BILATERAL CINGULO-TRACTOTOMY

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Men ought to know that from brain and from brain only arise our pleasures, joys, laughter, and jests as well as our sorrows, pains, griefs, and tears. Through it in particular we think, see, hear and distinguish the ugly from the beautiful, the bad from the good. All that we suffer comes from the brain. That is why I hold that the brain is the most powerful organ of the body.

HIPPOCRATES

The purpose of the present study has been twofold: first, to develop a comparatively safe, simple, selective and effective operation that will eliminate or diminish as much as possible a patient’s psychosis and/or pain, at the same time leaving intact most if not all of his personality, and second, to apply this operation to psychotic patients, especially early and untreated schizophrenics, as the first and not the last resort. In developing this method there have been taken into consideration the neurosurgical virtues of “open” technic (actual visualization, selective section and complete haemostasis) and the nonsurgical merits of the “blind” procedure (conservatism, speed and simplicity). In short, bilateral cingulo-tractotomy is Poppen’s bimedial lobotomy made more selective and less destructive.

The material to be presented is unique in that it is Eastern. Eastern mentality and outlook differ in many respects from the Western. Jung’s “collective unconsciousness” helps to explain some of the Easterners’ views. On the whole they are more primitive, dependent and fatalistic.

For the successes Allah is praised.
For the failures doctor is blamed.

ANATOMICO-PHYSIOLOGICAL CONSIDERATIONS

After the epoch-making operation of Moniz and Lima, Papez advanced the hypothesis that the hippocampus and the structures closely connected with it, such as the cingulate gyrus, orbital surface of the frontal lobes, and temporal cortex, and the association fibre tracts act as a neuronal substrate for emotions. Since then neuroanatomists and neurosurgeons have concentrated on this area.

Le Gros Clark showed how the prefrontal lobes are connected with the thalamus and the hypothalamus by so many fibres passing in both directions that this entire system may be considered as functioning as an integrated whole. . . . The activities of the nervous complex consisting of prefrontal lobes, thalamus and hypothalamus are correlated with some of the higher intellectual activities, the personality, emotional affects and forms of be-
haviour of social significance. Fulton and his co-workers divided the forepart of the brain into two major divisions: (1) The “visceral brain,” which includes midline structures, and corresponds roughly to Papez’s neuronal substrate for emotions; and (2) the so-called “neocortex,” which occupies the lateral surface of the cerebral hemispheres and is most prominently developed in man. The visceral brain, which operates through the hypothalamus, is concerned with the integration of emotional responses, whereas the neocortex of the lateral surface is concerned with the integration of learning and the more highly intellectual functions. This “visceral brain” is the present-day target in psychosurgical operations.

There is an area of forebrain (Brodmann’s Area 32) that does not belong to the visceral brain, but it is unavoidably destroyed by lobotomy. This mysterious area is subjected to intensive suppressor influences. Meyer and McLardy have referred to it as a nodal point of considerable physiological activity between cortex and subcortical basal ganglia. That it has some concern with cortical activities underlying rather complex psychological processes is suggested by the few observations that have so far been made on the clinical effects of interference with some parts of the hippocampal circuit.

The writer is of the opinion that the destruction of Area 32 is contributory to a successful result. Cingulo-tractotomy passes through Brodmann’s Areas 8 or 9, deliberately destroys Area 32 and partly destroys Areas 24 and 11. It also interrupts most of the projections of the visceral brain (Fig. 1).
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OPERATIVE TECHNIQUE

Preliminary medication consists of morphine gr. 1/3–1/6 and scopolamine gr. 1/150 administered subcutaneously. Nembutal gr. 1.5 is given orally 1 hour pre-operatively. In cooperative patients the whole operation is done under local anesthesia. In other cases pentothal sodium is used.

In the female patient, the frontal half of the head is shaved. In the male, all of the head is shaved. The patient is placed in a semi-Fowler position. The head is prepared and draped in the usual manner. Two parallel incisions, usually 4 cm. in length, in a sagittal plane are made 2.5 cm. from the midline, beginning just in front of the coronal suture and ending behind the hairline. Two mastoid retractors are applied. By means of an electric drill two 1 cm. burr holes are made 3 cm. in front of the coronal suture and 2.5 cm. from the midline. The dura mater is incised in a cruciate manner and its edges are cauterized, thus insuring an almost 1 cm. exposure of the cortex, covered with pia arachnoid and pia mater. The latter two structures together with intervening blood vessels are cauterized and cut. The 1 cm. exposed cortex is cauterized and removed. The incision is deepened until the white matter is seen.

A ventricular needle is introduced and directed towards the edge of the sphenoid wing. A second needle tract is then made more posteriorly at an angle with the first tract at less than 25° down, just missing the anterior horn of the ventricle. Sometimes it has actually entered the ventricle. Between these two tracts lies the desired plane of section. The combined tip is introduced in the first tract. The tip is turned mediodiagonal posteriorly and with a kind of stroking movements from below upwards the brain tissue is cauterized in a medial and slightly posterior direction until a rubbery feeling is encountered, which means that the falx has been reached. Most of the cauterization is done under vision (using a head light or, better still, a lighted round Sjöqvist retractor). Cauterization is continued medially superiory until the lower border of the sagittal sinus is reached. Then the Gigli guide is introduced and directed medially towards the falx to complete the leucotomy. Complete haemostasis is secured (Fig. 2).

The same procedure is performed on the other side. The burr holes are plugged with two 1 cm. circular pieces of gelfoam. The wound is closed with silk sutures, and dressed with gauze and elastoplast.

The patient is very little disturbed except that the blood pressure falls, for example from 120–90 Hg mm., in from a few minutes to a few hours. It then gradually rises to its preoperative level.

MATERIAL

Cingulo-tractotomy was performed on 28 patients. There were 18 cases of schizophrenia, 1 case of depression, 1 of paranoia, 1 of sexual psychopathy, 1 of intractable pain caused by inoperable intramedullary tumour, and 6 cases of idiopathic epilepsy.

I. Schizophrenia. The 18 schizophrenics have been divided into two groups: (a) recent and previously untreated patients, and (b) chronic schizophrenics who have undergone all kinds of treatments, including electric shock therapy.

(a) Recent (5 cases). All of these patients were males. Four, whose ages ranged from 18 to 25 years, were operated upon during the first 2 weeks of
their illness. All made complete recovery. The fifth patient, who had had a course of 6 treatments with electric shock without much improvement, was operated upon 1 month after the onset of his illness. He too made a good recovery. He said: "The operation hurt me much less than the electric shock."

All 5 patients went to their homes within 2 weeks, and returned to their work within a month.

(b) Chronic (13 patients). There were 4 women and 9 men in this group. The duration of their illness was from 2 to 8 years and their ages ranged from 19 to 52 years. These patients had had all kinds of treatments previously, including insulin and electric shock therapy. Two of them had also had a previous leucotomy.

Three of the patients (1 female and 2 males) were in excellent condition after the operation. They went back to their homes within 2 weeks, and were at their jobs within a month. However, 2 of these suffered a relapse after 4 months. One was given Cartazol therapy, and although there was some improvement, he did not return to his postoperative status.

Five patients (3 males and 2 females) improved after the operation and all of them were sent home. Their parents and relatives thought they were less aggressive and more manageable than before. They were unable to work, although some of them could do knitting, gardening, etc. at home.

Four patients (1 female and 3 males) were not benefited by the operation.
They were not made worse. Three of these subsequently had a bilateral prefrontal lobotomy; there was no improvement, and 1 of these patients died from self-induced infection after the lobotomy.

II. *Heterogeneous Group* (depression, paranoia, sexual psychopathy and intractable pain). The 4 cases in this group are presented in the following brief reports.

*Depression.* The patient, a 42-year-old Mullah, was an intelligent man. He had been very much depressed for the last 6 months. He thought a great deal about Heaven and Hell. He could not sleep and smoked heavily. He was contemplating suicide. He had had all kinds of treatments without much help.

After the operation, he ate well, slept well, and was euphoric. He said, "Doctor, before the operation I was in Hell, now I am in Heaven."

*Paranoia.* A 60-year-old woman suffered from hallucinations, delusions of persecution, and insomnia. She had become a morphine addict. She complained a great deal from hallucinations of camels and buffaloes rushing into her bedroom. She had various sensations of itching, burning, etc. all over her body. Because of her weakness it was decided to do a unilateral cingulo-tractotomy.

Postoperatively she was free from addiction to drugs and most of her complaints ceased. She can sleep without morphine.

*Sexual Psychopathy.* A 63-year-old man had become sexually perverted and bestial. He would not have sexual intercourse with his wife, but would try with cows and other animals. During operation gross organic changes and atrophy were evident in his brain.

After the operation he was apathetic for a month. Lately it has been reported that he has reverted to his old habits.

*Intractable Pain.* A 56-year-old diabetic suffered from an inoperable intramedul- lary tumour at T9-L1. He complained constantly of severe pains. He had an automatic bladder and was constipated. His mind had become unstable. He had attempted suicide twice.

After the operation, not only his pain but his spasms (mass reflexes) disappeared for 2 months. The spasms gradually began to reappear. He used to describe his experiences with pain without affect, just as though it belonged to someone else. His mental status is stable and he has not attempted suicide. The disappearance of mass reflexes after the operation is interesting. The writer has no explanation for this phenomenon. Their reappearance is a source of worry for the patient and his relatives.

III. *Idiopathic Epilepsy.* The 6 cases in this group will be reported in detail at a later date after a longer follow-up study. Now, 1 year after the operation, it may be said that the results are encouraging.

**RESULTS**

Of the 18 schizophrenes, 5 were operated upon soon after the onset of their illness. Four, who had had no previous treatment, were operated upon within 2 weeks, and 1, who had had recent electric shock therapy, was operated upon within a month. All 5 made a good recovery and returned to their work.

The 13 remaining schizophrenes had previously been subjected to many
types of treatment, including electric shock therapy. Only 1 of these patients made a permanent recovery after cingulo-tractotomy. Two were well for 4 months and then suffered a relapse. Bilateral prefrontal lobotomy was subsequently performed on 3 patients in this group without improvement.

Of the 4 patients in the heterogeneous group all were improved with the exception of the sexual psychopath.

COMPLICATIONS

Haemorrhage and infection may be prevented by means of careful haemostasis and the administration of Terramycin respectively. There was no postoperative haemorrhage. There was 1 case of self-induced infection (the only mortality in this series).

Vomiting. One third of the patients vomited on the 2nd or 3rd day.

Wetting. About 90 per cent of the patients had this complication from 3 to 7 days postoperatively.

Epilepsy. So far this complication has been nonexistent in this series. The writer believes that its absence may be ascribed to the selective and conservative nature of the operation.

DISCUSSION

It is a contemporary neuropsychiatric truism to apply psychosurgery to chronic and hope'ess cases. Neuropsychiatrists have been mainly responsible for developing this attitude. The neurosurgeons are asked to operate, and are too willing to oblige, still forgetful of von Bergmann's advice, which was also stressed by Horsley and reiterated by Cushing—a neurosurgeon must be his own neurologist. [May I add—and familiarize himself with neuropsychiatry. For is not every operation an experiment in neuropsychiatry and neurophysiology?]

Although "team work" and "group practice" are essential in modern therapy, let no neurosurgeon forget that more important than cooperation with his colleagues is his own independent judgment. Furthermore in the last decade neurosurgeons have concentrated on improving psychosurgical "hows" and neglecting its "whens."

Now having made psychosurgery comparatively safe for the patient, let us make the patient "hopeful" for psychosurgery. In my opinion this "hopefulness" depends above all on submitting the patient to surgery early in the course of his illness. I am not unaware of the objections to this opinion that are held by those in the field of neuropsychiatry. I am only presenting a viewpoint and supporting it with some experiments, with the hope that others will repeat these experiments and prove or disprove my viewpoint.

SUMMARY

1. A comparatively simple, safe, selective and effective operation has been described.

2. This operation was performed on psychotic patients.
3. The desirability of early operations, as a first and not the last resort, especially in cases of schizophrenia in which there has been no previous treatment, is emphasized. Five schizophrenics who were operated upon soon after the onset of their illness recovered completely. Of the 13 chronic schizophrenics, only 1 made a permanent recovery.

4. In the heterogeneous group of 4 patients, all made a good recovery except the sexual psychopath.

I wish to express my gratitude to Dr. Salman Faik for referring some of these patients to me, to Dr. Rafid S. Adib for his valuable assistance, and to Sister Asli Malik for her interest in, and devotion to these patients.

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