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Case Report
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# Benign Foot Drop: Large Cystic Peroneal Schwannoma

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## Abstract

We report an exceptional case of large cystic Schwannoma of peroneal nerve causing foot drop. The clinical, radiological and electrophysiological characteristics are discussed. The cyst was surgically removed. Careful detachment and decompression of the nerve fibers was followed by gradual recovery from neurological deficit in six months. Histological examination confirmed the diagnosis of cystic Schwannoma. There is no local recurrence in more than two years follow-up.

**Keywords: Cystic; Schwannoma; Peripheral; Nerve; Foot-drop**

## Introduction

Schwannoma is benign peripheral nerve tumor that grows slowly and gives rise to neurological deficit due to the compromised function of the fascicle (s) from which it originates, or compression exerted from the growing tumor to the rest of fascicles of the affected nerve contained under the same epineurium. In most of the reported cases peripheral nerve Schwannoma is solid tumor. 5% to 6% of cases are reported to be partly cystic [1]. In such cases the cystic component is mostly heterogenic, sometimes hemorrhagic or necrotic in its content. Only very few cases are reported as purely cystic Schwannoma harboring homogenous liquid compound.

## Case Presentation

A 45-years-old man complained of progressive fatigue in lifting the left leg and especially the big toe. He had noticed a swelling in the lateral upper part of the left leg. The difficulty in walking worsened during the last two months before coming to our attention. Physical examination revealed complete deficit of extensor hallucis longus (Figure 1). The patient was incapable to extend the big toe and there was 3/5 of muscle strength of foot and other toes extension, which caused evident step page gait. MRI of the left leg showed large cystic lesion 9 cm x 6 cm x 4 cm (Figure 2) extending from the head of left fibula downward the peroneal muscles. It had an oval shape and thin capsule with homogenous liquid content inside. Electrophysiological examination revealed conduction block of the left common peroneal nerve. Routine laboratory blood work was negative. Blood test for echinococcosis was negative as well. However, in an endemic area for echinococcosis we considered needle aspiration caring a potential risk of dissemination and in case of false negative blood tests for echinococcosis. The possibility of conclusive diagnosis was very small based on the tests over the liquid inside the cyst, even if we would consider the benign tumor of the nerve as an option. Hence needle aspiration of the cyst was omitted. We offered the patient the alternative of spinal epidural anesthesia or general anesthesia. Complete surgical removal of the cyst was achieved under general anesthesia. A lazy S skin incision over the lump in the lateral proximal part of the left leg was followed by the opening of the superficial fascia exposed the cyst formation. The first step was the exposure of the common peroneal nerve (CPN) in its passage around the neck of fibular head. The CPN was isolated and a small branch of two millimeters wide fascicle was dissected from the rest of the nerve fascicles. This fascicle gave rise to the cyst which extended down and inward the lateral part of the leg. Then a longitudinal incision was done on the epineurium over the cyst from proximal to distal pole. The location of the cyst was in between the peroneal muscles. The cyst extended for 9 cm from proximal to distal pole. The thin transparent layer of tissue over the cyst was handled very carefully and dissected from the cyst wall in a longitudinal opening and then 360 degrees around the cyst. The de-tensioned layer was a bundle of the nerve fascicles compressed by the huge cyst. They were progressively freed from the cystic wall (Figure 3) until the cyst was thoroughly

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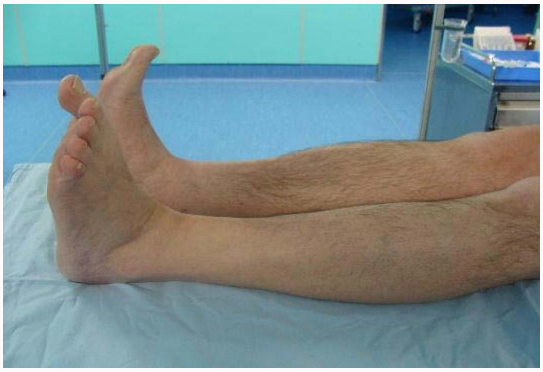

**Figure 1:** The left leg partial foot drop and complete deficit of extensor hallucis longus muscle.

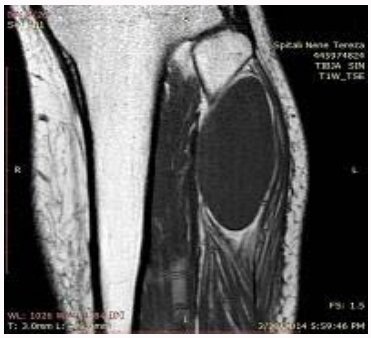

**Figure 2:** Coronal T1-weighted MRI.

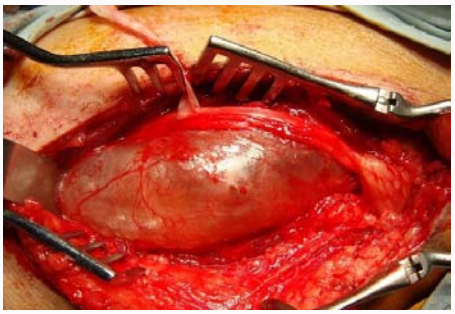

**Figure 3:** Intraoperative view of large cystic schwannoma and left peroneal nerve.

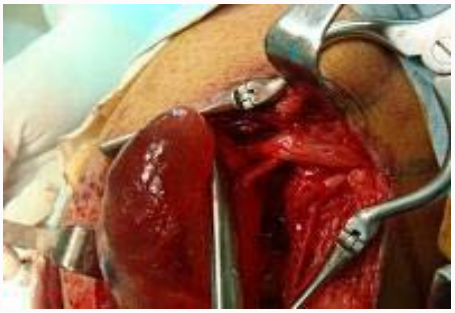

**Figure 4:** Progressive dissection of the cyst and its feeding proximal fascicle.

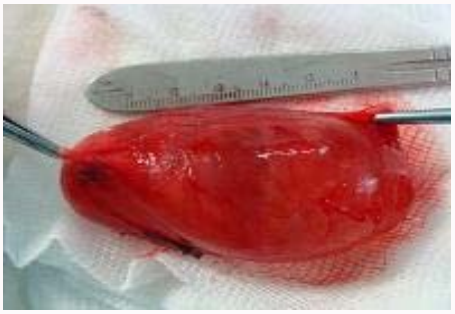

**Figure 5:** Removed cystic tumor with the sacrificed fascicles on the top of the pincers.

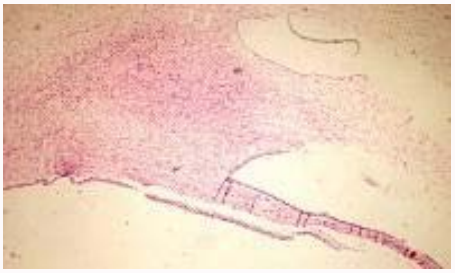

**Figure 6:** Histological view HE x 20. Compact hypercellular proliferation with narrow, elongated cells, with tapered ends interspersed with collagen fibers. Nuclear palisading around fibrillary process is seen. Tumor cells have ill-defined cytoplasm, dense chromatin and there is some degenerative nuclear atypia (ancient change). Multiple cystic spaces are present. Mitotic figures are not seen.

peeled off from the rest of the nerve fascicles that had become layers superficial to the cyst. The fascicle that gave rise to the cyst in its distal pole was then isolated (Figure 4). Both the fascicle that gave rise to the cyst was cut 4 mm from the cyst wall respectively (Figure 5) and the cyst totally removed without being ruptured. The remaining fascicles of the peroneal nerve were decompressed. The wound was closed and the patient made an uneventful recovery discharged the next day of surgery. Hematoxylin eosin stain demonstrated compact hypercellular proliferation with narrow, elongated cells, with tapered ends interspersed with collagen fibers. Nuclear palisading around fibrillary process was seen. Tumor cells have ill-defined cytoplasm, dense chromatin and there is some degenerative nuclear atypia (ancient change). Multiple cystic spaces were present. Mitotic figures are not seen. These characteristics were compatible with the diagnosis of CS (Figure 6).

The patient made a gradual full recovery of the neurological deficit. He was walking without difficulty with the left leg six months from surgery. In more than three years follow up there is no local recurrence.

## Discussion

Foot-drop due to huge CS is extremely rare. There are reported cases of peroneal nerve solid Schwannoma [2]. In front of cystic formation in the leg causing foot-drop careful differential diagnosis should be elaborated before tailoring treatment strategies. When the cyst is in contact with knee and tibiofibular joint the diagnosis of synovial or ganglion cyst should be taken in account. MRI study of the intensity of liquid content may reliably distinguish synovial from muscular, hydatid, abscess, hematoma or seroma.

Schwannoma is a benign tumor of the nerves arising from Schwann cell of the nerve fibers. It is mostly solid and rarely mixed cystic-solid tumor [2,3]. There is not enough evidence so far, on the mechanism of CS formation. There are hypothesis of cystic transformation by

degeneration of the Antoni B solid portion of Schwannoma giving rise to a larger cyst [4]. Furthermore ischemic necrosis due to tumor growth or intratumoral hemorrhage may result in cyst formation within the tumor. The cystic fluid is reported to be replaced relatively fast, considering its recurrence in a few days in reported cases where needle aspiration has anticipated surgical removal [5]. It seems that the dimension of the cyst depends on the gradient of pressure in and outside of it. When the cystic Schwannoma grows in endeavors like the intermuscular space of a limb as in presented case, or cavities such as thoracic [1], pelvic [6] or regions like axilla [5], the cyst may grow to huge dimensions. In presented case the liquid within the cyst was homogenously light yellow colored, without debris inside.

Large CS of peripheral nerves is very rarely reported [3,7-9]. There are few reports of CS located inside body cavities: vertebral canal [10], thoracic cavity arising from intercostal nerves or recurrent laryngeal nerve with cervical and mediastinal extension [11], abdominal cavity with extension into the pancreas [12] or inside the orbit [13]. In the case of cystic Schwannoma, the fine needle aspiration is not helpful in the cytological diagnosis [14,5]. The differential diagnosis of CS include: hematoma, ganglion or synovial cyst whenever located in joint vicinity; abscess, seroma, cystic epidermoid, myxoma, and in endemic areas like in our case, the intramuscular hydatid cyst. MRI can highly contribute to differentiate these entities [10,15]. Hydatid cyst is to be considered in endemic areas like Mediterranean, in order to avoid seeding through needle aspiration [16]. In this case we did not proceed with needle aspiration and biopsy considering that our country is endemic for hydatid disease. On the other hand, a false malignant diagnosis can lead to unnecessary en bloc resections with severe postoperative sequelae [17]. MRI characteristics of the present case were not characteristic for hydatid disease [16], yet could not exclude it for sure.

The chosen modality of treatment in front of a cystic lesion of soft tissue is the surgical removal without rupture and to avoid spilling of the liquid contain within the surgical cavity.

Likewise for solid [2], even CS is cured by complete surgical removal with sparing of the uninvolved fascicles. The decompression of the nerve fascicles involved within the same epineurium with the CS gives rise to gradual sensitive and motor recovery of the foot-drop, as it was observed in the presented case. Schwannoma should be considered in the differential diagnosis of cystic lesions of the soft tissues in extremities, especially in the presence of a neurological deficit of a peripheral nerve.

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