

## FUNCTIONAL NEUROSURGERY IN PSYCHIATRIC ILLNESSES

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Advances in the treatment of psychiatric illnesses have made it possible to use neuropharmacological drugs, in many instances, thus diminishing the need for somatic type of invasive treatment. However there still remains a core of patients with psychiatric illnesses for whom continued attempts at treatment with psychotherapy and drugs have not yielded good results. Such cases deserve consideration for treatment by other methods. One of the areas where such treatment is available for these intractable patients is in the field of functional neurosurgery.

All psychiatrists are familiar with the history of prefrontal leucotomy proposed by Moniz in 1935 and later popularised by Freeman and Watts (1952). A large number of operations were performed in the forties and fifties of this century. Govindasami and Rao (1944) published the first series of leucotomies in India. Kolb (1953) reviewed 10,000 cases and reported that the success of such surgery was dependent on the adequacy of the post-operative care and the attitude of relatives. Elithorn and Slater (1956) reported the views of relatives and of patients who had undergone prefrontal leucotomy. They found that in a series of 103 patients, 65 were happy to have had the operation, 11 regretted it, three thought it was a mistake and 23 were indifferent. Of 93 relatives interviewed, 72 thought the patient was better off. Miller (1967) in a ten-year followup of patients who under-

went leucotomy for mental illness between 1948 and 1952 found that 61% were working in the community. However it was obvious that, though about 60% of the patients improved, there were many who showed deterioration in their intellect and some who were reduced to a vegetable state. This led to a large scale condemnation of the type of surgery that produced such large lesions in the brain. Efforts were made to limit the ablation to only the effective and concerned areas of the brain. As early as 1949, Scoville devised modified leucotomies to obviate the unsatisfactory side effects. Sargant (1953) pleaded for confining the leucotomy to only the medial inferior quadrant of the frontal lobe. Lesions in this area divide the fronto-hypothalamic connections which run just above area 13 (Knight and Tredgold 1955).

Fulton (1947) suggested cingulotomy as a form of restricted leucotomy (Ballantine *et al.* 1967). Since then our knowledge of the indications for cingulotomy and the precision of our techniques have increased. Cingulotomy for drug addiction was initiated and popularised in India by Balasubramaniam *et al.* (1974).

With the advancement in our knowledge of the functional tracts in the human brain and with the advances that have taken place in the stereotactic techniques of brain surgery, it is now possible to place a small lesion in any desired area of the brain accurately and with great precision. This has proved to be a great benefit in the

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treatment of many functional neurological disorders like abnormal movements, epilepsy, pain relief as well as in psychiatric disorders. Such techniques of precise placement of stereotactic lesions in the brain preclude any lasting damage to the personality of the patient or any deterioration in brain function.

In spite of many reports on the value of such precise surgery on the brain in the treatment of specific psychiatric illnesses, there has been a general reluctance on the part of psychiatrists in our country to select and refer suitable cases for such relief. It is the purpose of this presentation to place before psychiatrists the results of functional neurosurgery for their critical assessment. Experience of 30 cases who had undergone stereotactic surgery for psychiatric illness are presented. Surgical therapy was found most helpful in cases of (1) depression, (2) obsessive compulsive neurosis and (3) drug addiction.

#### MATERIALS AND METHODS

Thirty cases have been treated during the period of 7 years from 1972 to 1979. All these cases had undergone sufficiently prolonged and regular psychiatric therapy only with marginal benefit. The average duration of medical treatment was 3 years, the longest being 8 years and the shortest 18 months. All the cases had been seen by at least two psychiatrists who have agreed with the decision to carry out surgical therapy.

The indications for the surgical treatment were (1) depressive psychosis in 11 patients (2) obsessive compulsive neurosis in 10 patients (3) drug addiction in 9 patients.

Pre and post operative psychological assessment was done for attention, memory, visiomotor coordination, perception and personality.

The apparatus used as the Leksell's stereotactic apparatus. It is possible by

using this technique to place a burrhole in any desired part of the skull nearest to the target and make precise lesions. After fixing the stereotactic frame to the head, the ventricular system is outlined by introducing air into the ventricles. The ventricles may also be outlined by contrast material like pantopaque, as in amygdalotomy. Calculations are made for enlargement due to radiological factors and precise coordinates are calculated in the X, Y and Z axis. Based on the above calculations an electrode is introduced to the target. The lesion is made by introducing wax mixed with myodil. Smaller lesions can be made by diathermic coagulation. It is thus apparent that this technique makes it possible to make small or large lesions accurately in the desired target in the brain.

Of the total number of 30 cases operated, 11 had baso-frontal tractotomy and 19 were subjected to cingulumotomy. Basofrontal tractotomy was preferred for patients with chronic depression and cingulumotomy for obsessive neurosis and for drug addiction. The operations were always bilateral, these small lesions placed on one side only do not influence the underlying psychiatric process. Five cases had combined lesions both in the cingulum and in the basofrontal region. Combined lesions were made in chronic long standing cases where the psychiatrists felt that a double lesion is more likely to be beneficial.

Repeat cingulumotomy became necessary in two out of 19 cases. This was due to the fact that a smaller lesion made in the cingulum bundle did not benefit the patient as seen in the immediate post-operative period.

#### RESULTS

Above cases have been followed for a period ranging between one to seven years. In the immediate postoperative period, in the combined operation of basofrontal

tractotomy and cingulumotomy, the patients become unusually quiet for a short while. This phase usually lasts for about 10 to 15 days after which the patients regain their normal vigour. This phase is not seen when only basofrontal or cingulumotomy lesions are made. No patient had any other neurological deficit like dysphasia, incontinence etc. even as a transient phenomenon.

*Functional Neurosurgery in Psychiatry (1972-1979)*

Basofrontal Tractotomy (11 cases)

Leading a useful and independent life .. .. .	6
Normal—Not leading independent life .. .. .	3
Transient Improvement ..	2

*Cingulumotomy for obsession (10 cases) results*

Complete relief	5
Recurrence after 3 weeks to 3 months	4
Repeat cingulumotomy with relief	2
Addition of Basofrontal tractotomy with relief	2
No lasting relief	1

*Drug addiction (9 cases)*

	No. of Relief cases	
Morphine	3	3
Pethidine	4	3
Alcohol	2	1

Of the 11 cases of basofrontal tractotomy, six were leading a useful and independent life and two showed transient improvement.

Of the 10 cases of cingulumotomy for obsessive neurosis, five had complete relief; four patients had recurrence of symptoms after a period of three weeks to three months. In these four patients, two had a repeat cingulumotomy with relief and in

two others, basofrontal tractotomy was performed, again with relief. One of these 10 cases had no lasting relief. These cases have now been followed up between three to five years.

The results of drug addiction have to be viewed with reference to the individual drugs. Good results were seen both in morphine and pethidine addiction. All the three cases of morphine addiction and three out of four cases of pethidine addiction were completely relieved. These cases have now been followed up between three to five years. In two cases of alcohol addiction, only one had relief.

It is necessary to stress here that in morphine and pethidine addiction, the drug can be withdrawn immediately after cingulumotomy has been done without any deleterious effect. They do not suffer from the withdrawal syndrome. This is an important factor to be considered when advising surgical therapy for morphine and pethidine addiction.

Followup psychological testing after four to six weeks has not revealed changes in attention, memory, coordination or personality. When the results of surgery are good, the disappearance of psychiatric features makes the patient more acceptable to himself and his relatives and friends.

#### CONCLUSIONS

The above experience with thirty cases with a followup ranging from one to seven years shows that in certain intractable cases of depression and obsessive measures, precise stereotactic techniques of basofrontal tractotomy and cingulumotomy provide a valuable method of providing relief and need to be considered as one of the accepted methods of psychiatric therapy.

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