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Case report

A case of acute deep palmar ulnar neuropathy due to a ganglion after weightlifting diagnosed with short segmental study and diagnostic ultrasound☆

Jong Woong Park[a], Dong Hwee Kim[b,*]

[a] Department of Orthopaedic Surgery, College of Medicine, Korea University, Seoul, Republic of Korea
[b] Department of Rehabilitation Medicine, College of Medicine, Korea University, Seoul, Republic of Korea

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1. Introduction

Ulnar neuropathy in the region of the wrist (UNW) is a rare condition that is sometimes confused with ulnar neuropathy at the elbow and thus can be a challenging diagnosis for physicians [1]. UNW can be caused by various etiologies [1]. Recently, occupational trauma was reported to be the most common cause of deep palmar branch lesion of the ulnar nerve [2]. There are several classifications of UNW, which was most recently classified into five types according to clinico-anatomical lesion location [3]. Electrodiagnostic tests have been developed to differentiate UNW from proximal ulnar neuropathy, medial cord or lower trunk lesions of the brachial plexus, and C8 and T1 radiculopathy, as well as to localize UNW into subtypes according to lesion location. In this case report, we describe a patient with a deep palmar branch lesion of the ulnar nerve in the palm, associated with a ganglion and precipitated by weightlifting. This case report demonstrates the usefulness of short segmental nerve conduction studies of the ulnar nerve around the wrist for localizing the lesion [4] as well as the utility of diagnostic ultrasound for detecting a space-occupying lesion.

2. Case report

A right-handed, 34-year-old man presented with a two-month history of a tingling sensation on the fourth and fifth fingers of the left hand. He reported that pain had immediately started after weightlifting and was aggravated by compression of the left hypothenar area. There were no history of localized direct trauma around the left wrist and other medical histories. Physical examination revealed vague tenderness of the left hypothenar area and mild hypaesthesia of the ulnar side of the fourth and the fifth digits. According to the Medical Research Council scale, the power of the first dorsal interosseous (FDI) muscle was grade 3, whereas other muscle powers of the left upper extremity, including the abductor digiti minimi (ADM) muscle, were grade 5. Froment's sign was positive in the left hand, but Tinel's sign was negative over the left wrist and elbow. Hypotrophy of the left hypothenar and hand intrinsic muscles were not appeared. Deep tendon reflexes were normal bilaterally.

Nerve conduction studies (NCS) were performed on both upper extremities. Left ulnar motor NCS with ADM recordings were normal, but FDI recordings revealed prolonged latency and low amplitude (distal latency, 5.3 ms; distal amplitude, 1.7 mV). The difference in latency between ADM and FDI recordings was 2.6 ms (our abnormal criteria, >1.4 ms), which indicated the primary involvement of the deep branch of the ulnar nerve based on our laboratory data. Bilateral ulnar sensory and dorsal ulnar cutaneous sensory responses were normal. A lumbrical–interossei

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* Corresponding author at: Department of Rehabilitation Medicine, Korea University Ansan Hospital, 516 Gojan-Dong, Danwon-Gu, Ansan City, Gyeonggi Province 425-707, Republic of Korea. Tel.: +82 31 412 5330; fax: +82 31 412 5344.
E-mail address: rmkdh@korea.ac.kr (D.H. Kim).

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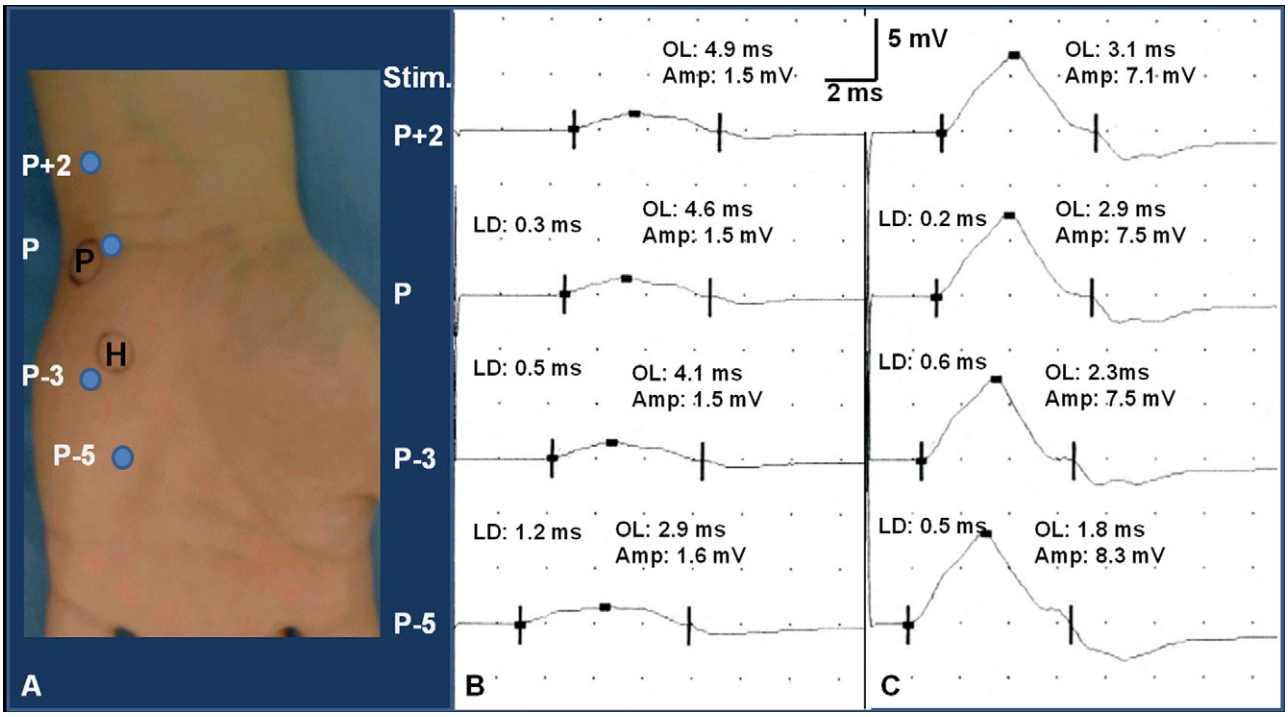

Fig. 1. Segmental nerve conduction study of the ulnar nerve with first dorsal interosseous recording in the region of the wrist was performed at four stimulation sites (A). Segmental nerve conduction studies of the left ulnar nerve (B) demonstrated decreased amplitude and conduction slowing (16 m/s) in the segment between 3 cm and 5 cm distal to the pisiform, and the right ulnar motor nerve (C), normal conduction velocity in all segments. Amp, amplitude; H, hook of hamate; LD, onset latency difference; OL, onset latency; P, pisiform; P + 2, 2 cm proximal to the pisiform; P – 3, 3 cm distal to the pisiform; P – 5, 5 cm distal to the pisiform; Stim., stimulation sites.

comparative study showed significant slowing of the ulnar nerve across the wrist compared to the median nerve (latency difference, 1.0 ms). A modified short segmental study (SSS) of the ulnar motor nerve at the left wrist, also known as the fractionated neurography of the ulnar nerve at the wrist, was performed for the purpose of the lesion localization [4]. The modified SSS of the left ulnar motor nerve at the wrist demonstrated abnormal conduction slowing in a segment between 3 cm and 5 cm distal to the pisiform bone compared to the unaffected side (Fig. 1). However, the SSS of the both ulnar sensory nerve were normal. Needle electromyography of the left upper extremity muscles including FDI, ADM, flexor carpi ulnaris muscles were performed, which demonstrated abnormal spontaneous activities and moderately reduced recruitment patterns of motor unit potentials only in the FDI muscle. Subsequent ultrasonography (SONOACE 9900, 7.5 MHz linear probe, Medison, Korea) showed a hypoechogenic lesion, measuring 2.3 cm × 1.6 cm × 1.0 cm, between the left fourth metacarpal bone and flexor tendons, which was located between 3 cm and 5 cm distal to the pisiform bone (Fig. 2A and B). Magnetic resonance imaging of the left hand revealed a ganglion, which resembled a comma lying on the proximal fourth metacarpal bone (Fig. 2C and D). Based on the information obtained from imaging studies and electrodiagnostic tests, a small zigzag incision was made in the hypothenar area and under the flexor tendons. The deep palmar motor branch of the ulnar nerve was found to be compressed by an underlying ganglion. The ganglion contained a dark reddish mucous-like fluid, which suggested that it had been developed as the result of a recent trauma. The compressed nerve was carefully dissected and protected with a loop, and the ganglion was completely removed. Three months following the operation, the patient's paresthesia symptoms were completely relieved, and the power of FDI muscle was grade 4. There was no evidence of recurrence of the ganglion cyst.

3. Discussion

The ulnar nerve passes through the arm and forearm into the hand where it innervates all of the intrinsic hand muscles except two lateral lumbricals and three thenar muscles. The ulnar nerve is most commonly compressed around the elbow and less often in the region of the wrist. The ulnar nerve in the region of wrist and hand has many potential compression sites, which represent typical clinical and electrophysiological findings (Fig. 3) [3]. However, identifying the location of the lesion site remains challenging because the disease is rare and there are different possible diagnose. Further complicating the ability to achieve an accurate diagnosis and localization of such lesions, three classification systems have been developed for UNW, of which the types of designations for each classification are arbitrary and not interchangeable.

Recently, a classification system was developed consisting of five types based on clinico-anatomical presentation and appears to be more reasonable compared with other existing classification systems (Fig. 3) [3]. Of these lesion patterns, types III and IV are most common, followed by type II [1]. However, because of the rarity of the condition and presence of several incompatible classification systems, it is difficult to fully ascertain the incidence of ulnar neuropathy around the wrist.

In the diagnosis of UNW, NCS of the ulnar sensory nerve and ulnar motor nerve with ADM and FDI recordings are essential. However, it is difficult to classify the type of lesion with routine ulnar motor and sensory NCS. To overcome these limitations of such routine studies, various forms of SSS using FDI recording have been developed. Among them, SSS of the ulnar motor and sensory nerves with three stimulations (2 cm proximal to the pisiform bone, at the pisiform bone, and 3 cm distal to the pisiform bone) is a simple, easy, and relatively fast technique useful for dividing the proximal