INTRODUCTION

Cubital tunnel syndrome (CUTS) is the second most common peripheral nerve entrapment syndrome in the human body, after carpal tunnel syndrome resulting from median nerve entrapment\(^{(1)}\). An underlying mass causing nerve entrapment should not be overlooked in diabetic patients since diabetes makes a nerve more vulnerable to compression due to local ischemia and interference with the innate metabolism of the nerve\(^{(2)}\). A series of

Abstract-

**Purpose:** An uncommon ulnar nerve schwannoma should not be neglected in a diabetic patient with cubital tunnel syndrome, the second most common cause of entrapment neuropathy.

**Case Report:** A 61-year-old woman with a past history of type 2 diabetes mellitus complicated with sensorimotor polyneuropathy presented with progressive numbness and weakness of the left ring and little fingers for one year. A provisional diagnosis of cubital tunnel syndrome was made according to physical examination and electrophysiological studies. The magnetic resonance imaging showed a nodular lesion over ulnar aspect of the left elbow, which was demonstrated to be a schwannoma by histopathology. The patient had moderate improvement after surgical decompression of the left cubital tunnel.

**Conclusion:** This case illustrates the heterogeneous group of pathologies causing peripheral neuropathy. The diagnosis of ulnar nerve schwannoma with cubital tunnel syndrome, superimposed with diabetic sensorimotor polyneuropathy, was made carefully according to clinical manifestations as well as a series of electrophysiological, imaging, and pathological studies.

**Key Words:** cubital tunnel syndrome, ulnar nerve, nerve compression, schwannoma, diabetes
electrophysiological examinations play as an assessment tool for diagnosis making and outcome prediction. We here describe an uncommon ulnar nerve schwannoma as the cause of cubital tunnel syndrome in a diabetic patient with sensorimotor polyneuropathy who got partial recovery after surgical decompression.

CASE REPORT

A 61-year-old, right-handed, Taiwanese female presented with progressive numbness and weakness of the ring and little fingers in the left hand for one year. She had a history of type 2 diabetes mellitus (DM) for 12 years, complicated with sensorimotor polyneuropathy diagnosed 5 years ago. A recent glycated hemoglobin A1c level was 9.2%. Clinical examination demonstrated wasting of the hypothenar and intrinsic muscles causing claw hand deformity, with positive Froment’s sign, and involuntary abduction of the little finger, the Wartenberg’s sign. Tinel’s sign was positive at the left elbow, with a score 2 on the McGowan grading system for ulnar nerve neuropathy. The range of motion of the left elbow was not limited.

T1- and T2-weighted magnetic resonance imaging (MRI) documented a well-defined nodular lesion about 1.3 × 1.3 × 1.8 cm over ulnar side of the left elbow, suggestive of a neurogenic tumor (Figure 1A and 1B). The nerve conduction velocity and electromyographic studies indicated left ulnar and median sensorimotor neuropathy, with prolonged distal latency, reduced amplitude, and significant reduction in conduction velocity over the cross-elbow segment of the left ulnar compound motor action potentials (CMAPs), reduced amplitude of left median and radial CMAPs, as well as reduced conduction velocity and reduced amplitude of the left ulnar sensory nerve action potentials (SNAPs), and prolonged distal latency, reduced conduction velocity, and reduced amplitude of left median SNAPs. Increased duration and amplitude of motor unit potential of the left flexor carpi ulnaris (FCU) and the left abductor pollicis brevis (APB) muscles were recorded (Figure 2), suggesting the presence of conduction block of the ulnar nerve proximal to the stimulation site.

The patient underwent surgical decompression of the left cubital tunnel by microscopic neurolysis with excision of neuroma and fat graft of the left elbow. The excised mass was measured 1.3 × 1.3 × 1.5 cm (Figure 3A and B).

**Figure 1.** (A) T1-weighted spin echo and (B) T2-weighted fat-suppression fast spin-echo magnetic resonance imaging revealed a well-defined nodular lesion about 1.3 × 1.3 × 1.8 cm over ulnar aspect of the left elbow. H = the humerus.

**Figure 2.** Increased durations and amplitudes of compound motor action potential of the left flexor carpi ulnaris and abductor pollicis brevis.

**Figure 3.** (A) Intraoperative view of the tumor inside the epineurium of the ulnar nerve. (B) The solid mass was 1.3 × 1.3 × 1.5 cm in size. H = the humerus.
Histopathology confirmed schwannoma, with Antoni A and Antoni B regions (Figure 4). The patient underwent rehabilitation and had moderate improvement in numbness and weakness of the fingers. Electromyographic study showed normal duration and amplitude of the sampling muscles with improved nerve conduction velocity of the left ulnar nerve at the postoperative 6-month follow up.

**DISCUSSION**

Focal mononeuropathies, depending on the distribution, are believed to be more frequent in diabetic patients. In a study of consecutive outpatients, for example, limb mononeuropathies, such as radial, ulnar and peroneal nerve paralysis, were more frequent in diabetic patients than in the general population, but the frequency of asymptomatic carpal tunnel syndrome (CTS) and Bell’s palsy was not higher in diabetic patients (4). Once the peripheral neuropathy involves isolated damage to more than two separate nerve areas, it is defined as mononeuritis multiplex that consists of painful, asymmetrical, asynchronous sensory and motor components. Indeed, distribution of altered sensation or weakness due to diabetic neuropathy and its exact etiology may vary between individuals. Diabetes duration, poor metabolic control, and presence of microvascular complications have been proposed to be contributing factors of peripheral neuropathy (5,6). The peripheral nerve is vascularized by a longitudinal vascular network with many anastomoses, allowing the blood flow to continue when segmental arteries are occluded. A major impairment in blood flow is therefore required to produce experimental ischemic nerve injuries, and these studies of experimental diabetes demonstrated the increased susceptibility of diabetic nerves to injury (7,8). The abnormal susceptibility of diabetic nerves to compression could be accordingly attributable in part to chronic ischemic injuries.

The manifestations of a diabetic hand may not just be ulnar neuropathy. The definition of diabetic hand traditionally consists of limited joint mobility, Dupuytren’s contracture and trigger finger (9). Stenosing flexor tenosynovitis (SFT) and CTS were further included into the spectrum of diabetic hand syndrome (DHS) in a population-based cohort study in Taiwan, which demonstrated a higher risk of DHS in men and younger patients with DM (10). Ulnar neuropathy can certainly be found in diabetic patients with hand pathology due to compression or ischemia of the ulnar nerve. It is relatively rare and usually found in patients with long diabetes duration (11,12). The exact probability of an increased frequency of limb mononeuropathies in diabetic patients however is not easily to confirm by epidemiological studies because mononeuropathies due to other factors are relatively frequent in the general population (13). A prospective electrodagnostic study suggests that the ulnar nerve is very susceptible to focal entrapment, with a diagnostic rate of 34%, in patients with type 2 DM (14). Furthermore, one-fifth of those with ulnar neuropathy at the elbow did not have polyneuropathy (14). In our case, electrophysiological studies showed the pattern of neuropathy beyond the common diabetic hand syndrome. She denied a history of trauma or osteoarthritis that may contribute to tardy ulnar palsy (15), and instead her ulnar neuropathy at the elbow result from a heterogeneous group of pathologies causing peripheral neuropathy.

Cubital tunnel is the most common location where ulnar nerve is compressed around the elbow, compared to arcade of struthers, medial intermuscular septum, medial epicondyle, and deep flexor spongiosus (1). Interestingly, the clinical manifestations of CUTS may vary by age...
Sensory symptoms seem to be more dominant in younger patients who present with more irritation of the nerve. The heterogeneous clinical manifestations may be a result of differing reasons for pressure on the ulnar nerve within the cubital tunnel. Our patient was diagnosed to have a schwannoma which render the onset insidious, rather than traumatic injury or compression by anconeous epitroclearis that is more common in young patients.

Schwannomas (neurilemmomas) are the most common benign neoplasm of peripheral nerves, but they account for only 5% of soft tissue tumors in adults\textsuperscript{(17-19)}. The tumors commonly develop as slow-growing, and they can remain painless swelling for several years before being diagnosed. Among all the cases with schwannomas in the extremities, only 30-70% complained of pain and 20% had paresthesia on presentation\textsuperscript{(20)}. Similarly, our patient presented with muscle wasting and weakness and initially attributed altered sensation to a concurrent diabetic polyneuropathy. The MRI study serves as a useful tool for preoperational diagnosis, and schwannomas are isointense to muscles in T1-weighted images and hyperintense in T2-weighted ones\textsuperscript{(21)}.

**CONCLUSION**

Diabetes makes a nerve more vulnerable to compression due to a microvascular injury causing local ischemia or by interfering with the innate metabolism of the nerve. The concurrent compressive injury should not be neglected in patients with diabetic polyneuropathy. Electrophysiological and neuroimaging studies were in line with our clinical diagnosis for a patient with CUTS, who was further diagnosed to have a schwannoma at the cubital tunnel by histopathology.

**REFERENCES**

15. Jeon IH, Oh CW, Kyung HS, Park IH, Kim PT. Tardy