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Case Report: Acute Finger Paralysis: A Case Report of Cortical Ischemic Stroke

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ABSTRACT

Somatotopic distribution of motor cortex and sensory fibers is theoretically fully understood. We present a case of stroke, mimicking peripheral palsy, with finger paralysis attributed to cortical lesion. The patient's brain MRI may be useful to further understand the somatotopic representation of fingers in precentral and postcentral gyrus.

Keywords: Fingers, Paralysis, Ischemia, Infarction

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Highlights

- Cortical stroke may present as pseudo-peripheral palsy.
- Motor fibers for ulnar fingers are represented medially in precentral gyrus.
- Sensory representation of ulnar fingers in postcentral gyrus follows the same pattern.

Plain Language Summary

Clinical presentation of acute stroke may be variable. Patients with large stroke usually present with serious symptoms and debilitating disability. On the other hand, small stroke may present with minimal or even transient symptoms, making diagnosis very difficult or mimicking other pathological conditions, such as peripheral nerve palsy. Careful history taking and thorough examination is needed in such cases to make the right diagnosis. Our patient presented with motor weakness and sensory disturbance of just three fingers of his left hand. Brain imaging helped us to confirm that the etiology of his symptoms was a minor stroke. It also showed which part of the brain is responsible for motor and sensory input of these specific finger problems.

Introduction

The term pseudoperipheral palsy refers to pure motor or sensorimotor deficits of the hand or (rarely of) the foot [1], caused by a Central Nervous System (CNS) lesion and was first introduced by Lhermitte in 1909. Pseudoperipheral palsy is often caused by cortical stroke, although lacunar infarcts in the corona radiata [2] and posterior limb of the internal capsule [3] had been also reported as the cause of pseudoperipheral palsy.

Case Presentation

A 79-year-old man was referred to our department with acute painless weakness of the third, fourth, and fifth digits of his left hand and numbness in the same region. His medical history was remarkable for hyperlipidemia and non-Hodgkin lymphoma as diagnosed 4 years ago. He had undergone a surgical removal of cervical and axillary lymph node block 3 years ago, followed by chemotherapy and radiation therapy. Since then he was referred to complete remission. On admission, he appeared to have mixed ulnar and radial palsy in the left hand (Figure 1a).

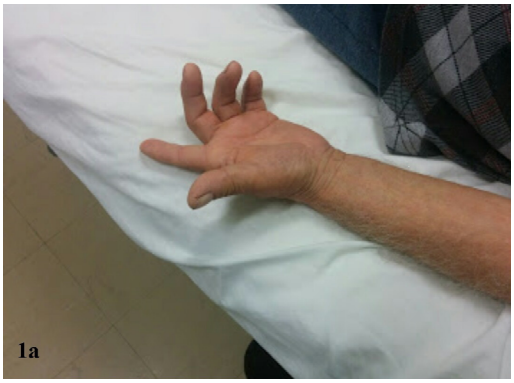
Our first diagnosis was that of compression neuropathy in the axillary division, associated with his past history of lymphoma. However, neurological examination disclosed weakness on the flexion, extension, adduction and abduction of the middle, ring, and little finger, while adductor pollicis brevis, adductor pollicis, extensor indicis proprius, extensor pollicis brevis, extensor pollicis longus and first dorsal interosseous were intact. The patient displayed impaired superficial sensation of both dorsal and palmar surface of the third, fourth, and fifth digits and a neutral left plantar response.

These findings favored CNS lesion rather than peripheral neuropathy. Brain MRI on Diffusion-Weighted Images (DWIs), revealed one high signal lesion in the area around the central sulcus covering part of the anterior and posterior central gyrus (Figure 1b). Although stroke had been diagnosed, further research with EMG and brachial plexus MRI were performed, providing normal findings and excluding 'double–crush' pathology.

Discussion

As observed in the conducted MRI, the ischemic lesion occupied the medial part of the anterior and posterior central gyrus. The area of infarction in this patient corresponds perfectly with the area of the third, fourth and fifth digits in the motor and sensory homunculus first drawn by Penfield and Rasmussen [4]. The motor homunculus shows a map of cortical brain areas involved in motor processing for various parts of the body. Likewise, the sensory homunculus shows a map of the brain areas involved in sensory processing. The primary motor cortex, located in the precentral gyrus, handles signals from the premotor area of the frontal lobes, while the primary sensory cortex, located in the postcentral gyrus, deals with signals coming from the thalamus [5].

Recently, newer techniques such as magnetoencephalography, functional MRI or PET scan, were used to further study the somatosensory representation of the human primary so-



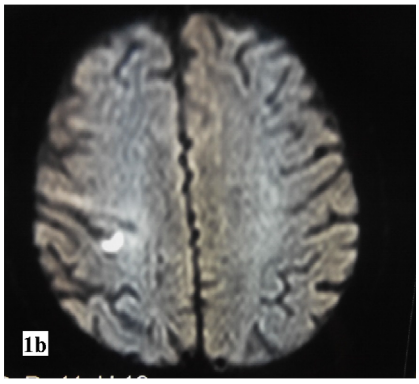


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Figure 1. a. The neutral wrist positioning (Notice the weakness in third, fourth, and fifth digits' extension); b. DW-MRI of brain showing high signal lesion round the right central sulcus

matosensory cortex [6]. Each finger has an orderly cortical somatotopic representation in the somatosensory Brodmann's area 3b [7], a part of Brodmann's area 1 [8] and an overlap in supplementary motor area and primary motor area [9].

Matching the study patient's clinical findings with his imaging suggests that corticospinal tract fibers in the precentral gyrus for the radial fingers are represented laterally, while ulnar fingers are located more medially. The same somatotopic pattern seems to apply for the sensory representation of the fingers in the postcentral gyrus.

Conclusion

It is very important for the clinicians to consider motor and or sensory disorders that are localized in a single extremity, or even just fingers, with a distribution that initially suggest peripheral nerve lesions, but can be caused by cerebral cortical lesions.

Ethical Considerations

Compliance with ethical guidelines

The patient's written permission was obtained to publish this work.

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Conflict of interest

The authors certify that they have no affiliation with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter or materials dismissed in this manuscript.

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