A NOTE ON THE TREATMENT OF INVOLUNTARY
MOVEMENTS OF THE ARM BY RESECTION
OF THE BRACHIAL PLEXUS

CARL J. BRIDGE, M.D., AND GILBERT HORRAX, M.D.
Department of Neurosurgery, The Lahey Clinic, Boston, Massachusetts
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Paralysis agitans, chorea, hemiballism, and tremor resulting from birth
palsies have been attacked surgically for more than 30 years. Various
methods have been used and new ones are being devised. The many
drugs introduced in recent years for control of such involuntary movements
and rigidity have not, apparently, lessened the desirability for surgical
treatment.

The patient whose treatment forms the basis of this report was seen
many years ago before operations on the brain for athetosis and allied condi-
tions could be performed with any degree of safety because of the lack
of modern neurosurgical equipment, such as adequate suction and electro-
surgery. Indeed, in these early years of neurosurgery even transcortical
incisions of a relatively superficial nature were only rarely undertaken and
the idea of an attack upon the basal ganglia could hardly have been enter-
tained. We feel, therefore, that it would be of interest from the historical
standpoint to present the case herein described, and it is also conceivable
that even at the present time the treatment afforded this patient might in
some instances be preferable to operations upon the brain.

HISTORICAL NOTE

In 1924 Hunter advocated sympathetic ganglionectomy for the treat-
ment of paralysis agitans, based on experimental evidence that sympathetic
nerve supply to the muscle helps maintain its tonus. It is known that some
surgeons attempted this, but the absence of reports in the literature attests
to the negative results that must have been obtained.

In 1930 Pollock and Davis reported a case of rigidity of an arm and leg
as a result of paralysis agitans, treated by rhizotomy of the 4th cervical to
the 4th thoracic posterior roots. The operation relieved rigidity of the arm
temporarily, but the extremity went into contracture after operation and
remained in that state.

In 1934 the first intracranial procedure was attempted for the relief of
paralysis agitans by Delmas-Marsalet and van Bogaert. It consisted of
destruction of the dentate nucleus of the cerebellum. It was tried on only 1
patient. Rigidity was improved, but the tremor became worse and the
patient died 10 days after operation.

In 1939 Bucy and Case, following Horsley’s work of 1909, reported one
case of extirpation of the precentral gyrus, an extrapyramidal suppressor area in the cerebral cortex. The "arm" area was removed. It was done in a case of right hemiparesis with coarse unilateral tremor. The operation resulted in partial paralysis. Tremor was abolished and had remained so at the time of the report, 15 months later.

This was followed by optimistic reports, including that of Klemme, who used this method of treating dystonia, paralysis agitans, and athetosis in 100 cases. He stated the "results were amazing," carrying an operative mortality of 10 per cent, a very high rate of rehabilitation, and no recurrence of tremors relieved by this procedure within a 3-year postoperative period. It was pointed out by Bucy on later occasions that considerable paralysis and increase in spasticity were produced by such extirpations, along with the desired loss of tremor.

A report by Bucy in 1948 stated that all operations for treatment of involuntary movements thus far were distinctly experimental and that all were unsatisfactory in several ways. Cortical extirpations, he said, did not affect the progress of the disease, serious contralateral hemiparesis always resulted, and their indications were sharply limited to young patients with severe, nonprogressive unilateral disease.

In 1948 Browder reported section of fibers of the anterior limb of the internal capsule in 15 patients with paralysis agitans, with beneficial results in 6.

Walker reported a case of cerebral pedunculotomy for the relief of hemiballism in 1949. In this procedure one cerebral peduncle was cut across two-thirds to three-fourths of its lateral aspect, with excellent relief of tremor and rigidity, and an eventual sequela of slight weakness of the contralateral arm. We did not find further reports of this operation.

In 1949 Ebin reported a new technique for relief of tremor of paralysis agitans, a combined lateral pyramidalotomy with ventral pyramidal tract section on the opposite side by means of one oblique knife cut. In 1 case this was done bilaterally, with what was said to be a good result. This procedure was carried out also by Oliver who reported in 1950 on 79 patients treated by section of the pyramidal tracts of the spinal cord, by this and other methods. In 19 of this group, the whole lateral column on one side was sectioned in the 2nd cervical segment. This seemed to be the most satisfactory type of pyramidalotomy; only 1 patient was dissatisfied as a result. It gave almost complete relief of tremor, with slight homolateral weakness, slight contralateral weakness and contralateral hemithermoneuropathia the only final sequela. There was no mention of relief of rigidity.

In 1950 Cobb and associates reported a series of 9 cases of paralysis agitans treated by section of "U" fibers of the motor cortex, by an incision in Area 4, following Russell Meyers, who reported a good result in treating a case of hemiballism by this method. However, all 9 of Cobb's cases were failures.

Browder and associates in 1953 reported a "capsular operation" in 2