STUDY OF SOME MOTOR SYNDROMES (RIGIDITY, TREMOR, SPASTICITY AND HEMIDECORTICATION) BY THE CAROTID AMYTAL TEST*

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The application of the intracarotid injection of Sodium Amytal by Wada and Rasmussen1 to study the cerebral speech dominance has provided a useful test to perform other observations in certain neurological disorders. The temporary functional inactivity of one cerebral hemisphere (cortex and basal ganglia) may throw some light on the level of integration of some common motor symptoms observed in clinical neurology.

The well known rigidity and tremor of parkinsonism and the typical spasticity with increase of reflexes and clonus of the classical capsular hemiplegia or that appearing after hemispherectomy have shown in these studies a completely different response to the carotid Amytal test which seems to point to different physiological mechanisms at various levels.

Also these observations, still in progress, were carried out with an aim towards possible therapeutic purposes and the selection of some motor manifestations that could be modified successfully by certain surgical operations at the level of the basal ganglia and thalamus.

Finally the functional block of the residual hemisphere by the intracarotid injection of Amytal in those patients with hemispherectomy also appeared of great interest for the study of the motor and other functions that were carried out in those individuals provided with only one cerebral hemisphere.

MATERIAL

A total of 20 intracarotid injections of 200 mg. of 10 per cent Sodium Amytal were performed under local anesthesia in 16 patients. These could be divided in 3 groups. 1) Parkinsonians with typical rigidity and tremor and 1 patient with postencephalitic action tremor predominant in one arm. 2) Patients with typical capsular hemiplegia of vascular origin with spasticity, clonus and increase of tendon jerks. 3) Finally 4 patients treated several months before by complete hemispherectomy or hemidecortication because of epilepsy and infantile cerebral hemiplegia.

All the patients were studied carefully by several observers immediately after the intracarotid injection of Amytal and the changes were recorded together with their duration.

An electroencephalogram was taken in most cases during the test and also in some of them an electromyogram of different muscles of the limbs with needle electrodes. Occasionally an angiographic control was performed.

We have not observed any immediate or late disturbances following the Wada and Rasmussen test.

RESULTS

A. Rigidity and Tremor. During the period of contralateral hemiplegia induced by the carotid injection of Amytal the rigidity and tremor of our parkinsonian patients were abolished (Fig. 1). These symptoms reappeared in a period between 3 and 9 minutes after the injection and usually the rigidity came back before the tremor. There was no obvious change in the ipsilateral side.

The contralateral hemiplegia lasted between 1½ to 4 minutes after the injection and the tone of the muscles was decreased and the
tendon reflexes were abolished. In the motor recovery we observed first withdrawn movements of the limbs to painful stimuli (beginning from the first minute after the injection), afterwards some movements of the proximal parts (between 2 to 3 minutes) and finally there reappeared the motility and power of the fingers and the hand (between 3 to 4 minutes). Tendon reflexes were present 3 to 5 minutes after the time of injection.

After motor recovery there was a period of about 1 minute in which the normal motility and the absence of the parkinsonian symptoms allowed the performance of movements with great facility. Afterwards the rigidity reappeared progressively (4 to 5 minutes after injection) followed by tremor of the mouth and face (5 to 7 minutes), in the arm (5 to 8 minutes) and leg (6 to 9 minutes). Sometimes the pain secondary to the rigidity of which some patients complained was also relieved during about 10 minutes after the Amytal injection.

Besides these effects on the motor system, which have been followed more carefully, there were some other changes, like a certain degree of confusion and disorientation appearing immediately after the injection and lasting between ½ to 1 minute. In 4 instances of Amytal injection in the left carotid artery there was an obvious disturbance of speech during periods between 1½ to 3½ minutes.

In the electroencephalographic record during the first half a minute after the injection slow activity of theta and delta waves appeared restricted to the hemisphere of the injected side and without changes on the other side. Afterwards the voltage of these slow waves diminished and at 1 to 1½ minutes later the presence of fast rhythms of alpha activity started to appear. Generally between 3 to 7 minutes after the injection there was complete normalization of the electroencephalogram (Fig. 2).

B. Spasticity and Clonus. The intracarotid injection of Sodium Amytal in the contralateral hemisphere of patients with classical capsular hemiplegia or hemiparesis induces confusion and disorientation during ½ to 1 minute and at this period the speech may be slow and difficult. In those patients with clinical aphasia caused by lesions in the dominant hemisphere the disturbance of speech may increase for 3 to 4 minutes but in some patients there is practically no change.

Altogether the motor changes produced by the carotid Amytal test in these cases are less marked than in the parkinsonians as could be expected because of the previous motor defect in the hemiplegic condition. In some patients with a less severe hemiparesis we have seen a complete paralysis which may last from 2 to 5 minutes after the injection; but in others there was only a loss of the