

SOME PRELIMINARY REMARKS ON PREFRONTAL LEUCOTOMY.*

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THE operation of prefrontal leucotomy first performed by Moniz (1) in 1936 in Lisbon will be by now more or less familiar to most psychiatrists, on paper if not in actual practice.

At first sight the operation would appear to be a revolutionary proceeding; and so it is in some ways. It is, however, no more drastic than the convulsion or insulin treatments in which the patient is near enough the line which separates life and death.

It is my intention to consider, rather inadequately I am afraid in the time available, two aspects of the operation which are causing considerable discussion and criticism. I shall endeavour to meet some of these criticisms, and point out possible lines of investigation which it is felt might provide us with some information of value as to the actual functions of the frontal region of the cerebrum.

Our knowledge of the function or functions of the frontal lobes is at present in a state of considerable uncertainty. Erickson (2) has recently stated that the fact that some patients with absence of the frontal lobes cannot be distinguished from normal persons by the usual tests almost makes one assume that there are many so-called normal persons who do not employ their frontal lobes in everyday life. He draws attention to the startling opinion expressed in certain quarters that the frontal lobes are biological luxuries; in fact an eminent evolutionist has spoken of them as parasitic growths! The removal of these neoplastic redundancies would appear to be a therapeutic procedure of value if these statements were true.

The two aspects I wish to consider are (1) the type of case suitable for this operation, and (2) the possible impairments of mental function which may follow.

Moniz included in his score all types of mental illness except dementia, but the recent tendency in America at any rate is to confine the operation largely to those cases exhibiting worry in either its mild or extreme forms. This throws the net over a rather wide area, ranging from severe agitated depressions to various mild anxiety states. The one clinical symptom which is important is the presence of *anxiety*.

Before considering the results offered by this operation we should discuss the prognosis in involuntional depressions. The prognosis in cases of depression appearing after middle life is not as a rule very good. The duration of the illness is long—Henderson and Gillespie (3) tell us that we need not despair up to the end of eight years; but that is a very long slice out of a patient's life. The presence of severe hypochondriasis is usually of bad prognostic import. According to these authors, if the affect is well maintained then the prognosis is reasonably good. Palmer and Sherman (4) have shown that in 62 per cent. of cases of involuntional melancholia the prognosis is bad. All those patients with a bad outcome had shown a very narrow and restricted outlook during their lives. In a high proportion of cases a paranoid element is present, but as a general rule these patients show a remarkable intellectual clarity. The older the patient with involuntional melancholia the worse the prognosis, i.e. of patients over 50, 80 per cent. do not recover. Brussel (5) largely agrees with Palmer and Sharman. He thinks that the outlook is distinctly favourable in those patients who have made a definite suicidal attempt prior to hospitalization. Brew and Davidoff (6) on the other hand consider that prognosis varies little with the presence or absence of unhealthy early personality traits. According to Mapother and Lewis (7) a first attack of involuntional melancholia clears up in two-thirds of the cases provided there is no vascular disease. Noyes (8) states that about 40 per cent. of cases recover. He considers that the expression of pronounced depressive ideas or the monotonous reiteration of complaints with little accompanying affect is of bad prognostic import.

Amongst the group of involuntional depression good results have been obtained

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by convulsion therapy, some workers claiming up to 85 per cent. of recoveries—a very high figure in a group with an unfavourable prognosis.

We are then faced with the choice of convulsion therapy, preferably by electric shock, or using what is not nearly so drastic a procedure really, a prefrontal leucotomy in which the white matter coming down from the cortex of the frontal lobes is severed by means of a blunt instrument.

Freeman (9) considers that the results of the operation are due to dividing a tract of fibres passing from the frontal cortex to the thalamus. After the operation, the nucleus medialis dorsalis of the thalamus degenerates, and there is some atrophy of the frontal poles. The anatomical result would appear to resemble superficially what we find in Pick's disease, and it will be interesting in the future to compare the results of psychological tests in the two conditions.

We have now to consider what the likely psychological results of the operation are. What functions are impaired and to what extent? We here come up against very complicated problems. Freeman maintains (9) that the frontal lobes are concerned with the projection of the total individual into the future. This makes the frontal lobes' function a higher one than merely solving problems and remembering previous knowledge. The function is concerned with foresight, and more particularly that foresight which orders the planning of the individual's relationships with himself, his environment and the future. The patient, after his operation, is considered by Freeman to be lacking in what he terms self-consciousness. He finds that the more complete the removal of the frontal tissue the more striking is the loss of consciousness of self. At the same time the affective component is reduced. It is this removal of the consciousness of self that is the important factor in the treatment of involuntional melancholics. The agitation and worry over ideas of guilt, unworthiness, sin, venereal disease and a host of hypochondriacal ideas vanish. The patient achieves peace of mind, and the presence of this is one of the most gratifying therapeutic results it is possible to obtain, especially in cases which have been the subject of a concentrated therapeutic attack over a period of many months.

We have not yet arrived at a stage in this admittedly experimental procedure where we can say to a patient who has suddenly developed a depression at the age of 60 and put her head in a gas oven that she should at once have a prefrontal leucotomy performed, but we may very easily come to that. I feel myself that when the peace of mind which is obtained from this operation becomes widely known there will be a demand for it at a very early stage in the depressive illness, and although it may appear rash to prophesy, I firmly believe that there will be a diminution in the suicide rate. Suicide outside mental hospitals has up to the present baffled all attempts to deal with it, and so many people who attempt it have been depressed for a considerable time and seek their only way out. Freeman reports that in a series of 100 cases discharged from hospital after shock therapy, 6 per cent. committed suicide within three years—he does not say how many attempted it but failed.

So much for the positive side of the picture; now what are the defects which appear? The question we are almost invariably asked by the relatives when requesting permission to carry out this operation is, Will there be any intellectual impairment—will the patient be "an imbecile", or permanently weakminded?

It is rather difficult to answer this question in the present state of our knowledge. My own practice in discussing the operation with relatives is to ask them which condition they consider the more desirable, peace of mind together with some possible impairment of intellectual ability, or the eternal misery and torture that the uncured melancholic suffers.

It has been known for a long time that removal of the frontal lobes either by disease or tumour gives rise to considerable euphoria, lack of control, and other symptoms which are gathered together under the term of "witzelsucht." After prefrontal leucotomy there may be present in some cases a milder degree of this syndrome, consisting of a tactlessness and tendency to blurt out the first thing that comes into the mind. There may be a certain lack of dignity.

There is a wide field for psychological testing, estimating various social aspects of personality, in addition to the more usual estimating of intellectual attainments. Nichols and Hunt (10) discovered defects although the patient in question had an intelligence quotient of 120. It is, of course, necessary to perform all tests before

and after operation, and this procedure is being carried out as we accumulate more cases. Results are not yet available, as it is necessary to wait six months, preferably twelve, before deciding what changes exactly have taken place.

Results so far indicate that there is some impairment of abstract thinking, but that the intelligence quotient does not show a great deal of impairment—nothing like as much as one would anticipate. Rylander (11) found in a series of 32 cases that after total excision of the frontal lobes for a variety of causes there was a decrease in the mean of intelligence quotients of his subject from 93.97 to 83.75. This is not a very great fall, and would hardly be noted by relatives or even by anyone unless tested for. This raises certain social problems. Up to the present for assessing the vocabulary level I have used the vocabulary test of the Shipley-Hartford scale (12), for assessing the Intelligence Quotient the Cattell Scale IIIA, and for testing abstract thinking the second part of the Shipley-Hartford Scale. The Shipley-Hartford Scale is very useful for comparing the subject's pre-operation level as gauged by the vocabulary test with his level as gauged by the abstract thinking test. The relationship between the two tests is expressed as a conceptual quotient. More recently we have added to our battery of tests two tests which Capps has described (13), one a categorization test which has a high and significant correlation with deterioration, and the other a homograph test consisting of twelve words each of which has a minimum of five different meanings. The subject is asked to give as many meanings as he can in two minutes; compound words are not allowed to count. The number of meanings given is then plotted on a graph.

It cannot be too strongly emphasized that the ordinary clinical examination of patients by means of general conversation and general assessment of improvement or otherwise is far too inaccurate. It is quite possible for a patient to have a very good social appearance—the Social Front—and have at the same time considerable mental impairment, which is only revealed by systematic psychological testing.

At the same time testing does draw attention to possible errors which occur, particularly in the involuntional type of melancholia. The patient is considerably inhibited, and as most of these tests are on a time basis, the score returned may be below the best the patient can do when he is able to concentrate better on the task. I have recently had three male patients, two of whom had been successful bank managers, and the third a successful business man who had made a colossal fortune in the last war and been made controller of a certain branch of trade. All these men were about 63 years old; the business man was still in business and doing well, the two bank men had recently retired at the age limit. All three made a very poor score on the Shipley-Hartford test, particularly the second half, dealing with abstract reasoning. If these three men should have leucotomies performed on them we may find them returning a very good score compared with what they did prior to operation. These three patients, when allowed to continue for twice the normal time, were not able to add much to their performance.

In these few remarks I hope I have indicated that we did not "dash in with careless rapture to mutilate the frontal lobes," even if it is true that one of our patients, of non-Aryan descent, did request a nurse to "lacerate his brains" some twelve months before Moniz published his first paper!

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