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Schwannoma in the Bifurcation of the Sciatic Nerve: A Case Report and Literature Review

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Abstract

Purpose: The scwannoma is a benign tumor and is known to be the most common type of tumor of the peripheral nerve sheaath. Theyre known to arise from the nerves of the head and neck; however, outside this region, it is found more ofen in the upper extremity, and if occurring in the lower extremity, is likely found in the posterior tibial nerve. Schwannoma of the sciatic nerve is considered a very rare entity, accounting for only 1% of all schwannomas, with an estimated incidence of about 6 cases per /million individuals.

Methods: In our literature search, it is noted that they are more likely to arise from the proximal aspect of the nerve, as it exits the sciatic notch, presenting as a mass in the proximal thigh. Ths case reports tackles an even more unusual presentation of this tumor, occurring adjacent to the bifurcation of the sciatic nerve.

Results: A 46-year- old male presented with sharp, shooting pain from the back of his thigh to the plantar aspect of his left foot of 2 ears duration. Patient was initially diagnosed as a case of plantar fasciitis and hamstring tightness that was managed conservatively. However, due to persistence as well as appearance of a small mass on the posterior thigh and positive Tinel's sign over the mass, patient underwent work-up and subsequent surgery.

Conclusion: Due to its presentation that closely mimics sciatica of a lumbosacral discal pathology and other musculoskeletal disorders, these are ofen diagnosed and managed late. Despite its rarity, it should be suspected in patients with history of radicular pain without any neurologic defiits, which is poorly controlled by analgesics and supportive therapy, with physical examination pointing to a localized neural pathology.

Keywords: Schwannoma, sciatic nerve, bifurcation.

Introduction

The scwannoma is a benign tumor and is known to be the most common type of tumor of the peripheral nerve sheath. They re known to arise from the nerves of the head and neck, commonly in the eighth cranial nerve; however, outside this region, it is found more ofen in the upper extremity, and if occurring in the lower extremity, is likely found in the posterior tibial nerve [1, 2, 3]. Schwannoma of the sciatic nerve is considered a very rare entity, accounting for only 1% of all schwannomas. [1, 2, 3]. In our literature search, it is noted that they are more likely to arise from the proximal aspect of the nerve, as it exits the sciatic notch, presenting as a mass in the proximal thigh. Our case tackles an even more unusual presentation of this tumor, occurring adjacent to the bifurcation of the sciatic nerve. To the best of our knowledge, there is no similar case in the Philippines that has been reported. Further, due to its presentation that mimics sciatica and other musculoskeletal pathologies, their diagnosis is ofen delayed and current diagnostic and treatment practices of these tumors are based solely upon case reports. With this paper, we aim to provide more information to the limited pool of data that is are known of sciatic nerve schwannomas.

Materials and Methods

We describe the clinical presentation of a patient and the imaging, diagnostic tests, and management during the course of his disease. The atient's history, physical examination, and data related to his case, including his progress on follow-up, were obtained afer informed consent was signed by the patient.

Results

1. History and physical examination

A 46-year- old male presented with sharp, shooting pain from the back of his thigh to the plantar aspect of his left foot 2 ears prior tobefore consult. Patient denies history of back pain or trauma. Afer 1 year from the onset of symptoms, there was note of gradual worsening of pain associated with difficulty ambulating, inability to tolerate long sitti g, and inability to extend the knee due to triggering of pain.. Ths prompted consult at our institution. Patient was initially diagnosed as a case of plantar fasciitis and hamstring tightness which was managed conservatively with pain medications and physical therapy. However, due to persistence of complaints with minimal improvement of pain, and now with reports of a small, non-

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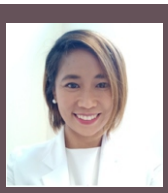
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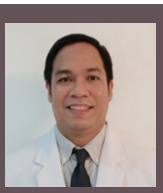
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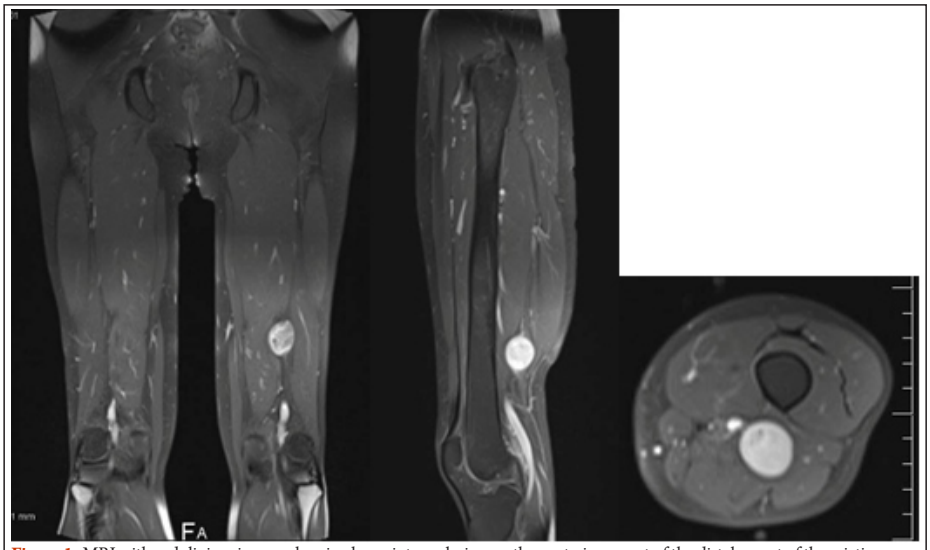

Figure 1: MRI with gadolinium images showing hyperintense lesion on the posterior aspect of the distal aspect of the sciatic nerve, measuring 3.7 × 2.8 × 3.2 cm, 2.5 cm from the bifurcation of the nerve in the apex of the popliteal space.

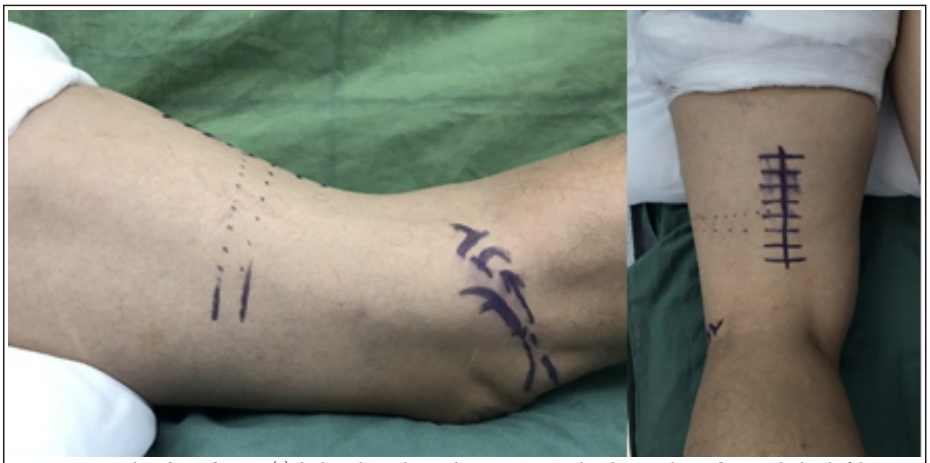

Figure 2: Surgical markings done on (a) the lateral joint line and 12.5 cm proximal to this joint line indicating the level of the mass, and (b) the area of the planned incision centering on the mass and extending 5 cm above and below for exposure.

tender mass on the posterior aspect of the left thigh which the patient incidentally palpated, further investigation was done.

Physical examination at this time revealed a non-visible, but palpable deep-seated, fim and moveable mass on the posterior aspect of

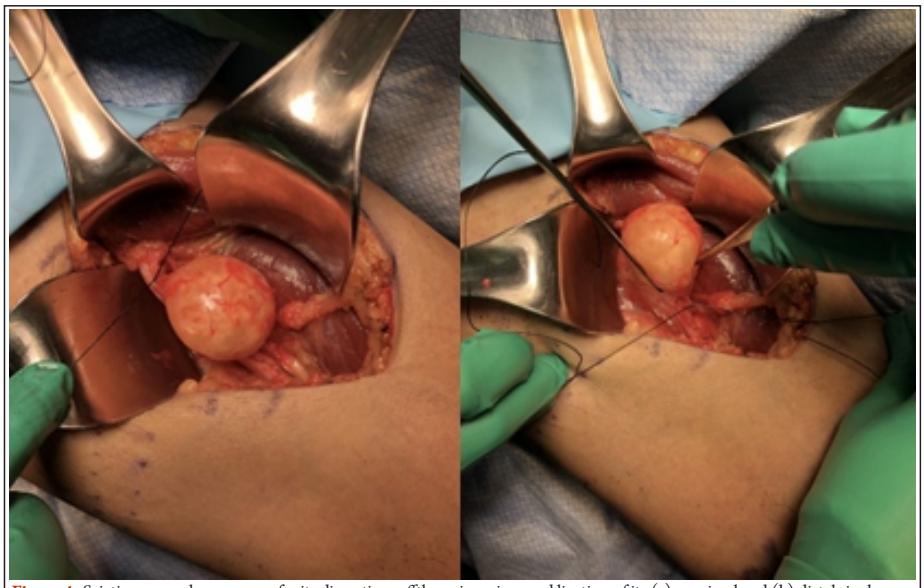

Figure 4: Sciatic nerve schwannoma afer its dissection o ffthe epineurium and ligation of its (a) proximal and (b) distal single fascicular attchments, which were then cut sharply.

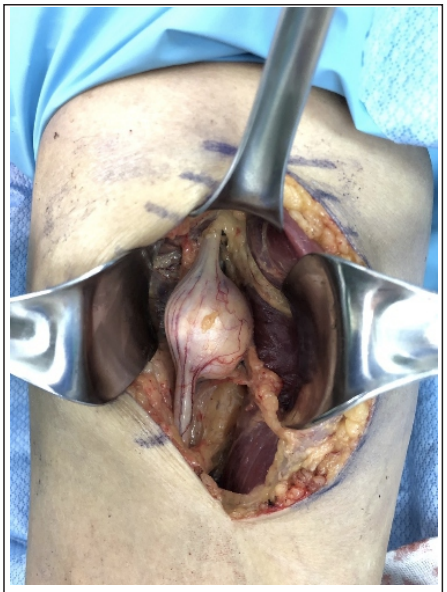

Figure 3: Isolation of the lesion revealed a eccentrically-located, round, firm, and wel-encapsulated mass with intact nerve fascicles pushed to its periphery.

the midthigh, with no noted overlying swelling, or skin changes. Deep palpation or a light tapping over the area of the mass would reproduce the shooting pain down the left l g and foot. Thre were no sensory or motor defiits. Patient had full range of motion of the left kn e but prefers the kneee in fl ion to avoid triggering the pain. Popliteal, dorsalis pedis, and posterior tibial pulses were noted to full and equal.

2. Imaging

MRI was done which revealed a well-defin d, avid heterogeneously enhancing, ovoid mass measuring 3.7 ×x 2.8 ×x 3.2 (CC × x W ×x AP), demonstrating T1 isointense and T2 hyperintense signals compared to muscle seen arising from the anterior aspect of the distal portion of the left siatic nerve, just before it divides into the tibial and common peroneal nerves (Fig.ure 1), for which a peripheral nerve sheath tumor (PNST) is primarily considered. The est of the neurovascular structures and osseous structures were unremarkable. Thre is no evident lymphadenopathy.

3. Course of present illness

Patient consented for excision biopsy of the mass and underwent the contemplated procedure. Patient was placed on prone position afer induction of anesthesia and a tourniquet was applied in the most proximal aspect of the left thigh. urgical markings were placed as follows: (a) lateral Lateral femoral condyle and joint line, (b) 12.5 cm

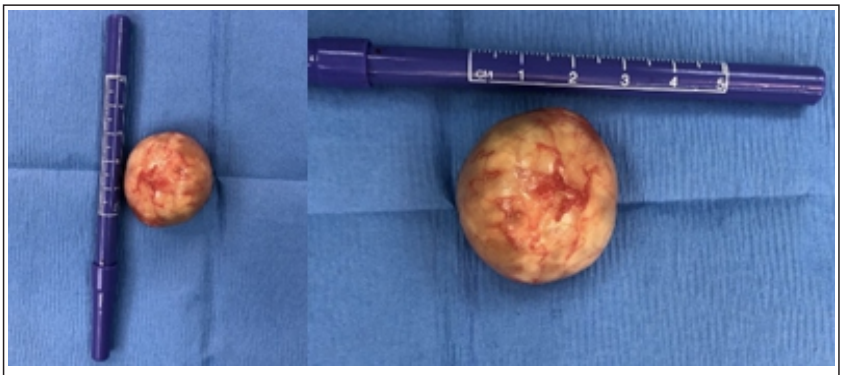

Figure 5: Isolated mass afer complete excision measuring 3 × 3 cm.

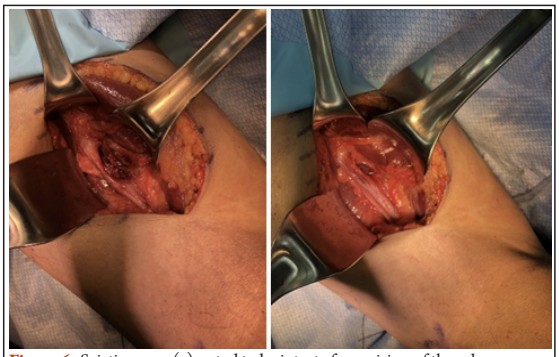

Figure 6: Sciatic nerve (a) noted to be intact afer excision of the schwannoma, with (b) repair of the epineurium done thereafer using Prolene 7-0.

proximal to the joint line on the posterior thigh indicating the approximated location of the mass (Fig.ure 2a), and (c) the incision centering on the mass and extending 5 cm above and below to allot for exposure (Figure Fig. 2b). Incision was done and plane was developed medial to the biceps femoris muscle belly, between this muscle and the semitendinosus until the mass was visualized (Figure Fig. 3). Epineurium was incised and careful blunt and sharp dissection was were done to isolate the mass along with its proximal and distal single fascicular attchments, which were then ligated and cut sharply (Figure Fig. 4). The ass was noted to be round and fim, yellowish in color, measuring 3 × x3 cm (Fig. ure 5). Epineurraphy was then completed using Prolene 7-0 (Figure Fig. 6) and wound was closed in standard fashion. Histopathology of the specimen revealed a schwannoma that was completely excised.

In the immediate post-operative period, the patient was noted to be stable, ambulatory with minimal discomfort, and with no reported numbness or weakness of the left leg. Wound remained clean and dry and patient was sent home the day right afer surgery. CurrentlyAt present, at 6 months postoperatively, the patient is ambulatory without recurrence of radiating pain and is without any motor or sensory defiits or wound complications.

Discussion

Peripheral nerve sheath tumors (PNST) are rare conditions originating from the neuroectoderm. [1, 2]. Among these are Schwannomas, also called neurilemmomas, which arise from Schwann cells and are known to be the most common type of PNST [1, 3] and represents 8% of all sof- tissue tumors [104]. They end to be found equally in male and female patients between 20 -and 50- years- old and are slow-growing nerve sheath tumors, usually solitary and benign, with only about 1% of cases having malignant potential when associated with neurofbromatosis [1, 2, 45, 76, 87, 158], and some being radiation-induced [59].

Although they commonly occur as vestibular lesions in the head and neck region [1, 2, 3, -45, 1110, 1611], there have been reports of its appearance in the upper and lower extremities [2, 45, 59], as well as in the retroperitoneal space and pelvis, [2, 45], and in the mediastinum and trunk [59]. In the limbs, they generally occur commonly in the upper extremity, while in the lower extremity, they occur most frequently in the posterior tibial nerve [1, 2, -3, 87, 1110].

Schwannomas of the sciatic nerve are reported to be very rare (1%) [1, 2, 612, 13], with an estimated incidence of about 6 cases per /million individuals [45]. UpoOn review of published case reports, which are writen in English, and are free and with available full text, we were able to encounter 18 case reports, tabulated as follows.

It is of note that among these studies, the most common location of the schwannoma of the sciatic nerve is at its proximal aspect, comprising 10 of the 18 reports; while the middle and distal aspects of the nerve are less common locations, comprising 4 four reports each.

A case report done by Nahar et aland Goyal. (2018) [3]. states a detailed history and clinical examination in view of a history of radicular pain without any neurologic defiits, poorly controlled by analgesics and supportive therapy, remains the cornerstone to its successful diagnosis. As these tumors expand within its confind space in the peripheral nerve sheath, fascicles are pushed into the periphery, and its continued growth typically causes a palpable mass [1, 87] resulting to local discomfort and radicular pain [45, 1110]. On physical examination, numbness may or may not be present;, however, range of motion and strength are is ofen normal [87]. Tinel's sign may be positive and its presence should lead one to suspect a peripheral nerve tumor. [87]].

These ere all ccommon findgs in the aforementioned case reports. Owing Due to its symptoms mimicking sciatica or other musculoskeletal pathologies, sciatic schwannomas are hence misleading, ofen contributing to a delay in its diagnosis and subsequent management [2, 3, 87, 1713]. Ths may aatibute to its potential to grow to a substantial size prior tobefore surgical management, as seen in a few case reports [45, 84, 107]. Ths reiterates the importance of the possibility of this albeit although rare pathology, especially when there is no resolution of symptoms despite conservative therapy such as anti-inflmmatory medications and physical therapy, as well as localized signs such as a palpable mass and positive Tinel sign over the area, all of which were present in our patient.

Investigation with an MRI is the gold standard imaging in cases such as this with an unknown nerve pathology [1, 45, 87]. It is helpful in determining entrapment of the sciatic nerve along its course in the pelvis or the lower extremity due to heterotrophic ossifiction, myofascial bands in the thigh, myositis ossificns of the biceps femoris muscle, and posttaumatic or anticoagulant-induced hematomas [612]. In the event that a tumor is clinically suspected, the MRI may aid in the differentiation of a Schwannoma from neurofbromas [45]. Although the two may appear homogenous on both T1- and T2-weighted images, the former appears as a well-encapsulated solitary mass eccentrically located on the nerve, while the later tends to be multiple, without a clear capsule and is a central fusiform swelling in the nerve. [2, 3, -

Table 1: ??? .

Main author, Year	Age/Sex of patient	Presenting symptoms	Location in the sciatic nerve	Treatment	Outcome
Rekha and Ravi, 2004 [14]	60 M	10 years history of painless swelling in the posterior thigh	Distal portion	Surgical excision	Transient neuropraxia that recovered
Gorgan, *et al* . 2008 [13]	54 F	2 years history of right-sided sciatica and weakness of the right foot	Middle portion	Surgical excision	Residual motor loss (present preoperatively)
Omezzine, *et al* . 2009 [1]	42 (sex not mention-ed)	1 year history of pain radiating from posterior aspect of right thigh	Proximal portion	Surgical excision	No neurologic deficits No complications
Hamdi, *et al* . 2009 [15]	45 M	3 months history of burning pain radiating to dorsal aspect of the foot; aggravated by sitting	Proximal portion	Surgical excision	No neurologic deficits No complications
Rhanim, *et al* . 2013 [2]	37 M	3 years intermittent right lower leg and foot pain; exacerbated by sitting	Distal portion (upstream of its bifurcation)	Surgical excision	No neurologic deficits No complications
Haspolat, *et al* . 2013 [12]	60 M	Long standing symptoms of pain on his right thigh and paresthesia on his right foot	Proximal portion (area of the sciatic notch)	Surgical excision	No neurologic deficits No complications
Eroglu, *et al* . 2014 [10]	40 F	1 year slow-growing painful swelling in the right posterior thigh	Middle portion	Surgical excision	No neurologic deficits No complications
Mansukhani, *et al* . 2015 [16]	46 F	4 years history of pain and tingling of the left hip and leg	Proximal portion	Surgical excision	No neurologic deficits No complications
Kumar, *et al* .2015 [17]	23 F	1 year history of posterior hip pain	Proximal portion (adjacent to the sacrum)	Surgical excision	Not mentioned in the study
Rosario, *et al* . 2016 [9]	64 M	Soft-tissue mass on right gluteal area with right leg pain with later signs of inflammation (no duration of symptoms given)	Proximal portion (subgluteal)	Surgical excision w/ debridement	No neurologic deficits No complications
Godkin, *et al* . 2016 [4]	40 F	8 months history of fullness of the right posterior thigh with pain primarily on sitting and radicular pain down right leg	Proximal portion	Surgical excision	No neurologic deficits No complications
Munakomi and Shrestha, 2017 [18]	69 F	2 years right-sided shooting pain down to right foot	Proximal portion (subgluteal)	Surgical excision	No neurologic deficits No complications
As-Sultany, *et al* . 2017 [5]	39 F	6 months swelling and discomfort in posterior aspect of the right thigh	Proximal portion (subgluteal)	Surgical excision	No neurologic deficits No complications
Nahar and Goyal, 2018 [3]	40 F	2 years history of persistent dull aching pain of the left lower limb, aggravated while walking	Distal portion (area of the popliteal fossa, between the semi-membranosus and biceps femoris)	Surgical excision w/ epineurrhaphy	No neurologic deficits No complications
Naik and Velho, 2019 [8]	34 M	1 year history of pain and swelling in the back of the left thigh	Middle portion	Surgical excision	No neurologic deficits No complications
Wu, *et al* . 2020 [6]	27 M	2 years left posterior proximal thigh pain with numbness radiating to his buttock and leg	Proximal portion (just below the long head of the biceps)	Neurolysis	No neurologic deficits No complications
Maes and Ledoux, 2020 [6]	50 F	Some months duration of pain of the left lower limb with a painful mass just above the popliteal fossa	Distal portion (above the popliteal fossa)	Surgical excision	No neurologic deficits No complications
Cavalcante, *et al* . 2020 [11]	77 F	2 years history of pain and mass in the middle region of the left thigh	Middle portion	None (refused surgery)	-

45, 76, 1110]. The use of n ultrasound and EMG-NCV has also been proven useful in a number of case reports [1, 2, 76]. Following imaging techniques, a biopsy may then be preferred in cases where a malignancy is entertained, such as in a tumor size larger than 5 cm or a heterogenous appearance of the mass in MRI. [45]. Although neurofbromas are the main differential diagnosis that has to be ruled out, one has to keep in mind that other rare nerve tumors such as intranervous lipomas, hemangiomas of the nerve sheath, and neurofbrolipomas, may also develop [1, 2, -3]. Definiti e diagnosis is possible only afer histopathologic diagnosis [3, 4, 918, 10]. In schwannomas, the diagnosis is made with visualization of Antoni A and B areas, as well as Verocay bodies [45, 59, 7, 88, 11, 17, 918, 14, 15, -16], with only an occasional need for immunohistochemical markers like such as S100 [918], leucine-7, and vimentin [1814]. Surgical excision of schwannomas is the treatment of choice [1, 2, 3, -45, 8, 11, 612, 13,

14, 918, 15, 16, 17, -18]. Since they do not penetrate fascicular groups, they are theoretically removable via through complete enucleation while preserving nerve continuity [1, 2, 45]. Microsurgical excision may also be performed with the aid of an electrical stimulation to facilitate detection of motor fascicles, despite Schwannomas usually originating from the sensory fascicles in mixed nerve [2, 59]. In addition, it may help outline the course of the nerve and define the boundry of the tumor during its removal [918]. Outcomes of surgical excision of these tumors reportedly have good outcomes with no residual neurological defiits, as noted in almost all of the aforementioned case reports. Recurrence following surgical excision of schwannomas in general is reported to be low [76, 87, 10, 917, 11, 1418], and it may be due to a consequence of incomplete excision [87].

Conclusion and Clinical Relevance

We are reporting a rare case of a sciatic nerve schwannoma, presenting in an even less common location adjacent to its bifurcation at the apex of the popliteal space. Due to its presentation that closely mimics sciatica of a lumbosacral discal pathology and other musculoskeletal disorders, these are ofen diagnosed and managed late. Despite its rarity, it should be suspected in patients with history of radicular pain without any neurologic defiits, which is poorly controlled by analgesics and supportive therapy, with physical examination pointing to a localized neural pathology.

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