

[CASE REPORT]

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Painful Posteromedial Ankle Mass Caused by Posterior Tibial Nerve Schwannoma: A Case Report

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Abstract

Background: Benign peripheral nerve sheath tumors (schwannomas) are uncommon and form from Schwann cells, which are found in nerves. If it exists at this site, it may appear to be a more common cause of ankle pain and often is not suspected outside of the imaging modality.

Case report: We present a 56-year-old Hispanic woman with progressive sharp pain in the left lower extremity (LLE) for two years, who was found to have a palpable posteromedial ankle mass and paresthesia radiating to the calf and dorsum of the foot. MRI showed a high-contrast well-defined, fusiform lesion that extended along the course of the posterior tibial nerve suggesting the possibility of schwannoma. An elective surgical excision of the tibial nerve with external neurolysis of the nerve in the space of the adjacent neurovascular and tendinous structures was performed. The pathological examination showed a benign schwannoma with classic Antoni A and B features, nuclear palisading, and verocay bodies, free of atypia, necrosis or mitosis. Limited resources precluded immunohistochemical staining and diagnosis was based on typical histomorphology alone. Transient paresthesia in early postoperative period were found to be completely resolved and patient showed no complaints at 1-month follow-up, with no neurological deficit noted and normal gait.

Conclusions: Posterior tibial nerve schwannoma should be included in the differential diagnosis for patients with a chronic painful posteromedial ankle mass with a positive tinel sign and radiating paresthesia. The magnetic resonance imaging (MRI) is useful for localizing the neural origin of the lesion preoperatively, with the planning of the nerve-sparing surgical approach, and the complete microsurgical removal with neurolysis provides an excellent functional and oncological results.

Keywords: Posteromedial, Ankle Mass, Posterior Tibial Nerve Schwannoma.

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1. Introduction

Schwannomas also called neurilemmomas are slowly-growing benign tumors of Schwann cells that protect the outer nerves. They are most frequently seen in the flexor surfaces of the extremities, head, and neck and are among the most common of all benign peripheral nerve sheath tumors [1]. Involvement of the posterior tibial nerve at or near the tarsal tunnel and the ankle is relatively rare and often confused with other common causes of posteromedial ankle pain like tenosynovitis, ganglion cyst, tarsal tunnel syndrome of other origin and soft-tissue infection, which leads to diagnostic delay [2,3].

The clinical features of posterior tibial nerve schwannoma usually consist of insidious development of a lesion with a palpable tumor, Tinel's sign over the lesion, and paresthesia or dysesthesias diffused along the peripheral distribution of the nerve without any motor deficit [4,5].

Magnetic resonance imaging (MRI) is of paramount importance in the preoperative characterization, because it can identify the specific nerve involved, define its relationship with surrounding neuro-vascular structures and tendons and hypothesize about the neurogenic origin, which can lead to a comfortable approach of nervesparing surgery [6,7].

We describe a middle-aged female patient with a 2-year history of progressive posteromedial ankle pain and a palpable mass, diagnosed as a schwannoma of the posterior tibial nerve and treated with complete surgical resection and posterior tibial nerve neurolysis. It is written according to the CARE (CAse REport) guidelines and the purpose is to report its clinical, imaging & histopathology features, surgical management & functional outcome, to discuss differential diagnosis and to compare with previously described cases of ankle and tarsal tunnel schwannoma.

2. Case Presentation

2.1 Patient Information

A 56-year-old Hispanic female presented for elective assessment and surgical intervention for a mass located in the posteromedial portion of the left ankle as well as a distinct mass located in the plantar aspect of the left foot.

Her medical history included well controlled hypothyroidism for which she was taking oral levothyroxine once daily (75 micrograms). Her drug allergies were unknown. She had a history of three cesarean sections (C-sections) and no history of pregnancy loss. No significant family history was found. Socially, she denied alcohol or smoking tobacco and did not have a history of competitive athletics.

Approximately two years prior to presentation, she developed pain in the left lower extremity. The pain was initially mild and did not restrict ambulation or routine daily activities. Over time it progressed in intensity, becoming sharp and stabbing in character, reaching a self-reported severity of approximately 8 out of 10, and taking on a lancinating quality with associated hypersensitivity over the affected area. She also noted paresthesias radiating toward the calf and the dorsum of the foot. Because of the progressive nature of her symptoms, she was evaluated by her treating physician, who identified a palpable mass and a positive Tinel sign over the lesion, with no associated motor deficit. Magnetic resonance imaging of the ankle was obtained, which demonstrated a discrete soft-tissue mass, and she was subsequently referred for elective surgical resection under the traumatology and orthopedic surgery service.

2.2 Clinical Findings

At the time of admission for the planned procedure the patient was in good general condition; fully awake and oriented to person, place, and time. On General examination an expandable, normocephalic patient with isocoric and reactive pupils, moist mucous membranes, normal movement and symmetry of the neck with no palpable lymphadenopathy and a normal cardiopulmonary and abdominal examination was observed.

Focal examination of the extremities demonstrated preserved mobility and symmetry, with a palpable, non-tender mass located posteromedial to the medial malleolus of the left ankle. There was no pain or restriction with movement of the affected extremity at the time of admission, and the neurological examination of the limb was preserved, without motor deficit. As detailed in her earlier outpatient evaluation, the mass had been associated with a positive Tinel sign, hypersensitivity, and paresthesias radiating to the calf and dorsum of the foot, with pain reported as lancinating and of moderate-to-severe intensity (8/10) prior to surgery.

2.3 Timeline

For patient confidentiality, all dates are presented in relative terms.

2.4 Diagnostic Assessment

2.4.1 Laboratory Findings

Preoperative laboratory evaluation was unremarkable, with all measured parameters falling within or near normal reference ranges, as summarized in Table 2.

2.4.2 Imaging Findings

Multipplanar, multisequence magnetic resonance imaging of the left ankle identified a nodular, fusiform lesion along the course of the posterior tibial nerve, with its distal margin located approximately 2 cm from the tibioperoneal joint line. The lesion measured 19 × 19 × 46 mm, with an estimated volume of 8.6 mL. It demonstrated low signal intensity on T1-weighted sequences, high signal intensity on proton-density fat-suppressed sequences, and avid, heterogeneous enhancement after contrast administration, with a central area of reduced enhancement. Margins were well defined with minor anterior displacement of flexor hallucis longus myotendinous unit, which was not associated with an osseous edema or an abnormality of the osteochondrum, ligamentous and tendinous structures, or plantar fascia (Figure 1).

Due to its fusiform morphology and sharp features, and the intimate relationship with the posterior tibial nerve, the differential diagnosis on imaging suggested a benign peripheral nerve sheath tumor, with schwannoma as the most likely diagnosis and neurofibroma as the main alternative. Clinical correlation and pathological confirmation was recommended.

2.5 Therapeutic Intervention

The patient underwent elective surgical excision of the left posteromedial ankle mass under general inhalational anesthesia with a pneumatic tourniquet in place. Following aseptic preparation and draping, a longitudinal incision was made over the palpable lesion, and dissection was carried through the subcutaneous tissue and fascia to expose the posteromedial compartment (Figure 2A). Tenolysis of the flexor hallucis longus, posterior tibial, and flexor digitorum tendons was performed to facilitate access to the deep neurovascular structures. The posterior tibial artery and its accompanying veins were carefully dissected and protected throughout the procedure, and the tibial nerve was exposed by external neurolysis (Figure 2B).

A well-circumscribed, encapsulated tumor was identified arising along the course of the posterior tibial nerve. The lesion was meticulously separated from the surrounding neural tissue using a combination of blunt and sharp dissection, with careful preservation of nerve continuity and the adjacent functional structures (Figure 2C). Circumferential dissection allowed complete macroscopic removal of the mass as a single, discrete specimen, without gross residual tumor in the operative field. The adjacent tendons and the posterior tibial neurovascular bundle were preserved intact. Hemostasis was confirmed, both operative fields were irrigated, and the wounds were closed in layers, followed by application of sterile dressings and bandaging. The procedure was completed without immediate intraoperative complications, and the specimens were submitted for histopathological examination.

2.6 Histopathological Findings

The resected specimen was submitted in a single container, as an ankle tumour, and was a fragment of previously sectioned whitish tissue 3.5×2.2 cm in size and 6 g in weight, with an irregular external surface and a soft whitish cut surface (Fig. 2D).

Microscopic analysis showed an encapsulated, nodular lesion with spindle cells consisting of hypercellular (Antoni A) and hypocellular (Antoni B) zones. Within the Antoni A regions, cells with elongated or undulating nuclei in which there was nuclear palisading and Verocay body formation were seen, while within the Antoni B regions, myxoid stromal change and thin-walled vessels were present. Nuclear pleomorphism, atypical mitoses, and necrosis were not found (Figure 3). These were diagnostic for schwannoma (neurilemmoma) without any evidence of malignancy. The examiner only received one specimen from the posteromedial ankle mass, the additional plantar mass excised in the same operation was not submitted for histological examination.

Due to resource limitations, the use of immunohistochemical staining like S100, SOX10, EMA and neurofilament and Ki-67 were not undertaken. The classical and unequivocal histomorphological features and complete lack of atypia, mitotic activity and necrosis led to diagnosis of benign schwannoma based on H&E alone, which is a known pitfall of the diagnostic work-up to be discussed below.

2.7 Follow-up and Outcomes

In the first 48 hours after surgery the patient had manifestation of transient paresthesias in the distribution of the tibial nerve which were spontaneous resolved without any intervention. 10 days after surgery: operative wound was clean and healing properly; skin sutures were taken off. No tibial nerve dysfunction was seen at this visit and no persisting paresthesias were found with normal calf and foot function and gait.

At about a month after surgery, she was completely symptom-free, with complete resolution of all pain and sensory symptoms that were present prior to surgery. Her surgical incision was fully healed and there was no evidence of an infectious process; the incision was not dehiscid; there was no hematoma; nor was there local inflammation. There was also no clinically detectable motor dysfunction (weakness) in the affected extremity, and on neurological examination there was no deficit in sensation in the area innervated by the posterior tibial nerve. She had returned to normal walking patterns and was experiencing no impairment of gait or function.

3. Discussion

3.1 Pathology and Biological Characteristics of Schwannoma

Schwannoma (neurilemmoma) is a benign encapsulated tumor of Schwann cells of the peripheral nerve sheath [1]. It usually manifests as a single, slowly-growing, well-demarcated tumor displacing (not invading) the fascicles of the nerve from which it arises that often can be enucleated while preserving the nerve [1,8]. In this instance it was obvious that the classic histopathological appearance of alternating compact (hypercellular, nuclear

palisading, Verocay bodies) and loose (hypocellular, myxoid, Antoni B) was present, and is thought to be characteristic of schwannoma, whereas nuclear pleomorphism, atypical mitoses, and necrosis would favour a diagnosis of malignant peripheral nerve sheath tumour [1,8]. The Schwann cell lineage of these tumors usually is supported by strong and diffuse S100 and SOX10 positivity [1,8] and classic and unequivocal tumor histomorphology is compatible with the diagnosis without immunostaining, as was the case herein, unless there are atypical features that raise concerns for malignancy [1,8].

3.2 Posterior Tibial Nerve Involvement and Clinical Presentation

Schwannomas of the posterior tibial nerve at the ankle and within the tarsal tunnel are uncommon relative to their occurrence in more proximal or superficial peripheral nerves, and multiple case reports emphasize their rarity in this location [2,3,4,5,9]. When they do occur here, they characteristically present, as in this patient, with an insidious, progressively enlarging posteromedial mass accompanied by chronic pain, hypersensitivity, and paresthesias radiating into the nerve's sensory distribution [2,4,5]. A positive Tinel sign elicited by percussion over the lesion is a characteristic and clinically useful finding that reflects irritation of the underlying nerve fascicles and has been reported consistently across published cases, including instances where imaging was only obtained after the lesion had been mistaken for a ganglion cyst or after years of presumed tarsal tunnel syndrome, Morton's neuroma, or peripheral neuropathy had been treated without relief [3,9]. Motor deficits are typically absent or occur late, since sensory fascicles are usually affected first and the tumor tends to displace rather than infiltrate motor fibers, consistent with the preserved motor examination observed in this patient despite a two-year symptom history [2,3,9].

3.3 Differential Diagnosis

The differential diagnosis of a posterior lateral mass of the ankle that is painful with radiating paresthesias can be extensive and involves mostly neurogenic but also some non-neurogenic entities. Neurofibroma is the most common neurogenic mimic of schwannoma in this area, and has been reported specifically to account for tarsal tunnel syndrome and to be mistaken for tarsal tunnel syndrome [10,11]; unlike schwannoma, neurofibroma typically has a non-encapsulated structure and is known to invade nerve bundles, making resection that respects individual fascicles more difficult [10,11]. On cross-sectional imaging, an eccentrically positioned lesion relative to the parent nerve favors schwannoma, whereas a centrally located mass favors neurofibroma, and heterogeneous signal with cystic degeneration is more common in schwannoma [6]. Other considerations include ganglion cyst (a common initial misdiagnosis in reported cases) [3], tenosynovitis, tarsal tunnel syndrome from other space-occupying or fibrotic causes, soft-tissue infection or abscess, and, less commonly, malignant peripheral nerve sheath tumor, which should be suspected when imaging demonstrates infiltrative margins or rapid growth, or when histopathology reveals atypia, increased mitotic activity, or necrosis—none of which were present in this patient [1,8].

3.4 Role of Imaging

Magnetic Resonance Imaging (MRI) is generally regarded as the preferred method for evaluating the extent of a peripheral nerve sheath tumor before surgery [6,7,12,13]. MRI has several characteristics that are consistent with identification of peripheral nerve sheath tumors, which have been established through radiological studies. The primary characteristics include a fusiform shape with tapering at each end, the split-fat sign, the fascicular sign, and the target sign; these features are most apparent on MRI [6,7]. Neurofibromas typically appear homogeneous, whereas schwannomas can be heterogeneous due to degeneration and cystic cavitation [6]. MRI in this case identified the location of the mass along the posterior tibial nerve and demonstrated findings characteristic of schwannoma, including an encapsulated morphology with a defined fusiform shape and low T1 signal, increased fluid-sensitive signal, heterogeneous enhancement, and a decreased central signal corresponding to the cystic or myxoid degeneration commonly seen in large schwannomas [6,7,12]. Identifying the precise position of the lesion relative to the flexor tendons and the neurovascular bundle was critical for planning a nerve-sparing surgical technique and anticipating the need for tenolysis, similar to what was found in prior case reports of posterior tibial nerve schwannoma where imaging guided surgical planning [2,4,5].

3.5 Management and Nerve Preservation

The most appropriate treatment for symptomatic schwannoma involving a nerve is enucleation with preservation of the parent nerve and its uninjured fascicles through complete surgical excision; this treatment generally provides a cure [2,4,5,6]. Several cases in the literature describing posterior tibial nerve schwannoma have highlighted the importance of microsurgical technique, including use of an operating microscope, to facilitate dissection and preservation of fascicles during enucleation [4]. In this case, the longitudinal posteromedial approach allowed controlled access to the deep compartment, and tenolysis of the flexor hallucis longus, posterior tibial, and flexor digitorum tendons permitted safe access to the tibial nerve without violating adjacent structures. Following external neurolysis of the nerve, careful blunt and sharp circumferential dissection of the tumor away from the epineurium allowed complete macroscopic removal of the mass as a discrete specimen while maintaining nerve continuity, consistent with the microsurgical principles described for benign nerve sheath tumors at this location [2,4,5].

3.6 Postoperative Neurological and Functional Outcomes

Transient postoperative paresthesia or numbness, as seen in this patient within the first 48 hours, is an acknowledged and generally transient result of nerve manipulation during tumor enucleation and has been noted in previously reported cases, where it may occasionally continue as mild residual numbness without affecting function [2,5]. The patient's full symptom resolution, preserved motor and sensory function, and return to normal gait by one month postoperatively correlate well with the generally favorable functional outcomes previously reported for excision of posterior

tibial nerve and other benign peripheral nerve sheath tumors when nerve continuity is preserved intraoperatively [3,4,9].

3.7 Comparison with Previously Published Cases

Prior reports of schwannoma involving the posterior tibial nerve, the ankle, and the tarsal tunnel have similarly described a chronic, slowly progressive presentation with a palpable mass, a positive Tinel sign, and radiating sensory symptoms [2,3,5,9]. A recurring theme in this literature is substantial diagnostic delay: patients have been treated for years for presumed ganglion cyst, tarsal tunnel syndrome, Morton's neuroma, or peripheral neuropathy before magnetic resonance imaging identified the underlying nerve mass, in one instance after six years of unsuccessful symptomatic treatment [3,9]. As in the present case, magnetic resonance imaging in these reports has consistently been the key preoperative tool for suggesting a neurogenic origin and guiding surgical planning, and microsurgical enucleation with nerve preservation has been the mainstay of treatment, generally associated with favorable functional recovery [2,4,5,9]. Reported tumor sizes have varied considerably, from lesions of only about 1 cm identified early because of nerve conduction abnormalities [4] to markedly larger tumors of several centimeters extending into the forefoot [9,13,14]; the 19 × 19 × 46 mm lesion in this patient falls at an intermediate-to-larger size within this reported range, consistent with her prolonged, two-year symptom interval. This case adds to that body of literature by providing a detailed correlation of clinical, imaging, intraoperative, and histopathological findings in a middle-aged woman, further supporting posterior tibial nerve schwannoma as an important, if uncommon, and cause of chronic posteromedial ankle pain that merits earlier consideration in the differential diagnosis.

4. Limitations

The major shortcoming in this case is lack of the immunohistochemical confirmation (S100, SOX10) of the diagnosis due to limited resources. A diagnosis was therefore made based on classic histological features which were unequivocal, but ideally would have supported the diagnosis with immunohistochemical analysis which was performed in most of the previously described cases of Posterior tibial nerve schwannoma [1,4,5,8]. Furthermore, as in all single patient cases, the occurrence and outcome presented here cannot be extrapolated and would be beneficial to have a longer follow-up period to evaluate for recurrence.

5. Conclusion

A schwannoma of the posterior tibial nerve is an uncommon but important differential diagnosis that should be included in the differential diagnosis for patients with chronic, painful posteromedial ankle masses who present with a positive Tinel sign and radiation of paresthesias, even in the absence of motor deficit. Magnetic resonance imaging is used to determine the location of the lesion from a neural perspective and to guide a nerve-sparing surgery. In this case, with meticulous neuro-sparing surgery of external neurolysis and preservation of the posterior tibial nerve and

surrounding tendinous and neurovascular structures, complete microsurgical resection led to complete resolution of symptoms and excellent functional recovery at one-month follow-up, demonstrating their favorable prognosis when managed with meticulous and neuro-sparing surgical technique.

Declarations

Competing interests

The authors declare that they have no conflicts of interest relevant to this work.

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Authors' contributions

All authors contributed to the clinical evaluation and/or management of the patient, preparation and critical revision of the manuscript, and approval of the final version for publication. All authors agree to be accountable for the accuracy and integrity of the work.

Availability of data and materials

The data supporting the findings of this case report are contained within the article.

Ethics approval

Formal ethical approval was not required for this single-patient case report in accordance with applicable institutional policies.

Consent to participate

Informed consent for clinical evaluation and treatment was obtained from the patient in accordance with institutional practice.

Consent for publication

Written informed consent was obtained from the patient for publication of the clinical details and associated images included in this case report.

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Tables and Figures

Table 1. Clinical timeline.

Time Point	Event
~2 years before surgery	Onset of mild left lower extremity pain, not initially limiting activity.
Progressive interval	Pain intensifies to sharp/stabbing quality, reaching 8/10 severity; lancinating pain, hypersensitivity, and paresthesias radiating to the calf and dorsum of the foot develop; a palpable mass and positive Tinel sign are noted on outpatient evaluation.
Weeks before surgery	Outpatient magnetic resonance imaging of the left ankle performed, demonstrating a fusiform lesion along the posterior tibial nerve suggestive of a neural-origin neoplasm (schwannoma favored over neurofibroma).
Day of admission	Elective hospital admission; physical examination confirms a palpable posteromedial ankle mass with preserved neurological examination and no pain on movement.
Day of surgery	Elective excision of the left posteromedial ankle mass with external neurolysis of the tibial nerve, tenolysis of adjacent tendons, and separate excision of the distinct plantar foot lesion.
Postoperative day 0–2	Transient paresthesias in the distribution of the tibial nerve, without motor deficit.
~10 days postoperative	Wound clean and healing appropriately; sutures removed; no tibial nerve dysfunction, no persistent paresthesias, no weakness; calf and foot function preserved; normal gait.
~1 month postoperative	Complete resolution of preoperative pain and sensory symptoms; wound well healed without infection, dehiscence, or hematoma; motor and sensory examination normal; normal ambulation; no evidence of early recurrence.

Table 2. Preoperative laboratory findings.

Laboratory parameter	Patient result	Reference value
Erythrocyte sedimentation rate	11 mm/h	0–25 mm/h
Red blood cell count	$4.90 \times 10^6/\mu\text{L}$	$4.1\text{--}5.1 \times 10^6/\mu\text{L}$
Hemoglobin	14.4 g/dL	12.3–15.3 g/dL
Hematocrit	44.1%	35.0–47.0%
White blood cell count	$4.54 \times 10^3/\mu\text{L}$	$4.4\text{--}11.3 \times 10^3/\mu\text{L}$
Eosinophils	1.3%	2.0–4.0%
Basophils	0.4%	0.0–1.0%
Neutrophils	63.1%	50.0–70.0%
Lymphocytes	29.3%	25.0–40.0%
Monocytes	5.9%	2.0–8.0%
Platelet count	$224 \times 10^3/\mu\text{L}$	$140\text{--}440 \times 10^3/\mu\text{L}$
Mean corpuscular volume	90.0 fL	80.0–96.0 fL
Mean corpuscular hemoglobin	29.4 pg	28.0–33.0 pg
Mean corpuscular hemoglobin concentration	32.7 g/dL	33.0–36.0 g/dL
Prothrombin time	11.3 s	11.4 s
INR	0.99	1.0
Activated partial thromboplastin time	32.1 s	25.4–36.9 s
Fasting glucose	97 mg/dL	74–106 mg/dL
Aspartate aminotransferase	27 U/L	0–32 U/L
Alanine aminotransferase	40 U/L	0–33 U/L
Serum creatinine	0.6 mg/dL	0.50–0.90 mg/dL
Blood urea nitrogen	14 mg/dL	6–20 mg/dL
Total urea	30.4 mg/dL	16.6–48.5 mg/dL

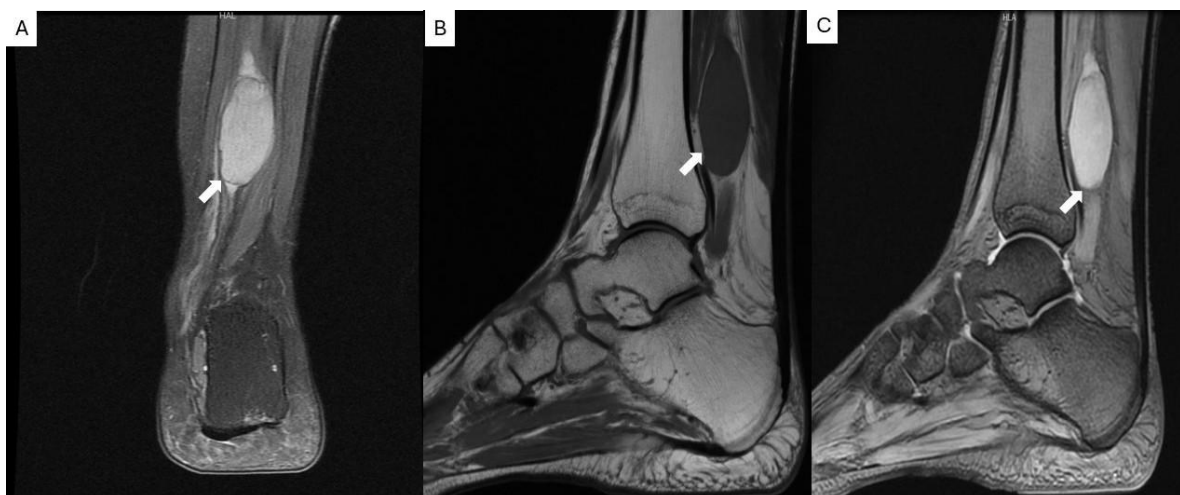


Figure 1. Magnetic resonance imaging of the left ankle showing a posterior tibial nerve schwannoma. (A) Coronal proton density-weighted fat-suppressed image demonstrates a well-circumscribed, fusiform, hyperintense mass along the course of the posterior tibial nerve (arrow). (B) Sagittal T1-weighted image shows the lesion as homogeneously hypointense relative to the surrounding fat, with sharply defined margins (arrow). (C) Sagittal T2-weighted image demonstrates marked hyperintensity of the lesion (arrow). The mass measured approximately 19 × 19 × 46 mm and produced mild anterior displacement of the flexor hallucis longus myotendinous unit. The imaging characteristics and relationship to the posterior tibial nerve were consistent with a peripheral nerve sheath tumor, favoring schwannoma.

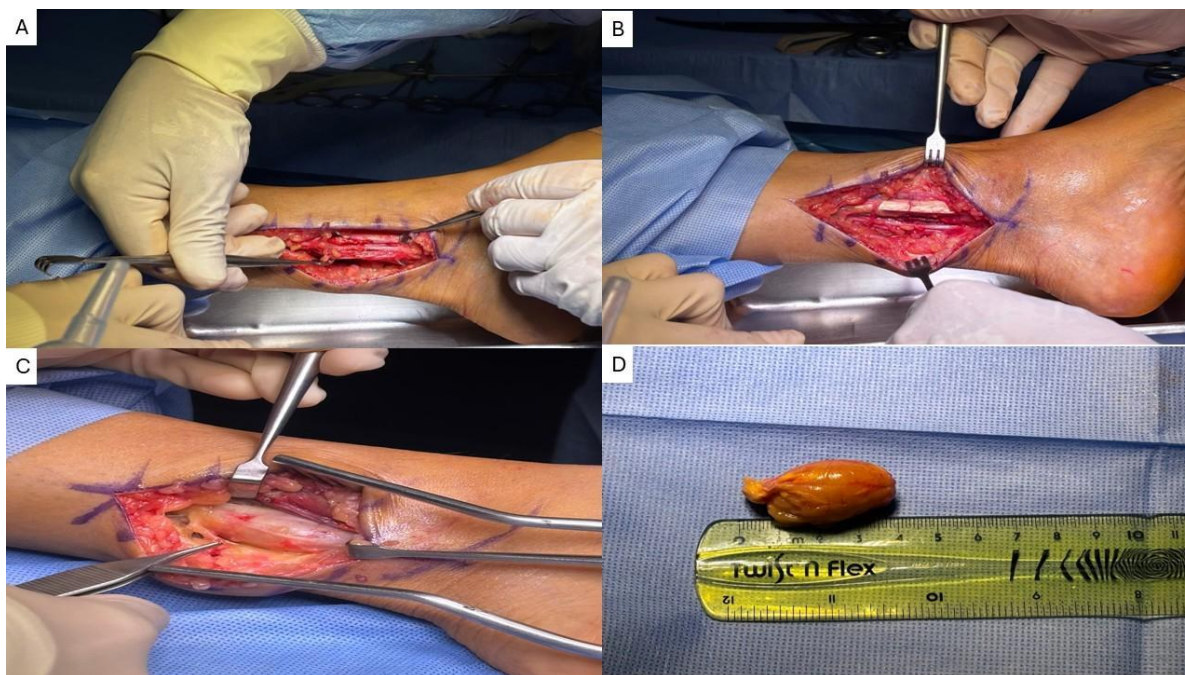


Figure 2. Surgical exposure, excision, and gross appearance of the left posteromedial ankle schwannoma. (A) Longitudinal posteromedial approach with dissection through the subcutaneous tissue and fascia to expose the deep compartment and tibial neurovascular structures. (B) Intraoperative exposure of the well-circumscribed, encapsulated mass along the course of the tibial nerve following mobilization of the adjacent flexor tendons and careful protection of the posterior tibial neurovascular bundle. (C) Close-up view of the lesion during circumferential blunt and sharp dissection from the surrounding neural and soft-tissue structures, with preservation of nerve continuity and adjacent tendons. (D) Gross appearance of the excised ankle mass placed adjacent to a metric ruler for scale. The specimen measured 3.5 × 2.2 cm, weighed 6 g, and exhibited an irregular external surface; sectioning revealed soft, whitish tissue. The specimen was submitted for histopathological examination.

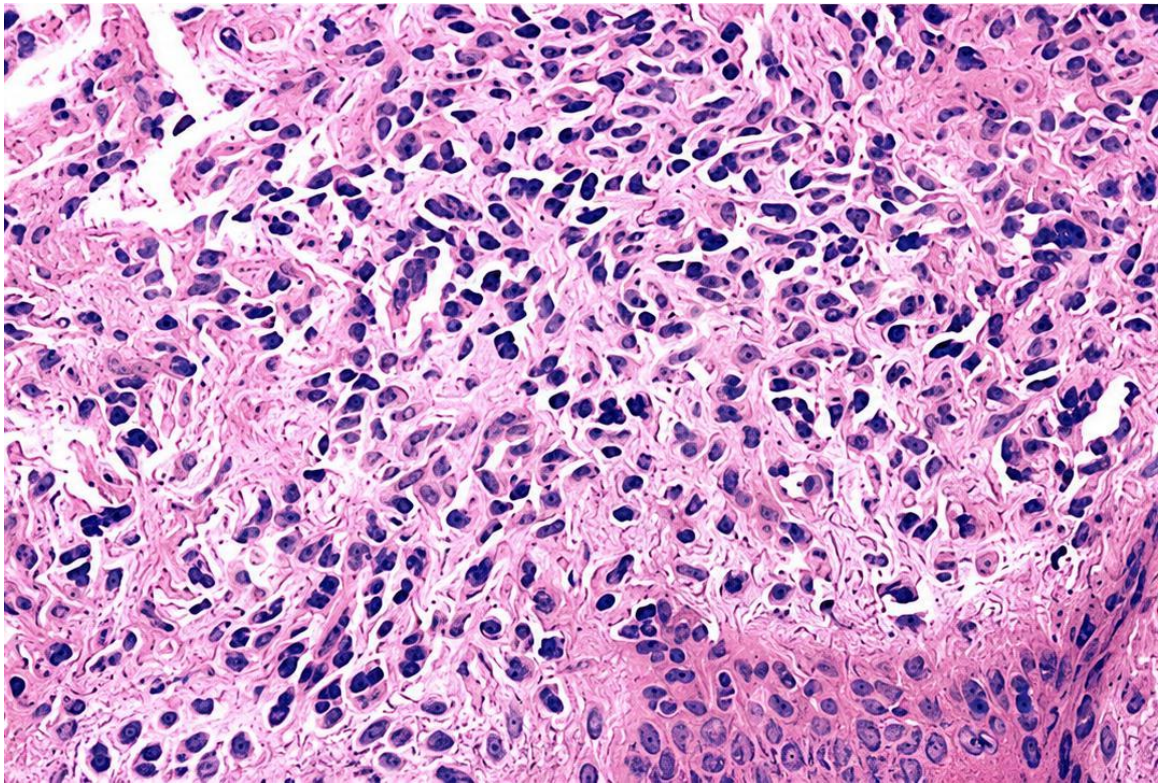


Figure 3. Histopathological appearance of the left ankle schwannoma. Hematoxylin and eosin-stained section showing a benign spindle-cell neoplasm composed of elongated cells arranged in alternating hypercellular Antoni A and hypocellular Antoni B areas, with focal nuclear palisading and Verocay body formation. No significant cytologic atypia, tumor necrosis, or mitotic activity is identified.