more closely does the mean intelligence approach the normal average'. In infancy at least there is a well-known association between 'infantile spasms' (or hypsarrhythmia of the American literature) and mental subnormality. This condition is well reviewed in a monograph by Jeavons & Bower (1964) who stress that early claims of the efficacy of ACTH treatment in preventing mental deterioration were considerably over-valued. They conclude it is probably of little use after the age of 18 months.

Other aspects of the psychiatry of brain-damaged and epileptic children were reviewed by Pond (1961) in his Goulstonian lectures. Ounsted, Lindsay & Norman (1966) deal only with the less common condition of temporal-lobe epilepsy in childhood. The hyperkinetic child who is restless, irritable and destructive occurs in the brain-damaged as well as the epileptic group. However, Ounsted *et al.* (1966) consider temporal-lobe epilepsy to be particularly associated with hyperkinesia, a view which is as yet unproven. The male hyperkinetic child is certainly more common than the female, whatever the cause, and schooling almost always presents great difficulties.

The autistic child also has difficulty with schooling and Rutter & Lockyer (1967) in a recent study have noted the association between infantile autism and brain damage. Twelve of the sixty-three children studied had fits, and in only twenty-nine was there no evidence of brain damage.

There are still many aspects of these childhood conditions that require investigation before

effective treatment can be carried out and appropriate services set up.

Conclusion

It can be seen from this review, mainly concerned with the literature of the past 10 years, that much has been learned about such matters as schizophrenic-like psychosis, and its possible relation to anti-convulsant medication, about temporal-lobe epilepsy and the importance of surgery. However, many problems remain relatively unsolved, such as the incidence of psychological disorders in epileptic patients. Perhaps most striking of these is the failure to find the cause of epilepsy in spite of much work in the neuro-chemical and electrophysiological fields.

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