

Ipsilateral Tremor-Like Grasp Reaction in a Patient With Ischemic Stroke

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CASE REPORT

Abstract: Reports of involuntary ipsilateral movements after a stroke are rare, and none have described a patient with both an instinctive grasp reaction and tremor-like movement ipsilateral to the acute stroke lesion. We here report such a patient. A 76-year-old right-handed woman with a past history of left thalamic hemorrhage developed left hemiparesis, an instinctive grasp reaction, and a peculiar involuntary movement of her right arm. This involuntary movement was stereotyped and sometimes rhythmical, with a groping or picking-like action. The lesion responsible for her motor deficits was a broad infarct in the right internal carotid artery territory. We suggest that her characteristic involuntary tremor-like movement was a variation of the instinctive grasp reaction caused by an ipsilateral ischemic lesion that included the frontal lobe. We illustrate her movements with a video, Supplemental Digital Content 1, <http://links.lww.com/CBN/A65>.

Key Words: tremor, ipsilateral, forced groping, instinctive grasp reaction, frontal lobe

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Involuntary movements ipsilateral to a recent lesion are observed in only one in 2500 patients with acute stroke (Ghika-Schmid et al, 1997). To the best of our knowledge, until now only 10 patients with involuntary movements ipsilateral to a cerebral injury have been reported (Table 1). In addition to these 10 patients, an ipsilateral instinctive grasp reaction was reported in one patient (Mori and Yamadori, 1985) and tremor-like movements were described in patients with a grasp reaction (Denny-Brown, 1958; Motomura et al, 1988). However, no patients with both of these findings have been reported.

Here we present a patient with both an instinctive grasp reaction and a tremor-like movement ipsilateral to an acute stroke lesion.

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A 76-year-old right-handed woman was admitted to our hospital in Kumamoto, Japan, with abrupt-onset left hemiparesis. The patient had a long medical history, but this was her first contact with our institution.

Past Medical History

The patient had graduated from junior high school at age 15 years and soon afterward began working in the fishing industry. Around age 20, she lost the tips of the first three fingers of her right hand in an accident while net fishing. She got married in her 20s and from then on she worked as a housewife and farmer. She and her husband had one son. Because of her injury, she had to use her left instead of her right hand to hold chopsticks and write, but she could use a spoon for eating; pick up thin, lightweight objects; and perform most manual tasks, including housework.

At age 61 she suffered a left thalamic hemorrhage that caused a mild right hemiparesis. She was treated at her local hospital. After inpatient rehabilitation, her right hemiparesis had improved enough that she could perform manual tasks as well as before the hemorrhage. She returned to living with her husband and son and running the household. During this time she was also taking anti-hypertensive medications prescribed by her general practitioner.

She had no marked family history of neurologic or other diseases.

Clinical Evaluation

As soon as the patient's left hemiparesis began, she was admitted to our hospital, which is the only comprehensive stroke center in Kumamoto. When we first examined her (Day 0), she was somnolent, with a left unilateral spatial agnosia and moderate left hemiparesis. She had involuntary movements in her right hand and foot, captured on video as she lay at rest on a gurney (Supplemental Digital Content 1, <http://links.lww.com/CBN/A65>):

Scene 1: Tremor-like movement in her right hand. This involuntary movement, a rhythmic shaking at 3 Hz, worsened when she lifted her hand to her face.

Scene 2: A second involuntary movement in her right hand. When she lay with her right hand on her abdomen, the hand repeatedly picked at or rubbed her clothes or abdominal skin, sometimes in a regular and sometimes an

TABLE 1. Clinical Characteristics of Reported Patients with Ipsilateral Involuntary Movement

Age (Years), Sex	Type of Involuntary Movement	Forced or Compulsive Behavior	Other Neurologic Deficits	Type and Location of Brain Lesion in Relation to the Involuntary Movement		Source
				Recent Ipsilateral	Contralateral	
20, W	Bilateral ballism	None	None	Infarct, right frontotemporal lobe	None	Hoogstraten et al, 1986
73, M	Left chorea	None	Left hemisensory loss	Subdural hematoma, left cerebral hemispheric area	Old infarcts, right corona radiata and temporo-occipital lobe	Yoshikawa et al, 1992
55, W	Right ballism	None	Left hemiplegia	Hematoma, right striatum	None	Borgohain et al, 1995
63, M	Left choreoballism	None	None	Infarct, left subthalamic nucleus	None	Crozier et al, 1996
66, W	Right choreoballism	None	Left hemiparesis	Cyst, right lateral ventricle after resection of meningioma	None	Borremans et al, 1996
76, M	Right postural tremor	None	None	Subdural hematoma, right frontotemporoparietal area	None	Lin and Chang, 1997
52, M	Right postural tremor	None	None	Infarct, right midbrain	None	Imai et al, 1997
47, W	Right hemichorea, tremor	None	Left hemiparesis	Astrocytoma, right basal ganglia	None	Krauss et al, 1999: case 1
85, W	Right choreoballism	None	Left hemiparesis	Hematoma, right thalamus	None	Krauss et al, 1999: case 2
87, M	Left ballism	None	None	Infarct, left subthalamic nucleus	Microangiopathy, right periventricular area and brainstem	Renard et al, 2011
76, W	Right tremor-like movement	Instinctive grasping reaction in the right hand	Left hemiplegia	Infarct, right frontoparietotemporal lobe	Old hematoma, left thalamus	Inatomi et al, 2017 (this report)

W = woman. M = man.

irregular pattern. She continued the rubbing motion when she raised her hand to her chest.

Scene 3: Involuntary movement in her right hand and foot. Her right foot shook irregularly or moved in a treading motion. This foot movement was not synchronized with the involuntary movement of her right hand. The involuntary hand movement was stereotypic and sometimes rhythmic, with a groping or picking-like action; the movement occurred during voluntary movements. The patient could not suppress the involuntary hand and foot movements by herself, but they stopped when she grasped something or slept.

Scene 4: Forced grasping and forced groping with her right hand when she saw something or when an object touched her palm or the back of her hand. When the examiner (author Y.I.) touched the back of her hand with a pen, she groped for and grasped at it. Once she had the pen, she held it tightly and would not release it. This behavioral abnormality was compatible with an “instinctive grasp reaction” (Seyffarth and Denny-Brown, 1948).

We did not see the patient engage in utilization behavior or compulsive manipulation of tools.

The neurologic exam also revealed that the patient had a subcutaneous hematoma on the right flexor surface of her right upper arm. She had not hit or scraped her arm. Rather, the hematoma had been caused by the violence of her involuntary movements.

T2-weighted magnetic resonance images taken on Day 0 showed an old hemorrhage in the left thalamus and multiple lacunes in the bilateral basal ganglia (Figure 1, Panels A to D). On Day 4, diffusion-weighted images (Figure 1, Panels E to H) revealed broad hyperintense lesions in the right frontoparietotemporal lobes, insular cortex, striatum, and internal capsule, with a decreased apparent diffusion coefficient.

Magnetic resonance angiograms taken on Days 0 and 4 revealed occlusion of the proximal portion of the right internal carotid artery.

Although an electroencephalogram on Day 1 showed slow activity, we did not see paroxysmal discharges such as spikes or sharp waves.

Course and Outcome

On Day 3 we started the patient on clonazepam. Her involuntary movements gradually diminished to a low level. Her other neurologic deficits continued, however, and she died from a pontine hemorrhage on Day 11.

DISCUSSION

Our patient was not examined with surface electromyograms, which might have confirmed her diagnosis. We concluded, however, that her involuntary movement was different from the tremor, ballismus, and chorea seen in many patients with stroke (Ghika-Schmid et al, 1997). Based on her diffusion-weighted magnetic resonance imag-

ing and electroencephalographic findings, we believe that her involuntary movement was caused by a brain infarction and not by status epilepticus. Moreover, she exhibited behavior compatible with an instinctive grasp reaction, which might be caused by a frontal lobe lesion (see below).

In many of the existing case reports of patients with ipsilateral involuntary movements, the most recent lesions involved the basal ganglia (Table 1). This finding led some of the authors of those reports to propose two possible mechanisms for ipsilateral involuntary movements: disturbance of the uncrossed control of motor function by the subthalamic nucleus and hyperexcitation of the extrapyramidal system contralateral to the recent injury.

As for our patient, because her recent infarct involved the perisylvian area and basal ganglia as well as the cerebral cortex, she may have had extrapyramidal disturbances. However, we did not think that the characteristics of her involuntary movement were compatible with extrapyramidal signs, mainly because the movement included a groping or picking-like action (rather than an oscillating motion) that was suppressed during grasping. If we had been able to perform surface electromyography, this question might have been resolved.

Denny-Brown (1958) described a grasp response as a tremor associated with a frontal lobe lesion; the tremor is likely to be clonic and to accompany any voluntary movement in the same limb. Motomura and colleagues (1988) reported a patient with a tremor-like involuntary movement and an instinctive grasp reaction in her right hand; the authors speculated that this tremor-like involuntary movement might be a variant of the instinctive grasp reaction. We assume that the involuntary movement in our patient was compatible with the tremor-like grasp reactions described by Denny-Brown (1958) and Motomura et al (1988).

The lesions responsible for the instinctive grasp reaction and the tremor-like grasp reactions have not been identified. Seyffarth and Denny-Brown (1948) and Denny-Brown (1958) assumed that instinctive grasp reactions might be associated with the frontal lobe. In the patients described by Motomura et al (1988), ischemic lesions were located in the left medial frontal and right frontotemporoparietal areas. Mori and Yamadori (1985) described patients with an “ipsilateral instinctive grasp reaction,” in whom the responsible lesions were located in the perisylvian region or subcortical region ipsilateral to the affected hand; however, none of these patients had involuntary movements. The authors suggested that ipsilateral instinctive grasp reactions could be interpreted as spatial attention to the right side caused by damage to the right cerebral hemisphere.

Our patient had a past history of a left thalamic hemorrhage. This fact, viewed in the context of previous findings in patients with ipsilateral instinctive grasp, suggests that her tremor-like grasp reaction resulted from a combination of her two injuries: a broad lesion in her right hemisphere, including her frontal lobe, and, as in the patients reported by Motomura et al (1988), a small left hemispheric lesion.

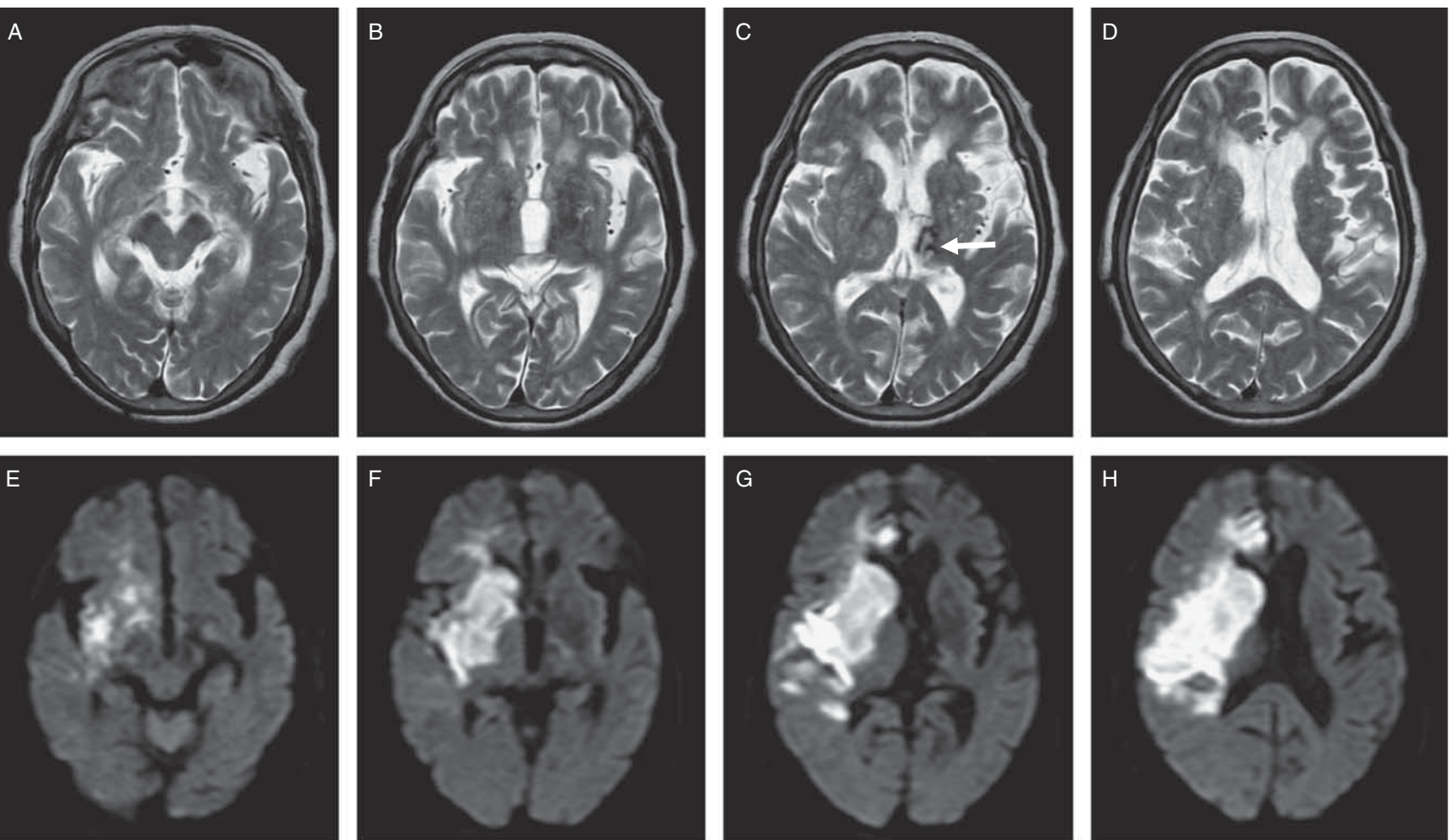


FIGURE 1. This patient's magnetic resonance imaging findings after her hospital admission for left hemiparesis. Day 0 (Panels A to D): T2-weighted images show an old hemorrhage in the left thalamus (Panel C, arrow) and multiple lacunes in the bilateral basal ganglia. Day 4 (Panels E to H): Diffusion-weighted images show a broad ischemic lesion in the region of the right internal carotid artery, including the right frontoparietotemporal lobes, insular cortex, striatum, and internal capsule.

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