Schwannoma of the Tibial Nerve
Chelsea Pino, Hamad Ghazle, Shweta Bhatt and Vikram Dogra
Journal of Diagnostic Medical Sonography 2010 26: 205 originally published online 25 June 2010
DOI: 10.1177/8756479310374360

The online version of this article can be found at:
http://jdm.sagepub.com/content/26/4/205

Additional services and information for Journal of Diagnostic Medical Sonography can be found at:

Email Alerts: http://jdm.sagepub.com/cgi/alerts
Subscriptions: http://jdm.sagepub.com/subscriptions
Reprints: http://www.sagepub.com/journalsReprints.nav
Permissions: http://www.sagepub.com/journalsPermissions.nav
Citations: http://jdm.sagepub.com/content/26/4/205.refs.html
Schwannoma of the Tibial Nerve

Chelsea Pino, RDMS¹, Hamad Ghazle, EdD, RDMS¹, Shweta Bhatt, MD¹, and Vikram Dogra, MD¹

Abstract

Schwannoma is a benign, well-defined, and solitary nerve sheath tumor and accounts for 5% of all soft tissue tumors. It can occur anywhere along the peripheral nervous system. It is a slowly growing tumor and usually presents as a painless, discrete, and firm swelling before being diagnosed, unless it grows in a confined place. Preoperative diagnosis of schwannoma is often difficult. Computed tomography, magnetic resonance imaging, and sonography are useful imaging modalities in the preoperative assessment of nerve sheath tumors. Although imaging may not be reliable in distinguishing nerve sheath tumors from each other, certain imaging characteristics should raise the suspicion of schwannoma.

Keywords

sonography, schwannoma, tibial nerve

Schwannoma is a benign, well-defined, and solitary nerve sheath tumor and accounts for 5% of all soft tissue tumors.¹ It can occur anywhere along the peripheral nervous system. It is a slowly growing tumor and usually presents as a painless, discrete, and firm swelling before being diagnosed, unless it grows in a confined place. Preoperative diagnosis of schwannoma is often difficult. Computed tomography (CT), magnetic resonance imaging (MRI), and sonography are useful imaging modalities in the preoperative assessment of nerve sheath tumors.² Although imaging may not be reliable in distinguishing the type of nerve sheath tumors, certain imaging characteristics should raise the suspicion of schwannoma.

Case Report

A middle-aged woman presented to the emergency department at our institution with a prolonged history of left leg pain that was increasing gradually over 7 years along with a recent onset of left knee pain. There was no history of trauma. Physical and neurological examinations on admission revealed no abnormalities except for a limited and painful 65-degree flexion of the left knee.

The patient was referred for a sonographic examination to rule out deep vein thrombosis (DVT). A sonographic examination of the left leg using a 9-MHz linear array transducer (GE Logiq 9; GE Healthcare, Piscataway, New Jersey) excluded DVT. Because of the limited flexion of the left knee, the left popliteal fossa was scrutinized, and the sonographic evaluation revealed a 5.8 × 5.9 × 5.1-cm well-defined, round, heterogeneous mass that displaced the popliteal vessels anteriorly (Figure 1). Although the Doppler examination of the mass showed both arterial and venous flow, the feeding vessels could not be identified (Figure 2).

A left knee CT examination confirmed the presence of a well-defined, ovoid, attenuating soft tissue mass in the popliteal fossa (Figure 3). No calcifications were identified in the mass. The CT showed no invasion of the surrounding muscles, bones, and subcutaneous fat and skin.

Subsequently, an MRI scan was obtained for further evaluation. The MRI scan confirmed the sonographic findings and showed a well-circumscribed 6.2 × 5.1 × 4.6-cm mass in the popliteal fossa (Figure 4). Furthermore, it suggested that the mass was a peripheral nerve sheath tumor, although the nerve of origin could not be determined. Despite the lack of determining the specific and exact nerve of origin, the imaging findings were suggestive of a schwannoma.

A soft tissue core biopsy was performed. The histologic examination of the specimen demonstrated granulomatous changes and chronic inflammation, which were believed to be contributing to the patient’s pain. In addition, the immunohistochemical stain of the tumor

¹University of Rochester, Rochester, NY, USA

Corresponding Author:
Shweta Bhatt, MD, University of Rochester, 601 Elmwood Ave, Rochester, NY 14642, USA
Email: bhattshweta@hotmail.com
cells was positive for s-100 and negative for smooth muscle actin (SMA), which favored the diagnosis of a schwannoma.

Two weeks later, the patient underwent surgical resection of the mass. The patient was placed in a prone position and a standard posterior knee limb-sparing incision was made over the left popliteal fossa. A well-defined mass was identified, originating centrally from the tibial nerve with its proximal and distal branches surrounding the mass (Figures 4 and 5). The mass was dissected and resected without any damage to the proximal and distal branches of the tibial nerve or the gastrocnemius nerve branches.

Histopathologic examination of the specimen confirmed the mass to be a schwannoma. Postoperatively, the patient regained full motion of the knee, with slight residual tenderness.

Discussion

Benign peripheral nerve sheath tumors can be classified into schwannomas and neurofibromas. As in our patient, schwannoma (also known as neurilemomas and neurolemmomas) is usually a solitary, well-circumscribed tumor that is enclosed by a capsule called the epineurium. The name schwannoma is derived from the Schwann cells, which help coat the nerve cells.

Schwannoma has been reported to be eccentrically located and does not involve the main nerve. Schwannoma tends to displace the nerve fibers peripherally in contrast to neurofibromas, which grow within the nerves and permeate them, potentially necessitating the partial or complete removal of nerves, resulting in nerve deficit. This peripheral location and noninvolvement of the main nerve
Schwannoma is a very slow-growing mass and often is asymptomatic. However, symptoms may occur as a result of nerve compression caused by the growth of the tumor. It has been reported that schwannoma presents as a palpable mass with local pain and paraesthesia, which is exacerbated by direct percussion of the mass.

Although schwannoma may occur at any age, it is commonly seen between the ages of 20 and 50 years, with equal male and female predisposition and no racial predilection. Most lesions are usually solitary unless they are associated with neurofibromatosis, which is often multiple. Unlike neurofibromas, which are highly associated with von Recklinghausen disease, schwannoma rarely has a malignant potential. Schwannoma presents in various sizes, ranging anywhere from 2 to 20 cm in diameter. Schwannoma is not usually localized in a specific area but can occur anywhere along the peripheral nervous system in the neck, mediastinum, pelvis, retroperitoneum, and upper and lower extremities. According to Stull et al., schwannoma is usually found in the anterior aspects and flexor areas of the upper extremities and the posterior aspects of the lower extremities.

The use of imaging modalities such as sonography, CT, and MRI has enhanced the preoperative diagnosis of nerve sheath tumors. They have provided information regarding the gross anatomic characteristics, size, location, and relationship of the tumor with other structures, as well as tumor infiltration with surrounding structures. High-resolution sonography demonstrated a round, smooth, well-defined, heterogeneous mass with cystic degeneration and posterior acoustic enhancement, consistent with degenerating schwannoma with internal cystic changes as seen with previous reports of schwannomas. In addition, it has been reported that schwannoma is often contiguous with the nerve and located eccentrically. In our patient, the tumor showed cystic degeneration, but the nerve connection and the eccentric location of the tumor were not demonstrated. Moreover, King et al. have reported increased flow and vascularity on color Doppler sonography in two patients with schwannomas. In our patient, the color Doppler sonography showed minimal to moderate flow centrally and peripherally. Consequently, vascularity is not used as a distinguishing factor for diagnosing schwannoma. However, color Doppler sonography with compression has been reported to be of value in distinguishing between schwannoma and neurofibroma because obliteration of flow with compression is seen with schwannoma and not with neurofibromas or lymph nodes.
CT examination demonstrated a well-defined, ovoid, and soft tissue density mass similar to those reported in the literature.\(^3,7\) On the other hand, MRI scan revealed the well-circumscribed, ovoid schwannoma in two different ways. On T1-weighted images, the mass demonstrated isointensity to low intensity, whereas the T2-weighted images showed the schwannoma as heterogeneous and hyperintense. This variable appearance has been described by Sakai et al.\(^23\) Furthermore, we believe the hyperintensity demonstrated in the schwannoma on T2-weighted images corresponds to the cystic degeneration and fibrous bands seen on the histopathologic examination.

Even though schwannoma tends to be benign, the treatment of choice is typically total resection of the tumor. The prognosis of schwannoma is very favorable. Severe nerve damage or neurological deficits are uncommon because of the perineurium nature and the eccentric location of the tumor with respect to the involved nerve.\(^3,7\) Postsurgical functional or sensational impairment may occur, but it typically resolves shortly after.\(^3,5,7\)

**Conclusion**

Given the advancement and improvement in imaging technology, the visualization of the peripheral nerves and the preoperative diagnosis of nerve sheath tumors are now possible. A peripheral nerve sheath tumor such as schwannoma should be suspected at imaging when a well-defined, ovoid, heterogeneous mass in conjunction with cystic degeneration, eccentric location, and posterior acoustic enhancement (on sonography) is identified. These imaging characteristics may not only assist sonographers and radiologists in narrowing the differential diagnosis but also aid in preoperative planning.

**Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the authorship and/or publication of this article.

**Funding**

The author(s) received no financial support for the research and/or authorship of this article.

**References**