Brainstem Tumor Presenting with Unilateral Astereognosis

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A patient with a brainstem tumor presented with astereognosis. The results of CT scan, evoked response studies, and neuropsychological tests all were consistent with a noncortical origin for the sensory defect.


Astereognosis is regarded as a neurological disturbance of focal parietal origin. There are reports, however, of patients in whom astereognosis was produced by peripheral lesions. The authors stress that on the basis of clinical examination, no distinction could be made between astereognosis of parietal (central) or peripheral origin [1, 2, 4-10].

A patient is presented in whom astereognosis was the first manifestation of a brainstem tumor. Integration of clinical, radiological, electrophysiological, and neuropsychological information excluded parietal origin and established that the astereognosis was of the peripheral type.

Case Report
A 13-year-old left-handed girl noticed on the first day at school that her handwriting was awkward. Her gymnastic instructor observed that her left foot was clumsy during running. The girl did not notice any motor weakness and was bothered only by the change in her handwriting. Examination elsewhere revealed minimal astereognosis in her left hand. Skull roentgenograms, electroencephalogram, and isotope brain scan were normal. A CT scan did not reveal a tumor, and the girl was given steroids with the presumptive diagnosis of multiple sclerosis.

The patient was seen at Hadassah University Hospital three weeks later. Meanwhile, her handwriting had worsened. She attributed this to the fact that the pen did not "feel right" in her hand. No changes in mental alertness or physical performance were noted. Physical examination did not reveal any abnormal finding. On neurological examination she was found to be alert, intelligent, and cooperative. There was minimal left facial weakness of central type and a left upgoing toe. No cerebellar signs could be elicited. No abnormalities of the senses of touch, temperature, position, and vibration were found on repeated examinations. Stereognosis and object recognition were disturbed in the left hand but were normal in the right hand. The visually evoked response recorded from over the right and left occipital poles was of normal configuration and latency.

CT scan demonstrated a brainstem tumor. The girl was reexamined four weeks later. Her handwriting had continued to deteriorate, and stereognosis and object recognition in the left hand were profoundly disturbed. The patient took longer to answer positioning on the left than on the right. The rest of the neurological examination was unchanged. The CT scan suggested some enlargement of the tumor. A pneumoencephalogram (Fig 1) confirmed its intraxial location.

The somatosensory evoked response to right and left median nerve stimulation was recorded from over the somatosensory cortex. When the right hand was stimulated, normal responses were recorded from over each hemisphere. Stimulation of the left median nerve evoked a very low amplitude response in which the early components could not be identified. No difference was seen in the response recorded from the contralateral and ipsilateral hemispheres (Fig 2).

Because astereognosis was such a prominent feature in the patient's symptomatology, we evaluated high-order parietal function. The following tests were applied in order to reveal any disturbance of personal or extrapersonal spatial orientation: (1) Butters' stick test for spatial orientation, (2) body recognition test, (3) left-right naming test, (4) WISC maze test, (5) facial recognition test, and (6) three-dimensional constructive apraxia test. In each of these tests, the patient's score was normal or above the mean for her age.

Exploration of the posterior fossa was carried out. The floor of the fourth ventricle was found elevated by an intramedullary mass. No extraaxial protrusion of tumor was seen, and a biopsy was not taken. Radiotherapy (5,000 rads) was started. There was no substantial change in the patient's neurological condition during nine months of follow-up. The electrophysiological and neuropsychological tests were repeated with the same results.

Discussion
Astereognosis not associated with a decrease in any modality of superficial sensibility due to a lesion at a lower level than the parietal lobe was probably first reported by Batten in 1912 [1]. His patient had a high cervical lesion. Gans [4] and Nissl von Mayendorf [7] followed with similar cases. Cushing [2] in 1923 described a patient in whom the finding of unilateral astereognosis led to negative exploration of the parietal region. He was later found to have a posterior fossa tumor. Schott [10] tried to distinguish
between astereognosis of cortical and subcortical lesions but was unable to differentiate between the two on the basis of clinical examination. Rubinstein [9] in 1938 described two patients with astereognosis due to extraaxial tumors in the region of the foramen magnum. He carefully reviewed the literature and the findings in his patients but could not offer a means to distinguish between astereognosis and stereanesthesia. These terms were suggested by Riley [9], but he could not devise any clinical test to distinguish between them.

In their three patients with astereognosis due to midcervical (C4-5) tumors, Halpern and Beller [6] demonstrated how a lesion located in the spinal cord could cause astereognosis identical to that of parietal origin. Halpern [5] later reported three women who underwent unilateral mastectomy and irradiation for breast cancer. They developed astereognosis in the homolateral hand. This led Halpern to stress the need for clinical means to differentiate between astereognosis and stereanesthesia.

The tests carried out in our patient made this distinction possible. With the introduction of noninvasive techniques like computerized tomography, the diagnosis of space-occupying lesions is made much earlier than was possible several years ago. The brainstem tumor in our patient was discovered when astereognosis was the sole symptom. The battery of neuropsychological tests provided direct evidence for integrity of parietal lobe function. The somatosensory evoked response to stimulation of the left hand pointed to a conduction defect because the early components were missing and there was no difference between the responses of the two hemispheres (see Fig 2). At the same time, normal responses were recorded from over each hemisphere when the right hand was stimulated, suggesting intact hemispheric function. The normal visual evoked response, especially in its late components [3], served as further evidence for normal parietal lobe function and excluded the first diagnosis of multiple sclerosis.

References

Fig 1. Pneumoencephalogram showing the floor of the fourth ventricle elevated by a brainstem mass (arrow) (midline tomogram).

Fig 2. The somatosensory evoked response to stimulation of the right (RMN) and left (LMN) median nerve. Only recordings from over the contralateral hemispheres are displayed. (LH = left hemisphere; RH = right hemisphere.)