Wrist Drop: Acute Ischemic Stroke or Radial Nerve Palsy or Both

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Abstract- Stroke has many different symptoms, isolated hand weakness is the rarest one. Even less common are concomitant radial nerve lesions and ischemic stroke that leads to isolated hand weakness. We report a patient with sudden onset of right wrist drop mimicking radial nerve palsy, found to be due to a acute cerebral infarct and radial nerve palsy in the same time. A well-taken history of the patient's illness and thorough clinical examination can differentiate stroke from peripheral neuropathy as the cause of hand weakness. Modern neuroradiological methods such as brain MSCT or MRI can quickly and reliably indicate the etiology of a neurological disease. In every patient who presents with isolated arm weakness, and for whom we are not sure whether it is a lesion of the central or peripheral nervous system, cerebral infarction must be included as a critical differential diagnosis because it can divert attention from sometimes harmful thrombolytic therapy.

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Introduction

Stroke is one of the leading causes of death and the leading cause of disability in the world. Over 12 million patients suffer from this serious disease annually. Acute stroke treatment includes mechanical thrombectomy and intravenous thrombolysis, and the timing of these therapies is critical to treatment outcome. A stroke can have many different clinical pictures, depending on which cerebral blood vessel is occluded. Recognizing the clinical picture is crucial for the neurologist because it enables a timely and adequate therapeutic response, but sometimes it is not so easy. A number of conditions can mimic the clinical picture of a stroke, including damage to the peripheral nervous system. Isolated hand weakness can be a consequence of an ischemic stroke, but also a lesion of the peripheral nerves, especially the radial nerve.

In our paper, we present a clinical case of a patient who simultaneously had an ischemic stroke due to occlusion of the middle cerebral artery and damage to the radial nerve, presented with painless arm weakness.

Case Report

A 63-year-old man ten days prior to hospital admission noticed the weakness of the right arm after morning rising. He denies headaches, weakness, concussion or pain. He is treating non insuline dependent diabetes, arterial hypertension and prostate hyperplasion. Two years ago, he had an ischemic stroke that left him with left side weakness, but he recovered completely. Although he smokes cigarettes, he refrains from drinking alcohol. On admission he had severe paresis of right wrist and finger extensors (1/5) and less severe weakness of finger flexors and interossei muscles (3/5). When the hand and metacarpophalangeal joints were placed in a neutral position, no extension was possible in the interphalangeal joints, nor did flexion of the affected fingers of the hand improve. Fine finger movements were slow and imprecise, tendon reflexes were weakened, and the patient reported a decrease in sensation to pinprick and light touch below the elbow on the same side. On the day of admission in hospital, MultiSlice Computed Tomography (MSCT) of the brain showed a small area of

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acute stroke in the left frontoparietal cortex. Brain Magnetic Resonance Imaging (MRI) was taken next day and it revealed supratentorially, diffuse cortical atrophic changes and consequently wider all cerebrospinal spaces. On the left side, in the precentral gyrus and and centrum semiovale, a blurred zone of high MR signal in T2 and FLAIR sequences with diffusion restriction in DWI and ADC maps were seen in terms of acute ischemic lesion in the irrigation area of the left middle cerebral artery (MCA). In addition to the described lesion, 3 more punctiform diffusion restriction zones can be seen in terms of punctiform acute ischemic lesions and minor chronic ischemic changes are seen in anterior arm of the internal capsule. Punctiform and macular hyperintensities (T2 and FLAIR) in terms of chronic vascular lesions are seen bilaterally periventricularly (Fazekas 2). This finding of the neuroradiological tests suggests that it is an atherothrombotic stroke, disease of small blood vessels(perforating branches of the left middle cerebral artery) and internal carotid artery (ICA). Magnetic resonance angiography (MRA) showed 40% stenosis measured by NASCET criteria within the proximal part of the left internal carotid artery (ICV) near carotid bifurcation. Transthoracic and transesophageal ultrasound of the heart indicated slightly weaker systolic function (ejection fraction was 55%), milder diastolic dysfunction, but no presence of thrombotic masses in the cardiac cavities was indicated. There was no patent foramen ovale on bubble test and 24-hour ECG did not indicate existence of the atrial fibrillation or undulation. Our patient presented after a time period of 10 days, and thrombolytic therapy and mechanical thrombectomy was not considered as a therapeutic option. Needle EMNG finding suggests compression of right radial nerve in posterolateral upper arm, a syndrome known in the literature as Saturday night paralysis. Thus, his diagnosis has two components-weakness of the right radial nerve as a result of compression in the elbow joint and ischemic stroke in the area of the left middle cerebral artery. Due to elevated lipids in the blood, the patient was treated with atorvastatin, and antiplatelet therapy is included. He was provided with appropriate physiotherapy and occupational therapy. During the hospital stay, the strength of our patient's right hand gradually improved, and extensor of the wrist and hand strenght graded as 4/5 at discharge. After a month of physical therapy, the patient came to the neurological outpatient clinic for a check-up and then only had mild weakness in the right hand. He stopped smoking and regularly takes all prescribed medications.

Figure 1. Brain MSCT scan, day 1, showing normal brain parenchyma densities

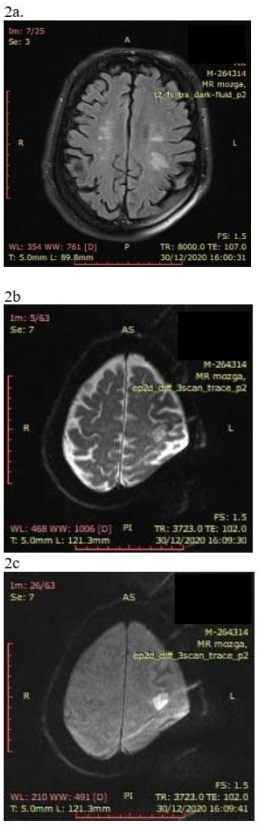

Figure 2. Brain MRI (T2-2a, diffusion-2b,2c), day 2, showing an acute ischemic lesion on the left parietal lobe, irrigation area of the left middle cerebral artery (MCA)

Discussion

Although a stroke can have numerous symptoms, and sometimes these symptoms can be confusing even for neurologists, isolated arm weakness is a very rare symptom and accounts for less than 2% of all ischemic strokes and often can be mistaken for a peripheral lesion (1). Simultaneous weakness of the radial nerve as a consequence of compression in the elbow joint and acute stroke leading to isolated weakness of the hand at the same time has not yet been described in the literature. Any delay in the acute treatment of a stroke can lead to a significantly worse outcome of the treatment of a patient

with a stroke, so a precise anamnestic data from the patient and an exhaustive clinical examination can indicate that it is a damage to the central nervous system (2).

There are no large epidemiological studies that would evaluate the frequency of isolated arm weakness as a result of stroke, perhaps precisely because a significant part of these patients is not understood as having a stroke and the diagnostic and therapeutic algorithms of acute stroke are not respected.

There are several important clinical characteristics that can be used to differentiate between central and peripheral isolated hand weakness. A patient who has arm weakness due to a stroke cannot flex or extend the fingers, and their abduction is also weaker (3). Patient who has arm weakness due to a lesion of the radial nerve can still activate the muscles of the arm and hand that are innervated by the ulnar and the median nerve. Patients with a peripheral lesion have a significant improvement in finger flexion strength if the hand is placed in a neutral position. the patient in this study did not have such an improvement of function in the neutral position of the hand, which speaks in favor of a central lesion (4).

Stroke damages the extensor muscles more than the flexor muscles of the hand, which is not the case with peripheral damage and can be a precise clinical difference between these two entities.

Additional neurological symptoms that may indicate that it is a stroke, is the presence of weakness in the ipsilateral leg, speech impairments or loss of part of the visual field. These symptoms make the diagnosis of stroke easier (5).

The majority of strokes, which are presented by isolated arm weakness, occur as a result of cardiac embolism from the left atrium and atrial fibrillation. A smaller number of them may be the result of atherosclerosis of small or supraaortal large blood vessels. Small vessels oclusio was the cause of stroke in our patient (6).

Several papers describe cases of isolated hand weakness that arose as a result of dissections of cerebral arteries or even cerebral hemorrhage, but in these cases the additional neurological symptoms point to the correct diagnosis (7). Small vessels disease is the cause of stroke, which is presented by isolated hand weakness, in 40% of patients. Cardiac embolism, especially due to atrial fibrillation, causes 25% of these strokes, and large vessel disease and hemodynamically induced strokes (8) are also the cause in a quarter of these cases, and often boundary zones were affected. Only a small part of them is the result of cerebral vessels dissection and cerebral hemorrhage (9).

Strokes, which present as isolated arm weakness, are caused by occlusion of the distal branches of the middle cerebral artery (MCI), usually the M3 or M4 segment, and damage to the lower parts of the precentral gyrus and the area along the central sulcus (10).

Our patient had presented far beyond time for intravenous thrombolytic therapy. Many patients who present with isolated hand weakness, when they arrive at the hospital, are not understood as having a stroke precisely because of an isolated and small neurological deficit, but neurologist believe that it is a lesion of the peripheral nervous system. We need high index of clinical suspicion for acute cerebral infarct in patients with isolated nerve palsies with or without history of waking up from sleep with deficit. Red flags for periferal lesion can be history of pain, fall or trauma, shoulder or neck pain. Differential diagnosis of isolated hand weakness must include cervical radiculopathy, posterior cord brachial plexopathy, radial or posterior interosseous neuropathy, vasculitis leading to hyperacute mononeuropathies, spinal cord disease (stenosis, trauma, or neoplasm) and hereditary neuropathy susceptible to pressure palsy (HNSPP) (Table 1).

Table 1. The differential diagnosis of isolated hand weakness

Differential diagnosis of isolated hand weakness
Ischaemic Stroke (embolic, large vessels disease, small vessels disease)
Cerebral hemorrhage
Carotid artery dissection
Spinal C7 radiculopathy
Posterior cord brachial plexopathy
Spinal cord disease (stenosis, trauma, neoplasm)
Hereditary neuropathy susceptible to pressure palsy (HNPP)
Radial or posterior interosseous neuropathy
Vasculitis leading to hyperacute mononeuropathies

Isolated hand weakness, although it is most often a lesion of the peripheral nerves, can sometimes be part of

the clinical picture of other neurological diseases, especially stroke. Acute cerebral infarction should be considered as differential diagnosis for isolated hand weakness especially in patients who are older, who have a higher risk factor for stroke, who previously had neurological symptoms or have another symptom in addition to arm weakness that can fit into cerebrovascular syndrome. Special attention should be paid to patients who are being treated for diabetes, high blood pressure, hyperlipidemia, who are smokers, who have known stenosis of the internal carotid arteries or known atrial fibrillation. Delaying the diagnosis of a stroke or not recognizing the symptoms can patients leave without valid therapy such as intravenous thrombolysis and mechanical thrombectomy. In this case, the outcome of the treatment of these patients is always worse than if these treatment methods are implemented, especially since both methods are time-limited. Sometimes, as in our case, neurologist has to think of an exceptional situation when two completely different diseases present with the same clinical picture and when delaying therapy means disaster for the patient. Recent advances in neuroimaging using magnetic resonance imaging (MRI) and new generation of MSCT could enable the identification of small vascular lesions causing isolated hand paresis.

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