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Ultrasonographic Features of Schwannoma of the Lower Limb: Two casereports

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Ultrasonographic Features of Schwannoma of the Lower Limb: Two Case Reports

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Schwannoma is a benign encapsulated nerve sheath tumor. It typically develops in middle age with unknown cause and usually involves spinal root and peripheral nerves. We report two cases of schwannoma presenting as palpable mass over lower limbs. Both masses had heterogeneous hypoechogenicity, faint posterior enhancement, and were located eccentric to a nerve fascicle. Preoperative sonography revealed both patients had nerve tumors derived from nerve fascicles. These cases illustrate how sonographic information about the relationship between mass and surrounding structures can facilitate surgical planning. (Tw J Phys Med Rehabil 2008; 36(3): 169 – 175)

Key Words: soft tissue mass, schwannoma, ultrasonography

INTRODUCTION

Schwannoma, also known as neurilemmoma or perineural fibroblastoma, is an uncommon benign nerve sheath tumor which is derived from Schwann cells. Schwannomas constitute 5% of benign soft tissue neoplasms and occur most frequently in persons between the ages of 20 and 50 years. Men and women are equally affected. Schwannoma typically presents as a solitary, well capsulated, ovoid or fusiform configuration, and slow growing mass.^[1-4]

Schwannomas commonly involve the brachial plexus, the vagus, median, and tibial nerves and usually appear on the flexor aspects of the limbs.^[5,6] They may also

locate deeply in the posterior mediastinum and the retroperitoneum.^[7-9] Relatively few schwannomas appear on the trunk.

Patients with a schwannoma often have no symptom except for a palpable mass. Sensory change or motor weakness is rare. Pain or paresthesia occurs when the tumor is large and causes nerve entrapment which is usually noted in a deep schwannoma. Malignant transformation is rare.

CASE REPORTS

CASE 1

A 50-year-old man had been aware of a soft tissue mass over his left thigh for about 8 years. He denied any

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symptoms except for mild local tenderness. Physical examination revealed a firm mass which was non-movable over the left anterior-middle thigh. High-resolution ultrasonography (Xario SSA-660A, Toshiba, Nasu, Japan) using a 12-MHz linear-array transducer disclosed a 15.8 x 11.8 x 12.3 mm, well-defined, heterogeneous and hypoechoic mass with faint posterior enhancement in the rectus femoris muscle at the depth of 1.5cm. (Figure 1-1, 1-2) A nerve fascicle ran eccentrically into it. (Figure 1-1) Color Doppler ultrasound image showed mildly increased vascularity. (Figure 1-3) An incomplete echogenic ring and a cystic space within the mass were also found. Surgical exploration revealed a pearl-like, well encapsulated solid tumor originating from the femoral nerve branch within the rectus femoris muscle. Complete tumor excision was achieved without sacrifice of the nerve. The pathology report confirmed the diagnosis of schwannoma. His postoperative recovery was smooth and uneventful.

CASE 2

A 37-year-old female patient visited our orthopedic clinic for a left ankle mass which was found incidentally. Physical examination revealed a firm, non-movable, and tender mass over the left medial ankle. There was no sign of neurological deficit. High resolution ultrasonography using a 12-MHz linear-array transducer showed a well-defined, hypoechoic, heterogeneous, lobulated mass with posterior enhancement along the nerve fascicle and posterior tibial artery within the tarsal tunnel. (Figure 2-1, 2-2, 2-3) Surgical excision of the mass revealed a 2.5 × 2.5 × 1 cm yellowish, lobulated mass which connected to tibial nerve. Pathology report confirmed the diagnosis of schwannoma.

DISCUSSION

Ultrasonography is a non-invasive, convenient tool for mass evaluation. The differential diagnosis of peripheral masses includes but is not limited to cyst, ganglion, lipoma, fibroma, vasogenic tumor, neurogenic tumor, and sarcoma.^[10-12] Schwannoma is a solid tumor as compared to cystic mass such as ganglion. Color mode examination can depict tumors with high vascularity. Proximity to a nerve is crucial to make a diagnosis. The masses in both patients of this report were identified as neurogenic

tumors because they oriented longitudinally in the nerve distribution and were contiguous with the parent nerve.^[6,13] This may be difficult when the radical nerve branch is small, tortuous or compressed by the mass. Both patients in this report had incomplete echogenic rings within the substance of their masses, which were pathognomonic features of neurogenic tumors.^[14]

Ogose et al. reported that the presentation of pain at rest, invasive margin or motor weakness are suggestive of malignancy in peripheral nerve tumors.^[15] Chao et al. reported that the combination of all the sonographic features of irregular border, and high vascularity or bony cortex destruction is useful to differentiate benign or malignant soft tissue tumors. The sensitivity and specificity were 80% and 100% respectively in their study.^[16] The absence of these features in our patients was thus predictive of the benign nature of their tumors.

The most common benign tumors of peripheral nerves are schwannomas and neurofibromas.^[2,3] Important features of schwannoma include the presence of a capsule, the eccentric position of the nerve relative to the mass, and a cystic lesion within it. On the other hand, a neurofibroma usually has no capsule, and the nerve runs through the center of the mass. Cystic lesion in a neurofibroma is rare. They are typically solitary. In 10-40% of cases, neurofibromas present as multiple lesions when associated with neurofibromatosis type 1. Malignant changes may occur in these cases.^[5,17] We considered our cases as schwannomas because of the eccentric position of the nerves relative to the masses.

The masses of both of our patients were hypoechoic and heterogeneous with faint posterior enhancement. These findings are typical of schwannomas.^[14] These two masses, however, had different features. First, one was fusiform and the other was lobulated. Lobulated schwannoma is not as common as fusiform one. Pilavaki reported a schwannoma with a bilobed appearance at the nerve bifurcation over axilla.^[6] Second, Color Doppler ultrasound image exhibited minimal blood flow in case 1 but not in case 2. (Figure 1-3, 2-3) Previous reports have described that the presentation of vascularity is not a consistent finding in Schwannomas.^[1] Third, there was a cyst within the mass in Case 1 but not in Case 2. Chiou et al. reported 15 cases of schwannoma in 1998. He compared the sonographic findings with histology of thin-cut

specimens. The echo-free cyst was compatible with myxoid cystic degeneration which was often found in an ancient

schwannoma.^[18]

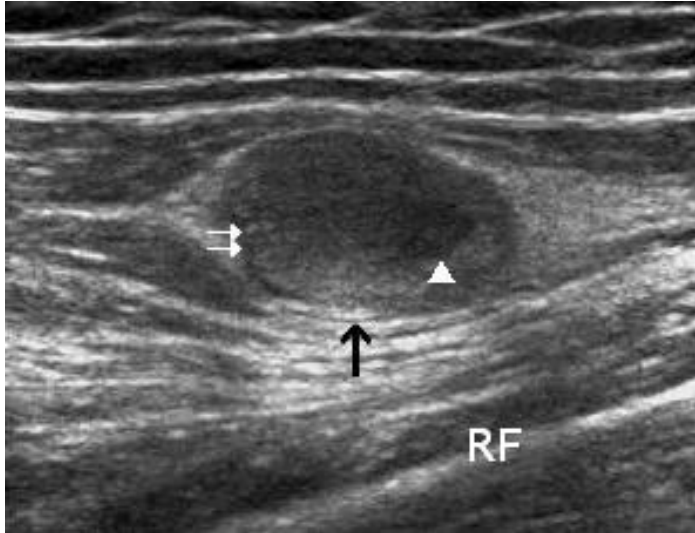


Figure 1-1. A 50-year-old man had a mass over the left anterior thigh. High-resolution ultrasonography in the longitudinal view showed a nerve bundle running into the peripheral part of the fusiform mass (large black arrow). An incomplete echogenic ring (double small white arrows) and a cystic space (white arrow head) within the mass were also noted. RF: rectus femoris muscle.

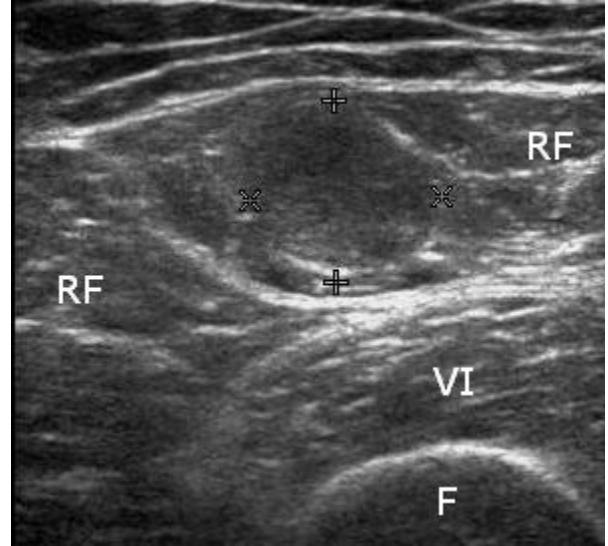


Figure 1-2. High-resolution ultrasonography in the transverse view showed that the mass was within the rectus femoris muscle (RF). VI: vastus intermedius muscle; F: femur bone.

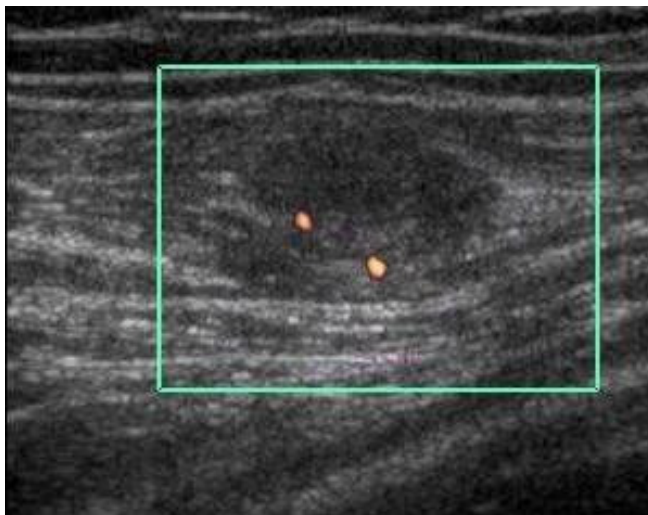


Figure 1-3. High-resolution ultrasonography with Color Doppler mode in longitudinal view showed mildy increased flow signal within the mass.

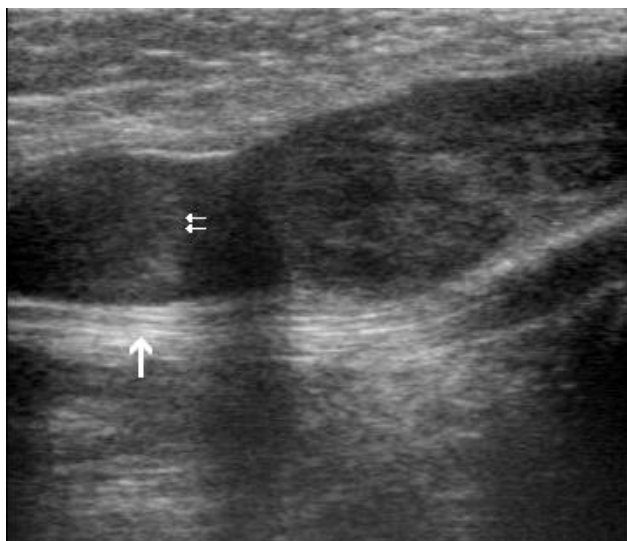


Figure 2-1. A 37-year-old female had a mass over the medial aspect of the left ankle. High-resolution ultrasonography in the longitudinal view showed a well-defined, heterogeneous, lobulated mass with posterior enhancement. Tibial nerve runs along the mass eccentrically. (large arrow) An incomplete echogenic ring is within the mass. (double small arrows)

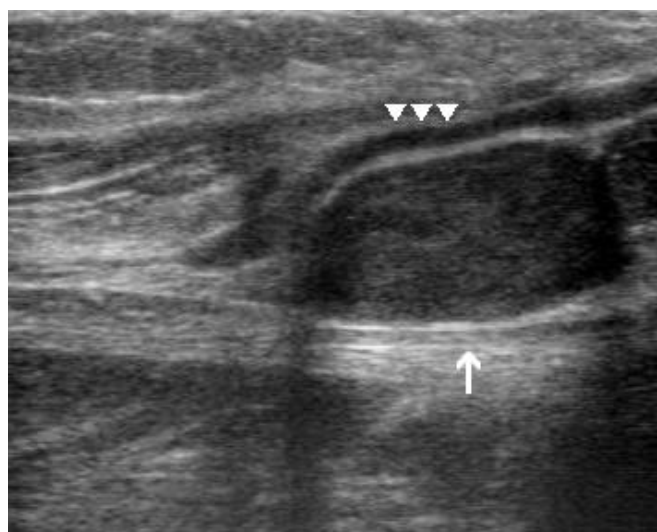


Figure 2-2. High-resolution ultrasonography in the longitudinal view showed the tibial nerve (arrow) and posterior tibial artery (arrow head) along the tarsal tunnel.

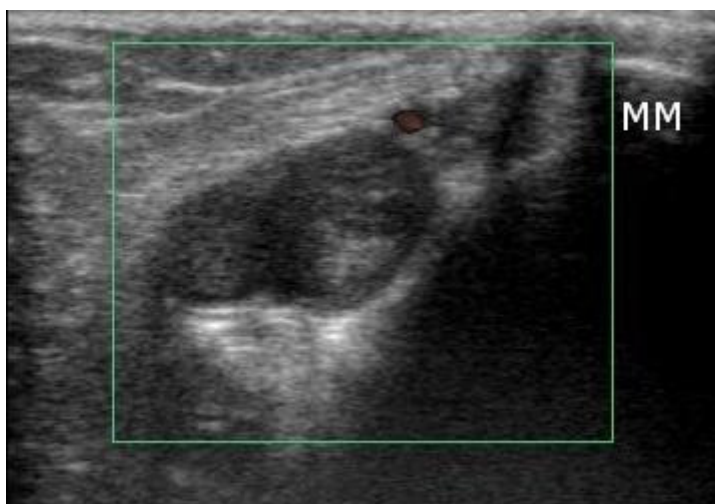


Figure 2-3. High-resolution ultrasonography with Color Doppler mode in transverse view showed only a pulsating posterior tibial artery but no flow signal within the mass. MM: medial malleolus.

Several case reports documented that a schwannoma could cause tarsal tunnel syndrome with positive Tinel's sign or throbbing pain during walking.^[19-21] Nevertheless, our Case 2 had no neurological symptom or sign, hence electrodiagnostic study was not arranged. Sonographic images offered our surgeon detailed information about the tumor location and its relationship to the vessels, tendons, muscles, and bones. It played an important role in pre-operative planning. Both of our patients had successful surgical resections by blunt dissection without resulting nerve damage.

Several image modalities can be used in evaluation of soft tissue masses, including MRI and high-resolution ultrasonography. The major limitation of high-resolution ultrasonography is operator dependence. However, it offers some advantages such as speed, cost-effectiveness and the ability to reduce psychological suffering from uncertainty.^[16] Patients with claustrophobia or mechanical implantations such as mechanical valves, internal fixation devices, or cerebral vascular clips can tolerate high-resolution ultrasonography well. It also offers good spatial resolution, dynamic evaluation of the mass in relation to the surrounding structures during active or passive range of motion.

CONCLUSION

Neurogenic tumors are uncommon soft tissue tumors. We presented two cases of schwannoma over lower limbs evaluated by high-resolution ultrasonography before operation. Meticulous ultrasonographic examination detailing the relationship between mass and surrounding structures led to successful tumor excision.

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下肢許旺氏細胞瘤的超音波表現：兩病例報告

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高解析度肌肉骨骼超音波(musculoskeletal ultrasonography) 雖已廣泛應用於腫塊的鑑別診斷，但第一線即診斷出許旺氏細胞瘤(schwannoma)並不常見。

本篇報告兩例於肢體發現的無痛腫塊。一例為 50 歲男性，腫塊位於左大腿前方，我們使用 12 MHz 線性(linear array)探頭，發現腫塊位於股四頭肌內，與股神經分支相連。另一例為 37 歲女性，腫塊位在左踝內後方，超音波發現腫塊處於跗管(tarsal tunnel)內，與脛神經相連。兩腫塊皆具有許旺氏細胞瘤典型的超音波特色：腫瘤邊界清楚、實體性、低回音、不均質、有回音後加強現象、神經束從腫塊旁通過。許旺氏細胞瘤是源起於神經束的腫瘤(neurogenic tumor)之一。雖然兩例腫塊在肌肉骨骼超音波下皆具有典型的超音波特色，然而其表現也不完全相同。兩者形狀一呈梭狀，一呈多葉狀；一有少許血流，一無血流；一腫塊內有囊性成份，一則無囊性成份。

我們在第一線即辨別出腫瘤與其源起神經束的相連性，正確的診斷出許旺氏細胞瘤。在第二例中更完整提供了術前腫塊與其他跗管內構造的相關資訊。正確的診斷配合周圍結構資訊的提供是治療成功的關鍵。(台灣復健醫誌 2008；36(3)：169 - 175)

關鍵字：軟組織腫塊(soft tissue mass)，許旺氏細胞瘤(schwannoma)，超音波(ultrasonography)