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Research Article

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Gluteal Mass Encountered During Nerve Conduction Velocity/Electromyography Exam

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Abstract

Foot drop is a common symptom that often requires further neurologic evaluation via electromyography (EMG). This case details a 57-year-old male who presented with left lower extremity pain, paresthesia, and foot drop. Lumbar radiculopathy was initially suspected, prompting a nerve conduction study (NCS)/EMG. A palpable mass at the left buttock was noted during the exam. Magnetic resonance imaging (MRI) of the pelvis revealed a large left gluteal mass extending into the pelvis through the greater sciatic foramen. Computed tomography-guided needle biopsy was performed, followed by surgical resection. Pathologic examination later confirmed the mass as an intramuscular myxoma. While rare, myxomas remain a notable differential in the evaluation of chronic radiculopathy.

Keywords

Foot drop, Gluteal mass, Myxoma, Lumbar radiculopathy

Introduction

Sciatica refers explicitly to lesions that impact the sciatic nerve, while lumbar radiculopathy results from pressure or inflammation as nerve roots exit the lumbar neural foramina. Thus, sciatica and lumbar radiculopathy can overlap or exist separately, depending on the location of nerve pathology. A retrospective series of patients evaluated for foot drop revealed the etiology centered around two distinct groups [1]. Of 217 patients, 31% of cases were attributed to lesions of the central nervous system and 68% to peripheral nerve lesions. Yuen et al. [2] also examined the clinical features of 73 consecutive patients referred for electrodiagnostic evaluation of sciatic neuropathy. Etiologies of these 73 cases included hip arthroplasty (21.9%), acute external compression (13.7%), infarction (9.6%), gunshot wound (9.6%), hip fracture/dislocation (9.6%), femur fracture (4.1%), contusion (4.1%), and uncertain causes (16.4%). A recent and extensive study with 1022 cases [3] reported a total of 21 causes of foot drop. 142 cases (13.9%) described foot drop after lumbar surgery. In comparison, while 131 cases (12.8%) involved patients with a variety of lumbosacral pathologies who had not undergone surgery and also reported foot drop.

Intramuscular myxomas are rare, slow-growing, benign soft tissue tumors primarily comprised of an abundant gelatinous myxoid extracellular matrix rich in hyaluronic acid [4]. They are typically hypocellular with mostly bland spindle or stellate-shaped fibroblasts, lacking significant nuclear atypia or mitotic activity. They can arise sporadically or as part of a larger constellation involving fibrous dysplasia, in conditions such as Mazabraud's or McCune-Albright syndrome

[5]. Mutations in genes such as guanine nucleotide binding protein, alpha stimulating (GNAS), have been postulated as potential risk factors [6]. The tumors are often found nested between larger muscle groups, most commonly in the thigh, and can grow significantly in size to form large, painless masses. [4-7].

Intramuscular myxomas can cause additional complications depending on their location and size. They can compress surrounding structures, leading to symptoms such as pain and mobility issues [8]. While these masses are often clearly visualized via imaging modalities like ultrasound or MRI, they cannot be fully distinguished from similarly appearing malignant soft tissue sarcomas without performing excision and histopathological investigations [9, 10].

Initial presentation

A 57-year-old male with chronic back pain presented to the EMG/Nerve Conduction Velocity (NCV) clinic for numbness and a persistent, sharp, aching pain in his left leg. His symptoms started 2 - 3 years prior to presentation with no history of preceding trauma. Symptoms were initially intermittent but gradually progressed to become constant. The patient rated the pain 4/10 in intensity and said it radiated from the left buttock to the lateral side of the left ankle.

Past medical history

The patient's past medical history included hyperlipidemia, hypertension, chronic back pain, and foot pain. He denied any history of diabetes, surgery, or smoking but admitted to drinking occasionally. In the review of systems, the patient denied recent fever, chills, chest pain, shortness of breath, hand paresthesias, saddle paresthesia, or changes in urinary/bowel habits.

Neurological exam

- Strength in left lower extremity: Weakness (4/5) in dorsiflexion, plantarflexion, as well inversion, and eversion.
- Left foot vascular: 2+ pedal pulses, 3 s capillary refill time in toes, no varicosities or edema. Skin intact.
- Sensation in left lower extremity: Decreased sensation to light touch, vibration, and temperature on the distal to mid shin.
- Deep tendon reflexes in lower extremities: Patellar reflexes 2+ symmetrically and bilaterally, Achilles reflexes 2+ on the right and trace on the left. No clonus bilaterally.

A firm lump was discovered at the left hip/buttock region.

Imaging studies

- MRI left foot: Muscle atrophy of the left foot with fatty infiltration of muscles. The plantar muscles in the midfoot were described as slightly atrophic and edematous. These findings are nonspecific but may represent neuropathic/denervation of muscle or myopathy/myositis.
- MRI lumbar spine: Multilevel moderate to severe degenerative changes with severe bilateral foraminal stenosis at the L5 - S1 level.

EMG/NCV Studies

The NCS was performed following verbal consent, which revealed the following findings:

- Absent left sural sensory NCS and left superficial peroneal sensory studies with normal corresponding nerves on the right (Table 1).
- Normal right peroneal motor study with significantly decreased amplitude at the popliteal fossa (0.4 mV) of left peroneal motor NCS (Table 2).
- Normal right tibial motor study with decreased amplitude at the ankle (1.4 mV) of the left tibial motor study (Table 2).
- F-wave studies demonstrated prolonged F-latencies of bilateral tibial and peroneal nerves (Table 3).

Notably, F-wave studies revealed prolonged F-latencies in the bilateral tibial and peroneal nerves, attributed to patient tolerance."

Subsequent course of investigations

MRI left hip with and without contrast (Figure 1): Large enhancing left gluteal mass extending medially through the greater sciatic foramen with mixed cystic and solid elements, high T2 signal, low T1 signal, and inhomogeneous enhancement. The sciatic nerve (as indicated by the arrowhead) is visualized and compressed between the mass and the inferior greater sciatic foramen.

Pathology and diagnosis

- IR biopsy: Left gluteal myxoma vs myxoid sarcoma.
- Gross: Specimen labeled left gluteal mass is a 17.2 x 13.3 x 10.7 cm unoriented pink-tan to pink-brown lobulated,

Table 1: Sensory conduction study.

Nerve/Sites	Recording site	Onset lateral (ms)	Peak lateral (ms)	Negative peak Amp (μV)	Segments	Distance (mm)	Velocity (m/s)
Right superficial peroneal - ankle							
Lateral leg	Ankle	3.0	3.9	6.5	Lateral leg -ankle	140	46
Right sural - ankle (calf)							
Calf	Ankle	3.0	3.7	4.4	Calf - ankle	140	47
Left superficial peroneal - ankle							
Lateral leg	Ankle	-	-	-	Lateral leg - ankle	140	-
Left sural - ankle (calf)							
Calf	Ankle	-	-	-	Calf - ankle	140	-

Table 2: Motor conduction study.

Nerve/Sites	Muscle	Latency (ms)	Amplitude (mV)	Duration (ms)	Segments	Distance (mm)	Lateral difference (ms)	Velocity (m/s)
Right peroneal - extensor digitorum brevis (EDB)								
Ankle	EDB	5.8	3.2	5.1	Ankle - EDB	90	-	-
Fib head	EDB	13.2	3.7	7.3	Fib head - ankle	310	7.4	42
Pop fossa	EDB	15.7	3.8	6.7	Pop fossa - fib head	100	2.5	40
					Pop fossa - ankle	-	9.9	-
Accessory peron	EDB	1.7	3.3	9.3	Accessory peron - pop fossa	-	-14.0	-
Right tibial - abductor hallucis (AH)								
Ankle	AH	3.6	5.5	5.8	Ankle - AH	80	-	-
Pop fossa	AH	13.6	2.9	7.1	Pop fossa - ankle	400	10.0	40
Left peroneal - EDB								
Ankle	EDB	5.7	2.7	6.0	Ankle - EDB	90	-	-
Fib head	EDB	13.9	2.0	7.5	Fib head - ankle	335	8.2	41
Pop fossa	EDB	11.6	0.4	13.0	Pop fossa - fib head	-	-2.3	-
					Pop fossa - ankle	-	5.9	-
Left tibial - AH								
Ankle	AH	3.7	1.4	6.3	Ankle - AH	80	-	-
Pop fossa	AH	14.0	0.5	6.8	Pop fossa - ankle	445	10.3	43

Table 3: F-wave latency.

Nerve	F-latencies (ms)	Normal (ms)
R peroneal - EDB	60.3	56
R tibial - AH	62.7	58
L peroneal - EDB	59.7	56
L tibial - AH	62.8	58

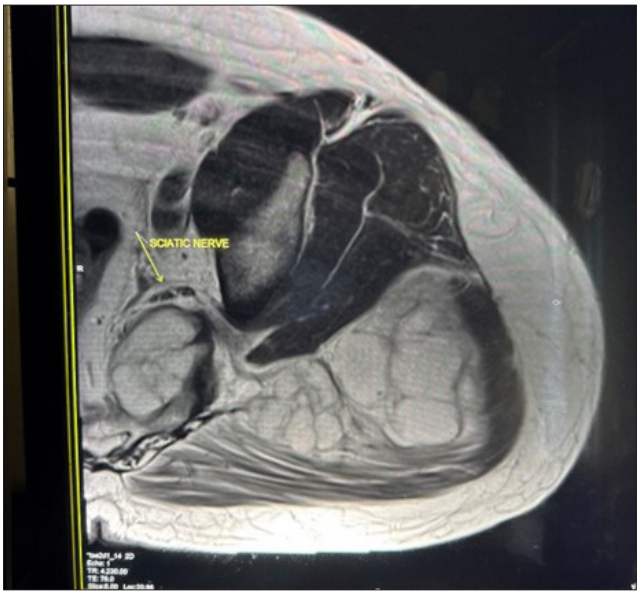


Figure 1: Hyperintense tumor extends through the greater sciatic foramen. The arrow shows the left sciatic nerve.

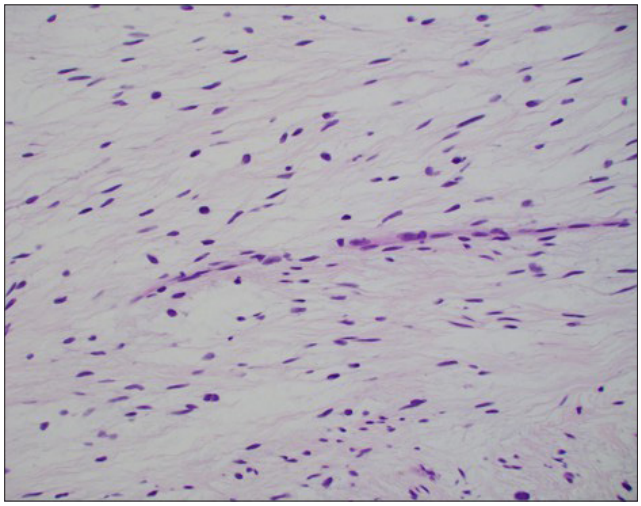


Figure 2: Hypocellular, bland spindle cells with few blood vessels in the background of basophilic myxoid matrix.

focally encapsulated, and focally disrupted mass. Separated is a 9.7 x 8.2 x 3.8 cm aggregate of pink-tan to pink-brown with lobulated, solid, and gelatinous focal cystic areas ranging from 0.3 to 3.7 cm and interspersed with tan-pink to yellow-tan soft tissue. There are focal pale tan-yellow areas of possible necrosis, ranging from 1.2 to 2.0 cm in diameter, that constitute approximately 10% of the cut surface. Representatively submitted in 1A - 1L - mass with possible necrosis in 1A - AD, 1M - 1P - separated fragments.

- Microscopic (Figure 2): Hypocellular, bland spindle cells with few blood vessels in a background of basophilic myxoid matrix.
- Diagnosis: Soft tissue mass in the left gluteal region.
- Excision: Intramuscular myxoma.

Surgery and treatment

Patient underwent staged excision of the left gluteal mass with intrapelvic extension to detach the tumor from surrounding nerves and vasculature. He then had surgery the following day to remove much of the tumor. A follow-up NCS three years after the surgery showed the absence of both left superficial peroneal and left sural sensory potentials. Table 4 shows the motor findings 3 years post-surgically.

Table 4: Motor conduction study (3-year post-surgery).

Nerve/Sites	Muscle	Latency (ms)	Amplitude (mV)	Duration (ms)	Segments	Distance (mm)	Lateral difference (ms)	Velocity (m/s)
Left peroneal - EDB								
Ankle	EDB	5.8	3.0	6.0	Ankle - EDB	90	-	-
Fib head	EDB	13.3	2.5	6.5	Fib head - ankle	305	7.5	41
Pop fossa	EDB	15.8	2.4	6.6	Pop fossa - fib head	100	2.4	41
					Pop fossa - ankle	-	9.9	-
Left tibial - AH								
Ankle	AH	1.5	0.5	6.8	Ankle - AH	80	-	-
Pop fossa	AH	16.8	0.3	5.9	Pop fossa - Ankle	-	15.3	-

Discussion

This case highlights intramuscular myxomas as a rare but notable differential in the evaluation of patients with suspected radiculopathy. They have been shown to elicit signs similar to those of sciatica and radiculopathy, potentially obscuring and delaying diagnosis. Acquiring a thorough history and conducting a careful physical exam are thus crucial in establishing a diagnosis. The eventual discovery of a palpable gluteal mass prompted additional imaging and biopsy.

Previous examples of malignancies that have also been described as presenting similarly to radiculopathy include sciatic nerve sheath tumors [8], low-grade fibromyxoid sarcomas [9], and leiomyosarcomas [10]. Myxomas typically do not recur or lead to further complications following resection, consistent with our report.

There are also some technical limitations in our NCS. For instance, the inability to record the conduction velocity across the left fibular head was most likely due to the significantly low CAMP amplitude at the popliteal fossa. In addition, a suspect conduction velocity drop at the popliteal fossa was observed as normal with repeat NCS after surgery (Table 4), which indirectly suggests that there was no conduction block at the popliteal fossa.

The prolonged F-wave latency on both sides is most likely due to the patient also having lumbar radiculopathy. However, the F-wave latency on the left side did not show a significant prolongation compared to the right side, which may be explained by the fact that the F-wave latencies on the left side were unreliable due to the significantly low amplitude with the motor nerve studies on the affected side.

Conclusion

This patient had both lumbar radiculopathy and left sciatica. While it remains common in today's healthcare setting to use either of these terms interchangeably, it is essential to distinguish between the two for proper diagnosis and management. To further help differentiate lumbar radiculopathy from sciatica, examining the gluteal muscles is crucial, as the sciatic nerve does not innervate them.

In patients presenting with progressive signs of radiculopathy, a benign or malignant neoplasm should be within the differential diagnosis. Needle EMG should be avoided in the area surrounding a palpable mass. It is also crucial to be aware that nerves and blood vessels may be displaced.

Imaging, particularly MRI, can help establish the diagnosis. Recently, ultrasound technology has been introduced to the electromyogram. By combining on-site imaging studies with traditional neurophysiological testing, a more accurate diagnosis can be achieved.

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Conflict of Interest

None.

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