Case Report | Journal of Orthopaedic Case Reports 2026 July:16(7):Page 362-365

Schwannoma Arising from the Deep Peroneal Nerve: A Case Report

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Learning Point of the Article:

Schwannomas arising from the deep peroneal nerve are rare and should be considered in patients presenting with chronic leg pain and localized swelling, as early surgical excision leads to excellent outcomes.

Abstract

Introduction: Schwannomas, also known as neurilemmomas, are the most common benign peripheral nerve tumors. Schwannomas arising from deep peroneal nerves are rare and often remain clinically silent until local mass effects cause pain, dysesthesia, or motor/sensory deficits.

Case Report: A 20-year-old female presented with a 6-month history of pain and swelling in her right leg, with difficulty in standing and walking for longer durations. Imaging revealed a well-defined lesion along the deep peroneal nerve. Surgical enucleation of the tumor was performed, and histopathological examination confirmed the diagnosis of schwannoma. Postoperatively, the patient experienced a significant improvement in symptoms with no recurrence at the latest follow-up.

Conclusion: Schwannomas arising from deep peroneal nerves are rare. However, they should be considered in patients with chronic leg pain and swelling with neurological symptoms in the leg and calf region. Surgical excision is the treatment of choice, and complete resection is generally curative.

Keywords: Schwannoma, neurilemmoma, peripheral nerve tumors, peroneal nerve, benign tumor.

Introduction

Schwannomas, also known as neurilemmomas, are benign tumors of the peripheral nerves arising from Schwann cells. Schwannomas most frequently occur between the third and sixth decades of life without any gender or ethnic preponderance [1]. These tumors typically remain asymptomatic until they cause local mass effects, leading to symptoms such as dysesthesia, pain, or muscle weakness.

Peripheral nerve sheath tumors may arise anywhere along the nerve, from the dorsal root ganglion to the terminal nerve branches. The head and neck, ulnar nerve, and peroneal nerve regions are common sites for these tumors [2]. The common peroneal nerve is vulnerable to injury due to its superficial anatomical course, making it susceptible to trauma or compression. There are multiple reports of schwannoma arising from the common peroneal nerve; however, schwannoma arising from a deep peroneal nerve is extremely rare, with only a few case reports in the literature [3].

We, therefore, present one such case of schwannoma arising from the deep peroneal nerve in a young female affecting her daily activities.

Access this article online

Website: www.jocr.co.in

DOI: https://doi.org/10.13107/jocr.2026.v16.i07.7690

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Submitted: 20/04/2026; Review: 05/05/2026; Accepted: June 2026; Published: July 2026

DOI: https://doi.org/10.13107/jocr.2026.v16.i07.7690

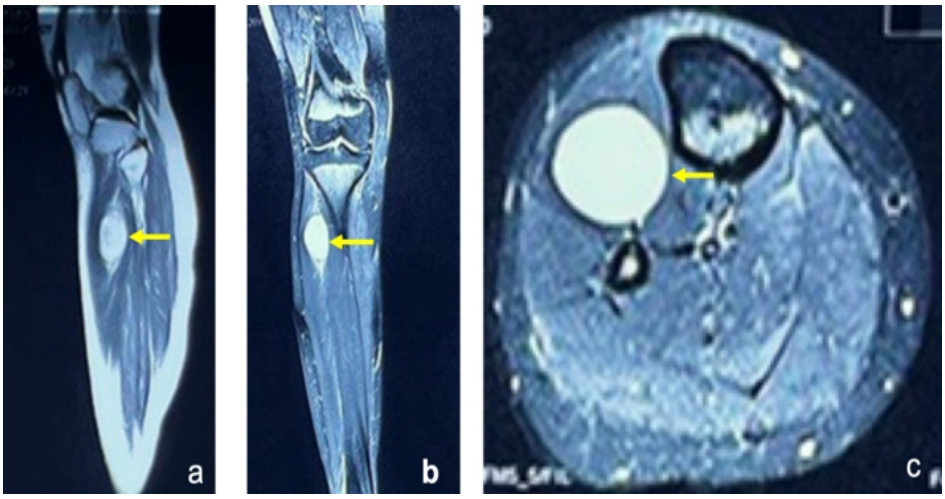

Figure 1: T2 sagittal, STIR coronal, and axial magnetic resonance imaging images (a, b, c) of the left upper leg demonstrate an oval T2-hyperintense encapsulated lesion (arrow) in the anterolateral intermuscular compartment.

Case Report

A 20-year-old female presented with pain and localized swelling in her right leg, along with difficulty in prolonged standing and walking for the past 6 months. The patient reported a moderate-intensity, burning pain that was intermittent, radiating distally, along with a feeling of heaviness in the calf. The pain increased on prolonged standing and walking and was relieved with rest and analgesics.

On clinical examination, a palpable mass measuring 5 cm × 3 cm was noted over the proximal lateral aspect of the right leg (Fig. 1). The skin overlying the mass appeared normal. The mass was firm in consistency and tender. Manipulation of the swelling triggered sharp, lancinating pain in the leg and foot. Ankle plantar and dorsiflexion were normal, and sensory function remained intact.

Magnetic resonance imaging (MRI) of the left leg revealed a well-defined, T2 hyperintense, homogeneously enhancing oval lesion (3 cm × 3 cm × 4 cm) located in the intermuscular plane of the anterolateral compartment of the proximal leg arising from the deep peroneal nerve (Fig. 2). Based on clinico-radiological examination, a provisional diagnosis of benign nerve sheath tumor was considered.

The patient then underwent core-needle biopsy of the lesion under ultrasound guidance (Fig. 3), which confirmed the diagnosis of a schwannoma with fatty and cystic degeneration. Immunohistochemical analysis showed that the tumor cells were positive for S100 and negative for CD34 and Desmin (Fig. 4).

After informed consent from the patient, she was planned for surgical enucleation. Intraoperatively, the tumor was found to be encapsulated and in continuity with the deep peroneal nerve. The tumor was enucleated, and the remaining sheath was repaired using Ethilon 6-0.

Postoperatively, the excised tumor was sent for biopsy, which confirmed it to be a schwannoma. The patient had an uneventful recovery, and her symptoms improved significantly. At the latest follow-up after 1 year, the patient is asymptomatic and has no recurrence of the lesion.

Discussion

Schwannomas are the most common benign peripheral nerve sheath tumors, arising from the Schwann cells, which are responsible for forming the myelin sheath around peripheral nerves. They are present in the sacral plexus, the brachial plexus, and the sciatic nerve [4,5]. Despite being the most common benign peripheral nerve sheath tumor, its presence in the lower limbs is reported to be only 1% [5]. They are typically solitary, but multiple tumors can be seen in conditions such as schwannomatosis or neurofibromatosis type 2.

Since these tumors have a slow-growing pattern, patients are mostly asymptomatic until they cause local mass effects, leading to symptoms such as dysesthesia, pain, or muscle weakness.

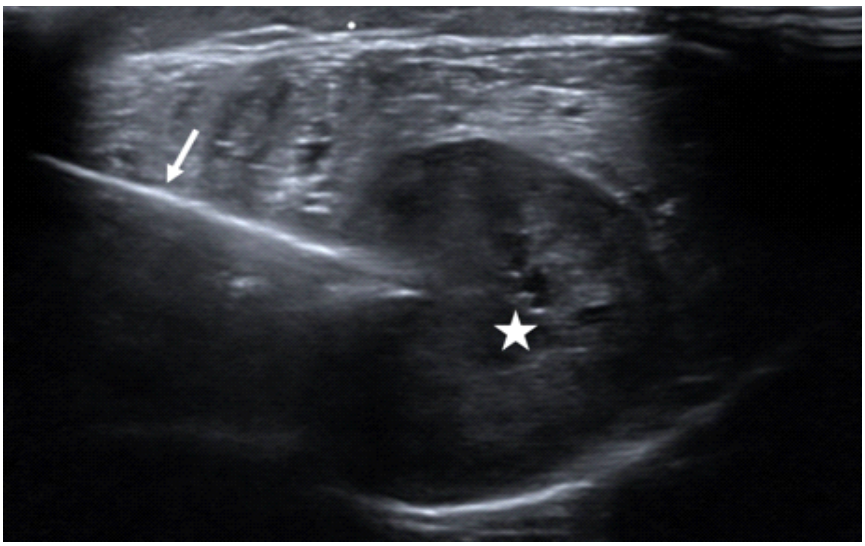

Figure 2: Ultrasound image demonstrating ultrasound-guided core needle biopsy of the lesion. (Arrow: Biopsy needle, Asterisk: Lesion).

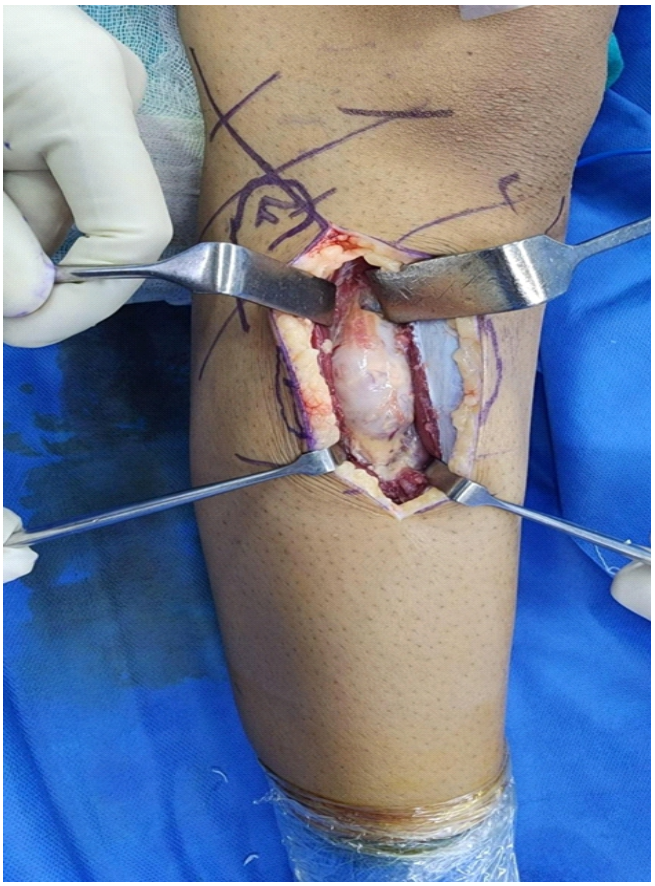

Figure 3: Intraoperative image showing encapsulated tumor in continuity with the deep peroneal nerve.

The diagnosis involves the triad of clinical history and physical examination, imaging, and histopathological studies. On MRI, a well-circumscribed mass is seen, which is isointense or hypointense on T1-weighted image, whereas heterogeneously hyperintense with a thin peripheral rim of fat is seen on T2-weighted image [6]. However, in neurofibroma, the image is hypointense on T1, while on T2, a hyperintense rim with the central area of a low signal may be seen, which is likely due to the dense central area of collagenous stroma. Magnetic resonance neurography is the modality of choice for its ease in confirming clinical suspicion of peripheral neuropathy by directly showing the nerve abnormality or regional muscle denervation changes; to assess the extent of the abnormality in nerve injuries or the disease load in diffuse peripheral nerve lesions, such as hereditary neuropathies and neurofibromatosis [7]. However, these modalities cannot differentiate from other benign or malignant tumors with the same consistency, such as ganglion, lipoma, myxoma, neurofibroma, or malignant peripheral nerve sheath tumor; hence, histopathological analysis is crucial [8]. In histopathology, a schwannoma is well circumscribed and surrounded by a capsule. It contains fascicles of Schwann cells with a spindle cell morphology (Antony A) or may become loosely arranged (Antoni B pattern). Furthermore, these tumor cells are positive for S100, podoplanin (D2-40), calretinin, and SOX10 and negative for CD34 and Desmin [8]. Mutations of the NF2, SMARCE1, SMARCB1, LZTR1, and SUFU genes have been associated with schwannoma formation [9].

Small, solitary schwannomas can be managed conservatively. However, surgical excision is indicated in cases of progressive neurological deficits, persistent pain, suspected malignancy, or tumor growth. Schwannomas can be easily dissected from the nerve without damaging the nerve's continuity, as they rarely invade into the nerve itself, as seen in our case [10]. Post-operative loss of nerve function is uncommon.

Risk factors for complications and post-operative neurological deficits include large tumor volume, proximal location, and involvement of major motor nerves [11]. Studies have reported that post-operative sensory deficits, such as paresthesia or hypoesthesia, often improve over time [11]. Tumor size, surgical technique, and intraoperative electrophysiological monitoring are critical to reducing the risk of neurological deficits.

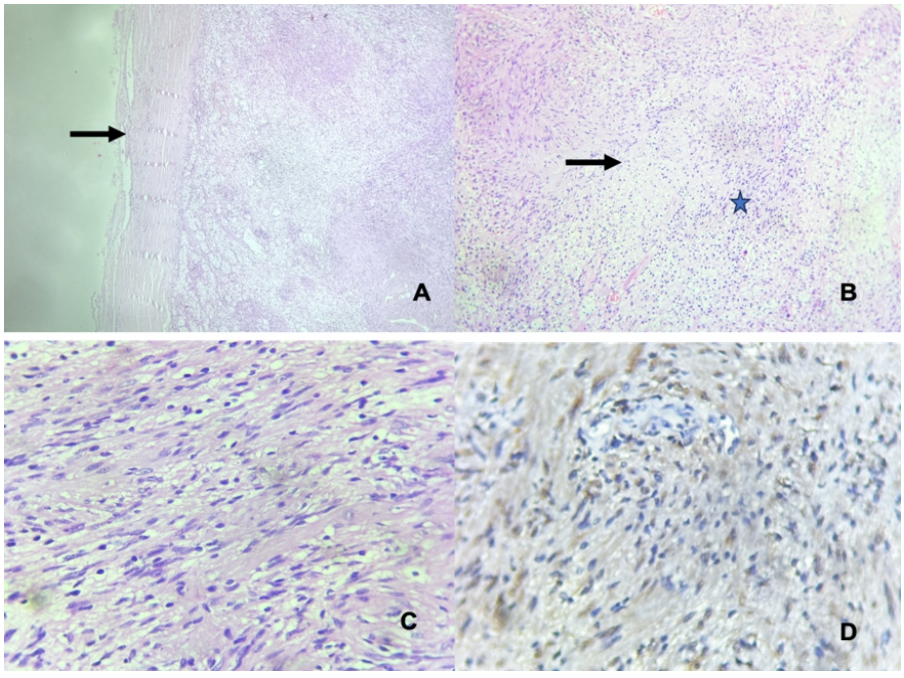

Figure 4: (a) demonstrates the encapsulated lesion (arrow), (b) shows the lesion having alternate hypercellular (asterisk) and hypocellular areas (arrow), (c) shows spindle cells, ill-defined cytoplasm with elongated nuclei, and (d) shows the immunohistochemistry image demonstrating positive S-100.

Conclusion

Schwannomas are benign peripheral nerve sheath tumors that rarely undergo malignant transformation. Although schwannomas of the lower limb are rare, they should be suspected in patients with chronic leg pain, localized swelling, numbness, or weakness. Evaluating the patient's clinical condition and the characteristics of the lesion is crucial for determining the most appropriate treatment. For symptomatic schwannomas, surgical excision is the treatment of choice, and complete resection is generally curative.

Clinical Message

Deep peroneal nerve schwannoma should be considered in patients with unexplained chronic leg pain and localized swelling, as timely diagnosis and surgical excision result in excellent functional outcomes.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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Conflict of Interest: Nil
Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this article

How to Cite this Article

Jalan D, Jha AK, Singh DK, Khanna G, Gupta V. Schwannoma Arising from the Deep Peroneal Nerve: A Case Report. Journal of Orthopaedic Case Reports 2026 July;16(07): 362-365.