High Resolution Ultrasonography of Ganglion in the Left Common Peroneal Nerve

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Intraneural ganglion is uncommon. We report a 49-year-old man with numbness of the left lower leg and foot drop for 1 month. High resolution ultrasonography (HRUS) showed a fusiform hypoechoic cystic structure, 5 × 0.5 cm in size, in the left lateral popliteal fossa which extended to below the fibula head region and which was encased by the epineurium of the left common peroneal nerve. Histology was compatible with ganglion. After operation, the patient recovered very well. This was correlated to a previous report in which the outcome essentially depended on the resectability of the lesion without nerve damage and the duration of symptoms. HRUS has the advantage of no radiation exposure, good resolution and high mobility. HRUS could be a valuable screening tool for soft tissue neoplasm and to differentiate it from the surrounding structure.

KEY WORDS — high resolution ultrasonography, intraneural ganglion, soft tissue neoplasm

Case Report

A 49-year-old man came to the outpatient department with numbness of the left lower leg and foot drop for 1 month. Physical examination revealed numbness in the dorsum of the left foot and lateral side of the left lower leg and an inability to walk on the heel and foot eversion. Left foot drop was noted. No palpable mass in the left leg was found.

Nerve conduction study (NCS) showed poor motor response of the left peroneal nerve.

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Electromyography (EMG) revealed fibrillation and positive sharp wave of the tibialis anterior (TA) muscle, no volitional movement of the TA muscle, fibrillation and positive sharp wave of the extensor hallucis longus (EHL) muscle and no volitional movement of the EHL muscle. The results from NCS and EMG showed poor motor response of the left peroneal nerve and moderate active denervation over muscles innervated by the deep branch of the left peroneal nerve. In other words, the results indicated that there was a lesion in the complete deep branch of the left common peroneal nerve.

HRUS showed a fusiform, hypoechoic and cyst-like structure, 5 × 0.5 cm in size, in the left lateral popliteal fossa. The lesion extended to below the fibula head region and was encased by the epineurium of the left common peroneal nerve. Ultrasonography of the posterolateral aspect of the knee was performed. The longitudinal scan of grayscale ultrasound showed a hypoechoic and tubular structure within the common peroneal nerve (Fig. A). Transverse scan of the lateral aspect of the lower leg showed an echo-free and cyst-like structure within the common peroneal nerve (Fig. B). Color Doppler ultrasonography showed no color signals within the cyst-like structure (Fig. C). The lesion had a well-defined margin and was echo-free in content. HRUS revealed that the lesion was most likely an intraneural ganglion in the common peroneal nerve. Under the impression of ganglion within the common peroneal nerve, the patient was operated on and received excision and neurolysis. The operative finding was of a 5-cm-long ganglion cyst within the common peroneal nerve. Histology showed dense, collagenous and fibrous tissue without lining cells in the wall, which is compatible with a ganglion. At the follow-up visit 1 year after the operation, the symptoms of numbness and foot drop had disappeared and there was improved muscle power similar to the healthy side (right leg). Follow-up study by HRUS after 1.5 years showed only mild swelling of the common peroneal nerve without recurrence.

**Discussion**

The peroneal nerve is derived predominantly from the L4 to S1 nerve roots which travel through the
lumbosacral plexus and eventually ends at the sciatic nerve. Within the sciatic nerve, some fibers eventually form the common peroneal nerve which runs separately from the tibial nerve. The common peroneal nerve gives rise to the lateral cutaneous nerve of the knee, which supplies sensation to the lateral knee before winding around the fibular neck and passing through the fibular tunnel between the peroneus longus (PL) muscle and the fibula. The common peroneal nerve then divides into superficial and deep branches. The deep peroneal nerve innervates the peroneus tertius and the dorsiflexors of the ankle and toes, including the TA, extensor digitorum longus (EDL), EHL and extensor digitorum brevis (EDB) muscles. It continues on to supply sensation to the first web space of the foot. The superficial peroneal nerve innervates the ankle everters, including PL and peroneus brevis (PB) muscles, and then supplies sensation to the mid and lower lateral calf. As it passes over the dorsum of the foot, it divides into the medial and intermediate dorsal cutaneous nerves of the foot, supplying sensation to the dorsum of the foot [1]. Intraural ganglion is uncommon. It could affect the common peroneal nerve, median nerve, ulnar nerve, radial nerve, superficial radial nerve, posterior interosseous nerve, digital nerve, brachial plexus, suprascapular nerve and the sciatic nerve [2,3].

This patient had lesions not only in the deep branch of the common peroneal nerve but also in the superficial branch of the common peroneal nerve. Clinical examination of the injured deep peroneal nerve was a foot drop. Disability in foot eversion and impaired sensation on the anterolateral aspect of the lower leg and the dorsum of his foot were noted because of the damaged superficial peroneal nerve. But EMG revealed only a deep branch lesion due to no abnormal findings of the PL muscle. This finding may be explained by the “unifying theory” of Spinner et al [4]. They indicated that patients with peroneal intraneural ganglion had predominant electrodiagnostic findings of the deep peroneal nerve [4]. The electrodiagnostic findings revealed only deep peroneal nerve injury. There may be insufficient time for detecting the denervation of the superficial peroneal nerve. This may be misdiagnosed as only a deep peroneal nerve lesion.

Bonar et al [3] indicated that NCS revealed localization of the nerve lesion. Patients may have fibrillation potentials in the EMG findings due to denervation of the EHL, EDL and TA. In our case, NCS revealed peroneal lesion and EMG revealed fibrillation potentials in TA and EHL. Our results are compatible with Bonar et al’s [3]. Giele and Le Viet [5] had mentioned that NCS and EMG should be performed preoperatively especially when there is no palpable mass. In our case, there was no palpable mass.

The symptoms of this patient were similar to those described in Bonar et al’s article [3], but the duration of symptoms (1 month) in our patient was shorter than in their studies (12–15 months). The prognosis of these lesions was variable and must be guarded. The outcome essentially depended on the resectability of the lesion without nerve damage and the duration of the symptoms. Patients with symptoms less than 4 months and minimal preoperative paralysis have a favorable outcome [3]. In our case, the duration of symptoms was less than 4 months, so prognosis was good. But, EMG showed complete deep peroneal nerve lesion and this may affect the prognosis. At the follow-up visits, he had no foot drop half a year after operation and numbness had disappeared by around 1 year after operation.

The pathogenesis of intraneural ganglion is controversial [6]. Some theories have been put forward. Communication with an adjacent joint has suggested that the tumor is caused by an invasion of the nerve trunk by an articular synovial cyst which has propagated along an articular nerve. Practically, such a connection is rarely found and there is no demonstration by arthrography. The absence of an epithelial lining also contradicts this suggestion [6]. Clark [7] presented the variation of histologic findings. In our case, the wall of the cyst-like structure was without epithelial lining, which means that it was not a real cyst. It was a ganglion. The ganglion was 5 cm in length, which was similar to the findings of Spinner et al, where the ganglion could propagate in variable size [4]. Clark [7] reported ganglion size of 3 cm to 14 cm. From a previous study, soft tissue
A ganglion could be diagnosed by computed tomography [8] and magnetic resonance imaging [9]. However, computed tomography is an irradiative modality and has relatively poor resolution for soft tissue lesions, especially small soft tissue neoplasms. Magnetic resonance imaging has good contrast resolution, but it is expensive and not readily available. HRUS has the advantage of non-radiation, good resolution and high mobility.

References