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Annotation

Psychiatric Manifestations of Frontal Lobe Tumours

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In a recent article in the *British Medical Journal* Maurice-Williams & Dunwoody (1988) reported two patients with frontal meningiomas who presented initially to psychiatrists. The correct diagnosis was made in one of them after prolonged, perhaps unnecessary, psychiatric treatment. In the other the diagnosis was made at autopsy. In this case psychiatrists were only briefly involved and neurosurgical referral had been made promptly. The authors, who treat these reports as a cautionary tale, conclude by warning psychiatrists to pay special attention to a number of features in the history and examination of psychiatric patients. In particular we are told that suspicion should arise in the presence of gradual non-remitting symptoms such as irritability, memory loss, self-neglect, dysphasia or incontinence in patients without a previous history of psychiatric disease or clear precipitating factors. They also suggest that we pay attention to the views of relatives when they feel the patient suffers from a physical rather than a psychiatric illness, and emphasise that early diagnosis leads to easier surgical removal and better outcome.

Similar reports have previously appeared in the literature and nobody would deny that this is sound clinical advice. On the other hand, it is also important to guard against unnecessary and costly investigations which are unlikely to disclose brain pathology in all but a very small proportion of psychiatric patients. The purpose of this annotation is to consider in some detail the psychiatric manifestations of intracranial, and in particular frontal lobe tumours, the frequency with which they might occur, and the ways they can present to psychiatrists.

The psychiatric manifestations of intracranial tumours

The clinical manifestations of intracranial tumours are determined by the damage or distortion they cause to structures in their vicinity and by the generalised effects of raised intracranial pressure. It follows that some of these features, including psychiatric symptoms, would be common to tumours of different histological types and localisations. Psychiatric manifestations have been reported to occur at some time in half of the patients with intracranial tumours (Hecaen & Ajuriaguerra, 1956). Mental abnormalities can be divided into three broad categories and the description which follows is largely taken from Hecaen & Ajuriaguerra's (1956) classic monograph.

Approximately a third of the patients experience *confusional states* or *progressive intellectual deterioration*. Disorientation with variable clouding of consciousness, indifference to the outside world, euphoria, childishness, and loss of insight are prominent in those with confusional states, while memory disturbance, loss of initiative, bradyphrenia, and bradykinesia are present in those with progressive intellectual deterioration. Papilloedema and other signs of raised intracranial pressure are particularly common in this group and the syndrome is more frequent with tumours involving both hemispheres. A further 20% experience *behavioural and mood disturbances*. Irritability and euphoria with mild psychomotor abnormalities are the commonest symptoms. Depression, hysterical conversion, and paranoid ideas are less frequent. A smaller number exhibit *paroxysmal disturbances* such as poorly formed visual hallucinations and automatisms, which probably indicate involvement of the temporal lobes. Fluctuations in the severity of mental abnormalities are commonly observed within a progressively deteriorating course, and in many cases symptoms from these three categories coexist in the same patient.

Symptoms of confusion and/or dementia are commoner with frontal lobe tumours followed by tumours in the temporal and parietal lobes, and the same applies to mood and behavioural disturbances. Psychiatric manifestations are far less common with infratentorial tumours and in Hecaen & Ajuriaguerra's (1956) series they occurred in approximately 12% of patients. They also reported a greater frequency of mental abnormalities in patients with gliomas (60%) compared with meningiomas (42%) and other space-occupying lesions, and this is undoubtedly due to the greater speed of growth and destructiveness of the more malignant tumours.

The psychiatric manifestations of frontal lobe tumours

The frontal lobes can be divided into two main components: the motor–pre-motor area, and the pre-frontal area. The latter comprises the paralimbic cortex located in the infero-medial part of the frontal lobe and the heteromodal association area placed in the most anterior part of the lobe. Damage to the motor–pre-motor area results in limb weakness, incontinence, akinesia, mutism, apraxia, and Broca's aphasia, while lesions in the pre-frontal areas result in predominantly mental disturbances, the so-called 'frontal lobe syndrome'. Mesulam (1986), in his excellent review of the behavioural affiliations of the pre-frontal cortex, has pointed out the common thread that runs through the behaviour of these patients. Thus, attentional deficits, shallowness and impulsivity of thought and affect, and the preferential vulnerability of types of behaviour that lack external control are the hallmarks of the syndrome. In clinical practice these deficits have protean manifestations, but in a given individual the localisation, size, type, and course of the lesion will determine the clinical manifestations, which in turn will be coloured by the previous personality and age of onset. In general terms, orbitofrontal and anteromedial lesions are said to produce predominantly affective symptoms, while impaired reasoning and lack of mental flexibility follow dorsolateral ones. In the case of space-occupying lesions symptoms of raised intracranial pressure and those resulting from damage to neighbouring structures (e.g. the motor–pre-motor area) will appear in addition to those of the 'frontal lobe syndrome'.

Frontal lobe pathology often results in profound changes in the personality and behaviour, but at times large lesions can be accommodated with little clinical disturbance and this discrepancy has on occasions led to the delayed diagnosis of treatable pathology. The possibility of frontal lobe tumours presenting with isolated mental disturbances is particularly relevant for psychiatrists. Gautier-Smith (1970) studied 213 patients with parasagittal and falx meningiomas presenting to two neurological centres. Psychiatric symptoms were commoner in anteriorly placed tumours and were the first to appear in over a third of those with anterior parasagittal meningiomas and half of those with anterior falx tumours. Headaches were the presenting symptom in another third and epilepsy in over a quarter. The rest presented with a combination of these features. In those presenting with psychiatric symptoms, impairment of consciousness and progressive intellectual deterioration were commonest, followed by mood and behavioural disturbances which rarely occurred in the absence of intellectual impairment. Neurological abnormalities, such as paroxysmal headaches, epilepsy and unilateral limb weakness, were usually present at the time of diagnosis even in those with early psychiatric symptoms. Incontinence, frequency and urgency of micturition were also seen in these patients. A specific association of disturbances of micturition with frontal tumours was found in 14% of a consecutive series (Maurice-Williams, 1974), and contrary to common belief, the patients were distressed by their presence. The correct diagnosis, even in those presenting with psychiatric features, tends to be made early. In Gautier-Smith's (1970) series only a few patients had experienced psychiatric symptoms for more than two years, and with the use of new imaging techniques the delay in diagnosis is likely to be shortened further. Thus in Chee *et al*'s (1985) study over half of the patients had been correctly diagnosed less than a year after insidious intellectual impairment was first noticed.

How often are frontal lobe tumours misdiagnosed as psychiatric illness?

Anecdotal reports originating from psychiatric hospitals have described patients with frontal lobe tumours in whom psychiatric symptoms had been present for many years before the correct diagnosis was made. Hunter *et al* (1968) described three patients who had been ill for 3, 25, and 43 years. Dementia was prominent in two of them while the third, with the longest history, had florid delusions and hallucinations. In these patients the psychiatric symptoms were accompanied by epilepsy, incontinence, and eventually by signs of raised intracranial pressure. However, such occurrences, like the report which has prompted this article (Maurice-Williams & Dunwoody, 1988), are probably very infrequent.

Much of the evidence suggesting that cerebral tumours may be misdiagnosed as psychiatric illness accrues from post-mortem studies carried out in mental hospitals. These studies, published long before modern imaging techniques had become available, are unlikely to reflect the current frequency of such misdiagnosis. In one of the most comprehensive studies sampling several North American psychiatric hospitals (Morse, 1920), the prevalence of intracranial tumours, a third of which were frontal, was between 1.3% and 2.6%. Over a third of the patients were either mentally subnormal and had entered the hospital many years previously or had long-standing psychosis before symptoms

attributable to the tumour became apparent. In such cases, it seems unlikely that the neoplasms were responsible for the psychiatric disturbances, although they may have aggravated or modified them at a later stage. This point has recently been emphasised by Law (1988), who quotes an annual incidence of 6.6 per 100 000 of primary tumours of the central nervous system in the UK. Given the high overall incidence of psychiatric illness, the chance occurrence of both conditions in the same patient is to be expected.

More up-to-date information on the prevalence of intracranial tumours in psychiatric populations can be obtained from some recent studies using computerised tomography (CT). Larson *et al* (1981) surveyed retrospectively 123 psychiatric patients who had undergone CT to exclude the presence of brain pathology suspected on clinical grounds. Three patients were found to have brain tumours, one of them frontal, and a further three had subdural haematomas. All six patients had neurological abnormalities on examination, while this was not the case for those with normal CT. The high frequency of neurological abnormalities in this series suggests that the prevalence of brain pathology is likely to have been considerably higher than in unselected psychiatric populations.

More recently Roberts & Lishman (1984) have reported the results of the CT scans in 323 patients examined at the Maudsley Hospital over one year. Some of these patients were scanned to exclude the presence of clinically suspected brain pathology, while others were patients suffering from major psychoses or alcoholism investigated for research purposes. Ventricular and sulcal enlargement were the commonest CT abnormalities. Only one patient in the series had a brain tumour, a parieto-occipital astrocytoma. Three others had infarcts or intracerebral haematomas. In most cases, brain pathology had been suspected because of the previous occurrence of 'organic' events (e.g. head injuries, epilepsy, etc.) or because of neurological abnormalities. As a result of the study the diagnosis was changed from 'functional' to 'organic' in two cases and in most patients the CT findings did not lead to new therapeutic approaches.

The prevalence of intracranial neoplasms varies depending on the psychiatric diagnosis. In the Morse (1920) series, intellectual decline and impaired consciousness were the main features in those in whom the neoplasm was likely to have been the cause of the mental abnormalities. Intracranial tumours have also been found in patients undergoing investigations for dementia, although frontal lobe tumours do not appear to be over-represented in these studies. Before CT, Marsden & Harrison (1972) found eight space-occupying lesions, none of them frontal, in the 106 patients referred to them with the presumptive diagnosis of dementia. A similar proportion of tumours, in this case gliomas in unspecified locations, was detected by Victoratos *et al* (1977) using pneumoencephalography, and by Smith & Kiloh (1981), one of whose patients had a left frontal astrocytoma. Using CT, Jacoby & Levy (1980*a*) found a corpus callosum tumour and a right frontal subdural haematoma in a group of 40 elderly demented patients. The need to investigate dementing patients does not need to be emphasised here, but the detection and removal of intracranial meningiomas has frequently lead to substantial clinical improvement even in those with long-standing symptoms (Chee *et al*, 1985).

The association between intracranial tumours and schizophrenia is less close. Psychotic symptoms were rare in the Morse (1920) series, and Davison & Bagley (1969), in their review of previously published cases, suggest that while the incidence of schizophrenia may be increased in patients with temporal and pituitary tumours, this is not the case with those located in the frontal lobes. In a group of 268 patients examined during their first episode of schizophrenia, Johnstone *et al* (1987) failed to find intracranial neoplasms in the 15 who had organic brain disease considered relevant in the causation of the psychiatric symptoms. Frontal pathology was also rare in the series of chronic schizophrenics reported by Owens *et al* (1980) who discovered unsuspected intracranial lesions in 12 of 136 patients using CT. Three of them had frontal or fronto-parietal infarcts which probably occurred many years after the onset of their illness and a fourth had a left frontal meningioma. This patient, a woman in her 70s who had been first admitted to hospital ten years previously, had a positive family history of schizophrenia and had responded well to phenothiazines. Her refusal to undergo surgical treatment made it impossible to unravel the link between the two conditions.

Intracranial tumours appear to be equally rare in patients suffering from strictly diagnosed affective illness and in whom the neurological examination was also normal. Thus Jacoby & Levy (1980*b*) did not find any tumours in 40 carefully selected elderly depressives who had undergone CT, and the same was the case in 108 younger patients investigated by Dolan *et al* (1985).

Conclusion

Occasional reports of psychiatric patients who are found to have brain tumours, perhaps more often

in the frontal lobes, have appeared in the literature for many years and may continue to do so from time to time. Failure to make the correct diagnosis has serious implications, as early surgical treatment carries a better prognosis. However, to perform costly investigations for every psychiatric patient because of the rare chance of finding a brain tumour is unnecessary and wasteful. In this age of advanced technology, a detailed clinical history and a careful physical examination are still the best predictors of brain pathology. For the patient with a suspected brain tumour, CT using enhancement is the investigation of choice, although magnetic resonance imaging (MRI) provides a superior visualisation of lesions in the posterior fossa. Other investigations such as electroencephalography are far less sensitive and should not be relied upon to exclude the presence of a brain tumour.

In terms of psychiatric diagnoses, patients suffering from strictly defined schizophrenia or affective illness are unlikely to have intracranial tumours if neurological symptoms and signs are absent, and the same applies to those with more clearly 'neurotic' symptoms. The search for brain pathology in these patients is bound to prove fruitless. On the other hand patients with intellectual deterioration, impairment of consciousness, unexplained personality changes of the 'frontal lobe' type, incontinence, or suspected raised intracranial pressure should be thoroughly investigated. Finally, we need to remember that intracranial tumours and other brain pathology may appear in patients with primary psychiatric illness and that it is necessary to keep the neurological status of chronic psychiatric patients under review.

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