PARADOXICAL IMPROVEMENT IN HEMIPLEGIA FOLLOWING CORTICAL EXCISION

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Improvement in longstanding hemiparesis has resulted from complete ablation of the previously injured motor cortex. This unexpected result followed the operative removal of epileptogenic lesions in 3 cases of focal epilepsy.

David Ferrier removed the Rolandic cortex of monkeys and proved that here resided an area of motor control. The experiment had been well conceived and its significance was clear. However, observations such as we are about to record show that, although there is abundant clinical evidence to identify the deficit of the hemiplegic patient with that seen following removal of inactivation of the motor area, additional and perhaps more subtle disorder might operate as well during the course of human disease.

Improvement in the control of hemiparetic limbs as the result of excision of sensorimotor cortex seems to constitute a clinical paradox. In each of the patients to be reported, sensorimotor convolutions were excised in order to free the patients of epileptic attacks. In each case the hemiparesis was not made worse, but was actually improved. The observations that we have made are presented in the hope that they may cast light upon the neural mechanisms involved in hemiplegia, spasticity and recovery of motor function in man.

OBSERVATIONS

Before summarizing our observations, abstracts from the records of the 3 patients will be presented.

Case 1. L.W. A 22-year-old girl, was first seen Oct. 12, 1946. She complained of weakness of the right arm and leg and of seizures which were ushered in by sensation in the right arm and movement of the arm.

The weakness of the right arm and leg was first noted when she was a baby of 1 month and epileptiform attacks made their appearance at 11 years. In an attempt to stop the seizures she was operated upon that year by Dr. Charles Frazier. He discovered in the left hemisphere a porencephalic cyst which he unroofed. Attacks became less frequent for a year, stopped for 4 years and then recurred.

Examination in Montreal showed the patient to be a tall left-handed young woman. The right arm and leg were small by comparison with the other side. Movement of these extremities was limited. Her chief difficulty in using them was the stiffness produced by spasticity. She walked with a pronounced limp and used the hand for nothing more than the simplest actions.

The tendon reflexes were exaggerated on the right side and the plantar response was extensor. Two-point discrimination and position sense were severely impaired
on that side and examination of the visual fields showed that she had a right inferior quadratic anopsia.

EEGs gave evidence of a localized epileptogenic area in the left frontal region. “Spikes” and “sharp wave” variations in potential were recorded consistently from this area.

1st Operation. Left craniotomy and partial removal of meningocerebral cicatrix. On Oct. 16, 1946, the left hemisphere was exposed through the cranial defect left at the time of the previous operation. The scalp was found to be adherent to dura and the dura to brain. Anteriorly the frontal lobe appeared quite normal but for a distance of 3 or 4 cm. from the edge of the former opening backward there were dense adhesions.

The patient had two spontaneous seizures during the early stages of the operation. The operation was carried out under local anesthesia but stimulation produced no response from the exposed cortex, possibly because of the attacks. A large excision of abnormal cortex was made in the precentral region (Fig. 1).

Course. The attacks continued to occur, though with decreased frequency. Consequently 8 months later a second operation was undertaken.

2nd Operation. Left craniotomy and removal of meningocerebral cicatrix including the remainder of central area. The brain was exposed a second time using local analgesia. Stimulation now produced both sensory and motor responses in arm and leg as shown in Fig. 1. It was thought that this responsive area was part of the post-central gyrus. There was some cerebral tissue anterior to this gyrus, but no response was obtained upon stimulating this. In the central portion of the hemisphere there was a large fluid-filled cavity. No other responses were obtained by stimulation of its banks.

It was decided to complete the removal of all cortex surrounding the central area of destruction. The patient’s strength of voluntary movement of hand and foot was tested. She was warned that in order to stop the attacks we would have to increase the weakness of hand and foot. The responsive convolution and all other convolutions above the fissure of Sylvius which formed the posterior border of the area of destruction were then removed.

The anesthetist, Dr. Nitikman, then tested strength in the opposite hand and foot and found no decrease whatever!

Postoperative Course. Careful study showed that there was an increase in the two-point and position sense deficit but no increased paresis.

When seen 2 years after operation, she had had no postoperative convulsive