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Sciatic Nerve Schwannoma: A Rare Cause of Atypical Sciatica

Alaa Massri[1*], Yassine Ben Bouzid[1], Oualid Assouab[1], Omar Aguenaou[1], Reda Fekhaoui[1], Rida-Allah Bassir[1], Monsef Boufettal[1], Jalal Mekkaoui[1], Mohamed Kharmaz[1], Moulay Omar Lamrani[1]

[1]Department of Orthopaedic and Trauma Surgery, Ibn Sina University Hospital, Rabat, Morocco

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***Corresponding author:** Alaa Massri
Department of Orthopaedic and Trauma Surgery, Ibn Sina University Hospital, Rabat, Morocco

Abstract **Original Research Article**

Background: Schwannomas are benign peripheral nerve sheath tumors arising from Schwann cells. Sciatic nerve involvement is rare and frequently misdiagnosed due to nonspecific symptoms mimicking lumbar radiculopathy. ***Objective:*** To analyze the clinical, radiological, and therapeutic features of sciatic nerve schwannomas through a case series and literature review. ***Methods:*** A retrospective study was conducted including three patients treated for sciatic nerve schwannoma at a tertiary referral center between 2007 and 2010. Clinical presentation, imaging findings, surgical management, and outcomes were evaluated. ***Results:*** All patients presented with chronic sciatic pain resistant to conservative treatment, with delayed diagnosis. MRI revealed well-circumscribed lesions along the sciatic nerve. Surgical enucleation was performed in all cases with preservation of nerve continuity. Histopathology confirmed benign schwannoma. Postoperative outcomes were favorable, with complete pain relief and no recurrence. ***Conclusion:*** Sciatic nerve schwannoma is a rare cause of sciatica. MRI is essential for diagnosis. Surgical enucleation provides excellent outcomes with minimal morbidity.

Keywords: Schwannoma; Sciatic nerve; Peripheral nerve tumor; MRI; Enucleation.

INTRODUCTION

Peripheral nerve sheath tumors constitute a heterogeneous group of neoplasms arising from the supporting elements of peripheral nerves, among which schwannomas and neurofibromas are the most frequently encountered benign entities [1–4]. Schwannomas, also referred to as neurilemmomas, are encapsulated tumors originating from Schwann cells and are characterized by slow growth and a benign clinical course. In contrast to neurofibromas, which tend to infiltrate the nerve, schwannomas typically develop eccentrically and displace nerve fascicles, a feature that allows surgical excision with preservation of nerve continuity in most cases [5–7].

These tumors may occur along any peripheral nerve; however, their distribution is not uniform. They are more commonly found in the head and neck region and in the flexor aspects of the upper and lower extremities. Involvement of the sciatic nerve remains rare, accounting for a very small proportion of all schwannomas, estimated at approximately 1% in some series [6,8]. This rarity, combined with the deep anatomical location of the sciatic nerve, contributes to the limited number of reported cases and the absence of large series in the literature.

Clinically, sciatic nerve schwannomas pose a significant diagnostic challenge. Their presentation is often nonspecific and most commonly manifests as chronic sciatic pain, which closely mimics lumbar radiculopathy caused by intervertebral disc disease. As a result, patients are frequently misdiagnosed and may undergo prolonged periods of inappropriate medical treatment before the correct diagnosis is established. The slow growth of these tumors and the frequent absence of objective neurological deficits further contribute to diagnostic delay, sometimes for several months or even years.

In this context, imaging plays a crucial role in the diagnostic process. Magnetic resonance imaging (MRI) is considered the gold standard for the evaluation of peripheral nerve tumors, as it provides detailed information regarding tumor localization, morphology, and its relationship to the parent nerve and surrounding structures [9,10]. Despite advances in imaging, distinguishing schwannomas from other soft tissue masses or malignant peripheral nerve sheath tumors may still be challenging in certain cases.

Surgical excision remains the treatment of choice for symptomatic schwannomas. Owing to their

encapsulated nature, these tumors can usually be removed by microsurgical enucleation with preservation of nerve fascicles, leading to excellent functional outcomes and low recurrence rates [11,12]. However, given the rarity of sciatic nerve involvement, experience remains limited, and most recommendations are based on small case series.

The aim of the present study is to report a series of three cases of sciatic nerve schwannoma managed in a tertiary referral center and to analyze their clinical presentation, imaging characteristics, surgical management, and outcomes in light of the existing literature. Through this study, we seek to highlight the diagnostic pitfalls associated with this condition and to emphasize the importance of considering peripheral nerve tumors in cases of atypical or treatment-resistant sciatica.

Materials and Methods

This retrospective descriptive study was conducted in the Department of Orthopedic Surgery at a tertiary referral university hospital between January 2007 and January 2010.

Study Design and Patient Selection

We reviewed the medical records of all patients managed for peripheral nerve tumors during the study period. Inclusion criteria were:

- Histologically confirmed diagnosis of schwannoma
- Tumor arising from the sciatic nerve
- Patients who underwent surgical treatment

Patients with other types of peripheral nerve tumors (e.g., neurofibroma, malignant peripheral nerve sheath tumors) or incomplete medical records were excluded.

A total of three patients met the inclusion criteria and were included in the study.

Data Collection

Data were collected retrospectively from patient records, operative reports, imaging archives, and histopathological reports.

The following variables were analyzed:

- **Demographic data:** age, sex
- **Clinical presentation:** duration of symptoms, type of pain, presence of palpable mass, neurological deficits (motor and sensory)
- **Diagnostic workup:** imaging findings, particularly magnetic resonance imaging (MRI) characteristics
- **Tumor characteristics:** location along the sciatic nerve, size (when available), and relationship with surrounding structures
- **Surgical management:** surgical approach, intraoperative findings, type of resection
- **Histopathological findings:** confirmation of schwannoma and description of microscopic features
- **Postoperative outcomes:** pain relief, neurological status, complications, and recurrence

Imaging Evaluation

All patients underwent preoperative MRI, which was considered the imaging modality of choice. MRI analysis included:

- Signal characteristics on T1- and T2-weighted sequences
- Enhancement pattern after gadolinium injection
- Tumor margins and encapsulation
- Relationship between the tumor and the sciatic nerve MRI was also used to assess tumor size and to plan the surgical approach.

Surgical Technique

All patients were operated on under general anesthesia. A posterior approach to the thigh or gluteal region was used depending on tumor location.

After identification of the sciatic nerve, the tumor was exposed. Microsurgical technique was employed in all cases:

- Longitudinal epineurial incision
- Careful dissection of nerve fascicles
- Intracapsular enucleation of the tumor

Special attention was paid to preserving functional nerve fascicles. No nerve grafting or reconstruction was required.

Histopathological Examination

All excised specimens were submitted for histopathological analysis. Diagnosis of schwannoma was confirmed based on typical features, including:

- Antoni A and Antoni B areas
- Presence of Verocay bodies (when identifiable)

No features of malignancy were observed in any case.

Follow-up and Outcome Assessment

Patients were followed clinically after surgery. Outcome assessment included:

- Resolution or persistence of pain
- Motor and sensory neurological evaluation
- Detection of postoperative complications
- Identification of tumor recurrence

Follow-up duration varied between patients but was sufficient to assess early and mid-term outcomes.

RESULTS

Patient Characteristics

A total of three patients were included in this study. The cohort consisted of adult patients with no known history of neurofibromatosis or prior peripheral nerve tumors. The age at diagnosis ranged from young adulthood to middle age, which is consistent with the typical age distribution reported for schwannomas. Both sexes were represented, with no clear predominance observed in this small sample.

Clinical Presentation

All patients presented with *chronic sciatic pain* as the main symptom. The pain was described as progressive in onset, with intermittent exacerbations, and followed the typical distribution of the sciatic nerve. The duration of symptoms before diagnosis was prolonged in all cases, ranging from several months to years, reflecting the slow-growing nature of the tumor and the frequent initial misdiagnosis.

The pain was *resistant to conventional medical treatment,* including analgesics and anti-inflammatory drugs. None of the patients reported significant relief with conservative management.

Neurological examination revealed:

- No major motor deficits in any patient
- Preserved muscle strength
- Mild sensory disturbances in some cases, mainly in the form of paresthesia

Importantly, the absence of significant neurological impairment contributed to the delay in diagnosis.

A *palpable mass* (figure 1) along the course of the sciatic nerve was identified in at least one patient, particularly when the tumor was located in the thigh. In other cases, the deep location of the lesion limited clinical detectability.

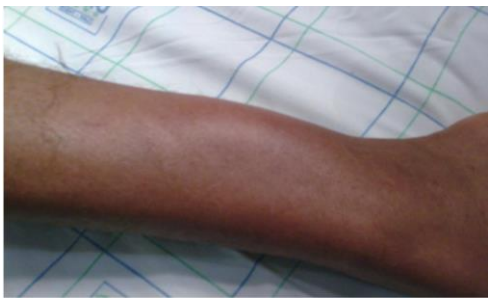

Figure 1: Right lower limb, lateral view: a postero-medial swelling located at the junction of the middle and distal thirds, measuring 10 × 5 cm

Imaging Findings

All patients underwent preoperative magnetic resonance imaging (MRI), which played a central role in diagnosis.

MRI demonstrated (figure 2):

- A well-circumscribed, encapsulated mass located along the sciatic nerve
- Clear delineation from surrounding tissues
- No signs of local invasion

Signal characteristics were consistent across cases:

- Iso- to hypointense signal on T1-weighted images
- Hyperintense signal on T2-weighted images
- Enhancement after gadolinium administration

In some cases, the lesion appeared eccentric to the nerve, suggesting a nerve sheath origin. MRI also allowed precise localization of the tumor and facilitated surgical planning.

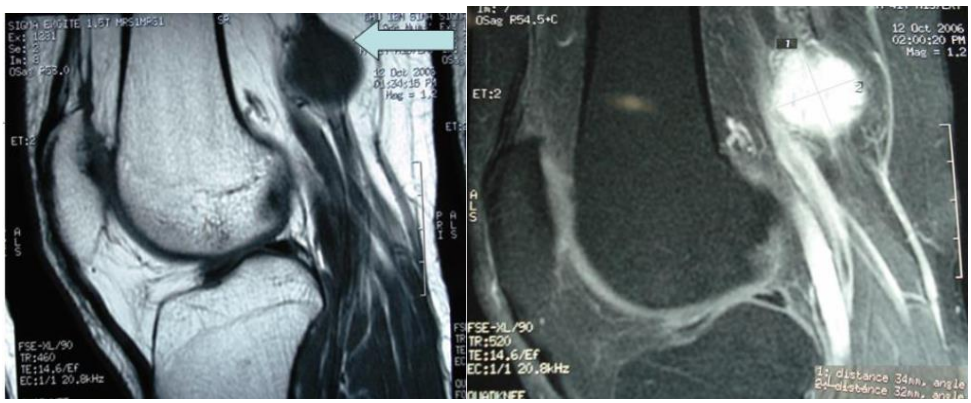

Figure 2: Coronal T1-weighted MRI of the right knee: a fusiform lesion with homogeneous T1 isointensity, showing enhancement after gadolinium injection. The lesion measures 34 × 32 mm and displaces the sciatic nerve at its distal aspect

Intraoperative Findings

All patients underwent surgical exploration via a posterior approach (figure 3). Intraoperative findings were consistent in all cases.

The tumors appeared as:

- Encapsulated, well-defined masses (figure 4)
- Arising eccentrically from the sciatic nerve (figure 5)
- Displacing, but not infiltrating, the nerve fascicles (figure 6)

The relationship between the tumor and the nerve was clearly identified, allowing safe dissection.

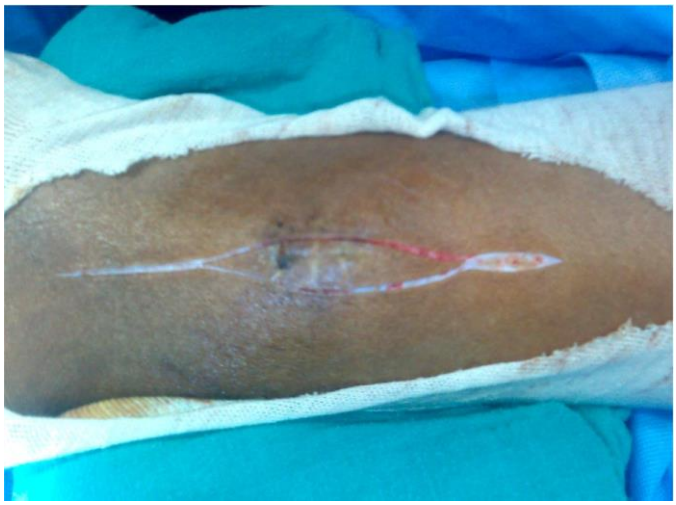

Figure 3: Surgical approach through a longitudinal incision with fusiform excision of the previous scar overlying the lesion

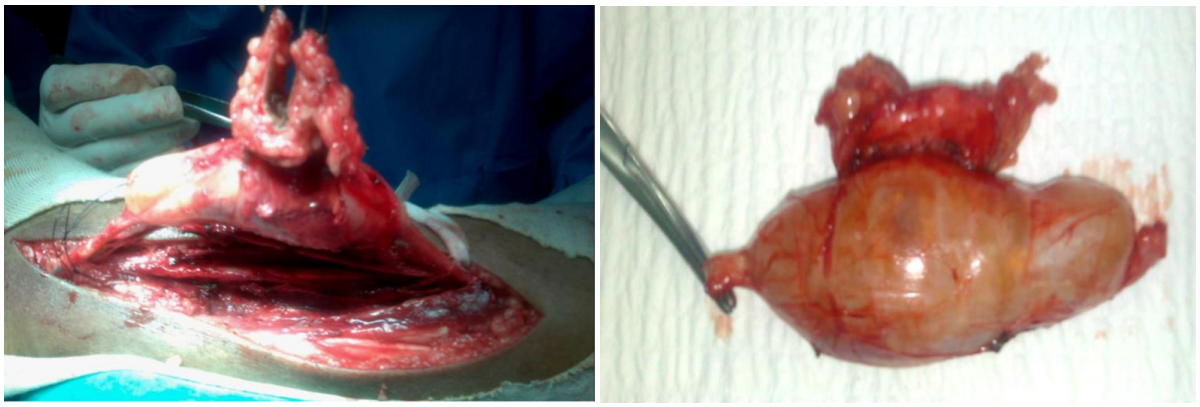

Figure 4: Intraoperative view of the tumor and the resected specimen, showing a well-encapsulated, well-circumscribed lesion

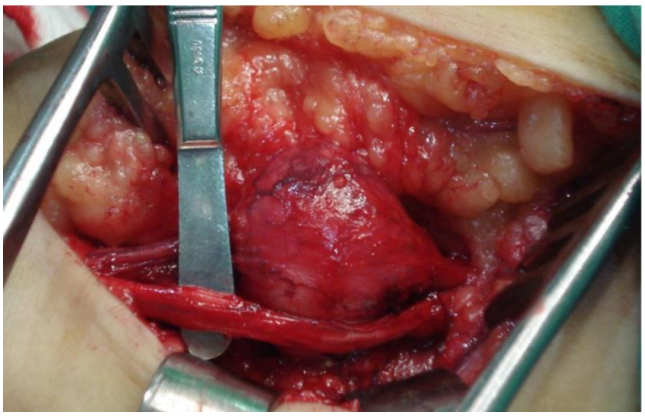

Figure 5: Intraoperative view: tumor enucleation with identification and exposure of the sciatic nerve

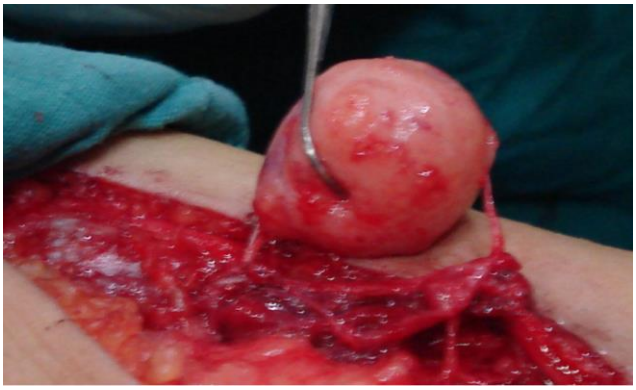

Figure 6: Intraoperative view: the tumor is seen arising from an underlying neurovascular bundle, which is clearly exposed

Surgical Management

Microsurgical enucleation was performed in all patients. The surgical procedure included:

- Identification of the sciatic nerve
- Longitudinal opening of the epineurium
- Careful separation of tumor from nerve fascicles
- Complete tumor removal

No intraoperative complications were reported. Importantly:

- Nerve continuity was preserved in all cases
- No nerve reconstruction or grafting was required

Histopathological Findings

Histopathological examination confirmed the diagnosis of benign schwannoma in all patients.

Microscopic analysis revealed (figure 7):

- Alternating Antoni A (hypercellular) and Antoni B (hypocellular) areas
- Spindle-shaped cells arranged in fascicles
- Occasional presence of Verocay bodies

No signs of malignancy, such as atypia, necrosis, or increased mitotic activity, were observed.

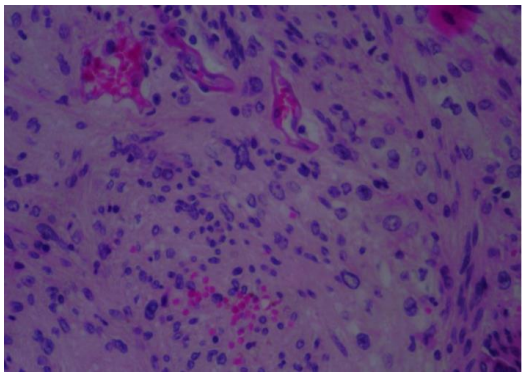

Figure 7: Hematoxylin–eosin staining. Microscopic image: areas of high cellularity (Antoni A) adjacent to hypocellular regions (Antoni B)

Postoperative Outcomes

The postoperative course was favorable in all patients.

Clinical outcomes included:

- Significant improvement or complete resolution of sciatic pain
- No major motor deficits
- Preservation of normal limb function

Some patients experienced mild, transient sensory disturbances (paresthesia), which resolved spontaneously during follow-up.

Follow-up

At follow-up:

- No cases of tumor recurrence were observed
- Patients remained asymptomatic or significantly improved
- Functional outcomes were considered excellent in all cases

The duration of follow-up was sufficient to assess early and mid-term outcomes.

DISCUSSION

Sciatic nerve schwannoma is a rare entity, and most available data are derived from isolated case reports or small series, reflecting its low incidence [6,8]. Despite schwannomas being among the most common benign peripheral nerve tumors, their occurrence along the

sciatic nerve remains exceptional due to the anatomical depth and size of the nerve.

From a pathophysiological standpoint, schwannomas arise from Schwann cells and develop eccentrically from the nerve sheath. This growth pattern explains their encapsulated nature and their tendency to displace nerve fascicles without infiltrating them, which is a key feature distinguishing them from neurofibromas [5,7]. This distinction is critical for surgical management, as schwannomas can typically be enucleated while preserving nerve continuity.

Clinically, sciatic nerve schwannomas often present as chronic sciatica, mimicking lumbar disc herniation. This leads to frequent misdiagnosis and prolonged diagnostic delay. In our series, all patients experienced long-standing pain resistant to conventional treatment, which is a common feature reported in the literature. The absence of neurological deficit further complicates the diagnosis and may falsely reassure clinicians, delaying further investigation.

MRI plays a pivotal role in diagnosis, as it allows precise localization and characterization of the lesion. Typical features include a well-defined, encapsulated mass with characteristic signal intensity patterns [9,10]. MRI also helps differentiate schwannomas from other soft tissue tumors and is essential for surgical planning.

The differential diagnosis includes neurofibroma, malignant peripheral nerve sheath tumor, and soft tissue sarcoma [13,14]. Features suggestive of malignancy include rapid growth, ill-defined margins, and neurological deficits. In our cases, imaging findings were consistent with benign lesions, which was confirmed histologically.

Surgical excision remains the gold standard treatment. Microsurgical enucleation allows complete tumor removal while minimizing nerve damage [11,12]. In our series, all patients underwent successful enucleation with preservation of nerve integrity and excellent functional outcomes.

Postoperative prognosis is generally favorable, with low recurrence rates and minimal complications. Transient sensory disturbances may occur but typically resolve spontaneously. Our results are consistent with previously published series demonstrating excellent outcomes following surgical management.

The main limitation of our study is the small sample size, which reflects the rarity of the condition. However, our findings are consistent with the literature and highlight the importance of considering peripheral nerve tumors in cases of atypical or treatment-resistant sciatica.

Conclusion

Sciatic nerve schwannoma is a rare but important differential diagnosis of chronic sciatica. MRI is essential for accurate diagnosis. Surgical enucleation provides excellent outcomes with minimal morbidity. Increased awareness is necessary to reduce diagnostic delay and improve patient care.

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