

## Painful Motor Nerve Schwannomas

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Received: 20 January 2023 / Accepted: 29 August 2023 / Published online: 18 December 2023

**BACKGROUND:** Schwannomas are benign peripheral nerve sheath tumors which grow slowly and are considered common peripheral nerve tumors. The presentation varies between painful masses, sensory complaints or rarely motor deficits. They are commonly capsulated and can be diagnosed clinically and using imaging studies as ultrasonography and magnetic resonance imaging. Surgery is the mainstay for treatment.

**OBJECTIVE:** To evaluate the surgical technique of resection of motor nerve schwannomas and the clinical outcome.

**PATIENTS AND METHODS:** In our study, we had 10 cases of painful schwannomas of the limbs presented to our institute in Alexandria Main University Hospital and affiliated hospitals.

**RESULTS:** All our patients had resolution of their symptoms following surgery with no permanent deficits and no postoperative recurrences.

**CONCLUSION:** Surgical resection is a safe and effective tool for managing patients harbouring peripheral nerves schwannomas with good postoperative outcomes.

**KEYWORDS:** Painful, Peripheral nerves schwannomas, Surgery.

## INTRODUCTION

Nerve sheath tumors most commonly arise from the schwann cells i.e schwannomas, and they are the most commonly seen pathologies in this setting. Myelin is formed by the schwann cells which are glial cells in the peripheral nervous system.<sup>1</sup> Schwannomas arising in the peripheral nerves result in displacement of the fascicles within the nerve and compression which lead to numbness and painful sensation. They grow slowly and have well-formed capsules and are usually solitary.<sup>2-4</sup> Schwannomas present at any age with the fourth decade being the most common age of presentation with no sex predominance.<sup>5</sup>

The diagnosis of schwannomas might be delayed because of slowly growing nature of the tumor and as the symptoms are attributed to other pathology like radiculopathy with spine pathology or compressive neuropathy e.g tarsal tunnel syndrome. The diagnosis is usually a clinical diagnosis based upon the presence of a swelling along the course of a known nerve which might be painful and tender on examination with some numbness in the dermatomal distribution of the nerve.<sup>6</sup>

Schwannomas are usually seen as hypoechoic lesions on ultrasonography and the magnetic resonance imaging (MRI) is used to define the depth, extent of the lesion and relation to nearby structures especially the vessels. Electrophysiological testing is usually non specific as schwannomas do not cause interference with nerve

function.<sup>6-9</sup>

Surgical resection is considered the treatment of choice. It is safe, has good prognosis, and is effective in ending the neuropathic symptoms with low recurrence rate.<sup>9,10</sup>

## PATIENTS AND METHODS

In this study we present our experience over 2 years (2019-2021) with 10 patients presenting with painful swellings in the extremities who were diagnosed based on histopathological confirmation as schwannomas without immunohistochemical testing. There were 8 male patients and 2 female patients with mean age of 25 years, where the youngest was 10 years old and the oldest was 70 years old. Regarding the involved nerves we had 4 patients harboring schwannomas of the median nerve, 1 patient with sciatic nerve schwannoma and other patient with pectoral nerve schwannoma. We had 4 patients with posterior tibial nerve schwannoma, where 1 patient had 3 lesions along the course of the nerve. The sizes ranged between 2 cm and 8 cm with mean size of 6 cm, with the largest tumor along the sciatic nerve. Four of our patients noticed recent increase in the size of the lesion. All patients had pain of recent onset though 5 patients stated that they had the swelling for a longer time before development of pain with mean time between the swelling and development of pain was 2 years. One of our patients had noticed the swelling for 7 years before seeking medical advice as it was painless and stationary in size. Upon examination the lesions were found along the course of the mentioned nerve, firm in consistency with no attachment to the skin and were freely mobile along the course of the nerve. Six patients noticed tenderness upon percussion

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of the nerve with positive Tinel sign in 8 patients. The patients harboring posterior tibial nerve schwannomas at the medial malleolus presented by inability to bear any pressure on that area or even to wear a full shoe with pain and tingling in the sole simulating tarsal tunnel syndrome. Preoperative pain scoring using the visual analogue scale (VAS) score ranged between 4-7 with mean of 5. No neurological deficits were found though some subjective sensory deficits were documented by the patients but were not confirmed on examination. All patients received medical treatment in the form of non-steroidal anti-inflammatory drugs and anti-neuropathics for at least 3 months preoperatively with no significant improvement.

All patients underwent ultrasonography as a primary diagnostic tool to exclude other soft tissue lesions e.g lipoma. Magnetic resonance imaging (MRI) was used for confirming the diagnosis. Computed tomography (CT) angiography was done for the lesion involving the pectoral nerve of the right upper limb to delineate the relation with nearby axillary artery and vein. This patient had previously undergone an open biopsy outside our institute with alleged vascular injury.

Electrophysiological testing was done and no nerve related dysfunctions were found. One patient with median nerve schwannoma had concomitant carpal tunnel syndrome which was managed by surgical release at the time of surgery.

### Surgical technique

Surgery was done in Alexandria main University Hospital

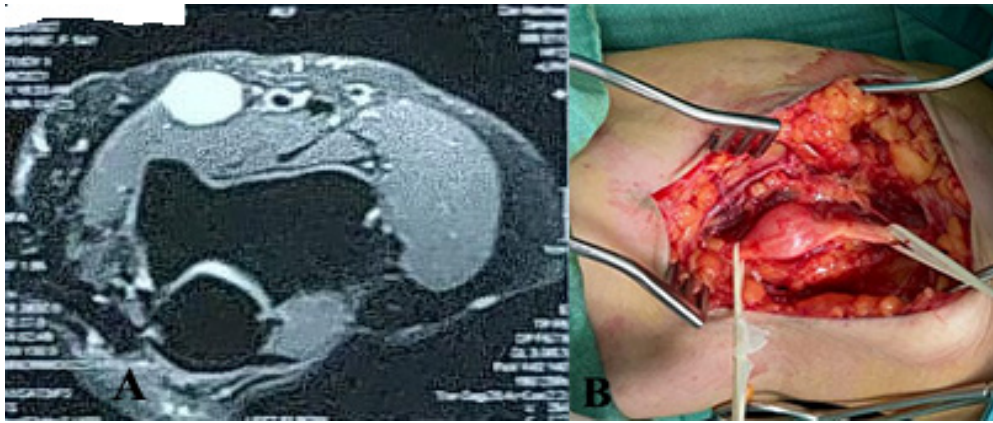
and affiliated hospitals after approval of the ethical committee, and consent was obtained from all patients. All patients were operated upon under general anesthesia. We did not use tourniquet in any of our patients. Surgical incision was planned along the course of the affected nerve to facilitate proximal and distal exposure of the nerve in relation to the lesion. Under microscopic magnification opening of the epineurium in a longitudinal fashion parallel to the fascicles and identifying the tumor capsule was done. Intracapsular debulking of the tumor was done and identifying the involved fascicle and resection of the tumor was completed. We did not use intraoperative nerve stimulators but as a substitute we used the monopolar bovie at the lowest possible setting for checking the fascicle of origin for motor response. All fascicles involved were sensory fascicles with no motor response on stimulation except a case with median nerve lesion and she had transient weakness postoperatively which improved over time

### RESULTS

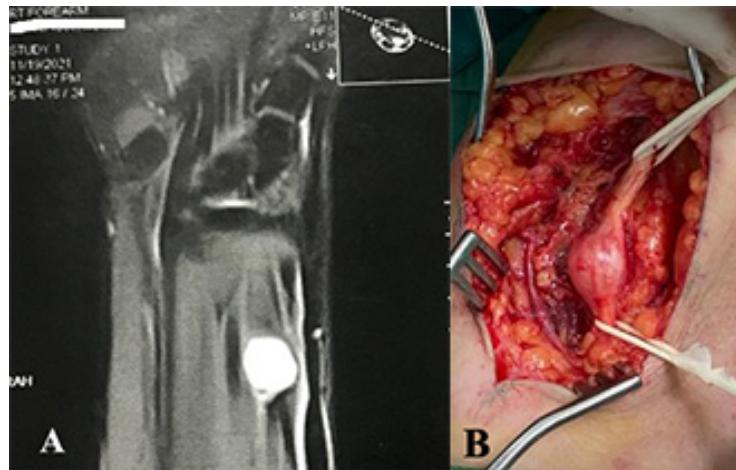
All patients recovered well postoperatively with total resolution of their symptoms and no postoperative deficits apart from mild weakness of a patient with median nerve schwannoma which resolved within 1 week. We achieved gross total resection of the tumor in all patients except in one patient with pectoral nerve schwannoma who had been operated previously and had venous injury with developing adhesions. We had 1 patient who developed causalgia like symptoms postoperatively with total resolution within 3 months. No recurrences were noted after 2 years follow up.



**Fig 1:** Case 1: (A) 70-year old male patient presented with pain in the tarsal tunnel together with painful palpable swelling at the tarsal tunnel region along with a positive Tinel's sign. No signs of radiculopathy were present on examination. (B) MRI examination showed solid enhancing lesion at the medial ankle around 1.5x1.8x1.7 cm in size which was hypointense on T1 sequence and hyperintense on T2 sequence with target sign and split fat sign. (C) The mass was seen related to the posterior tibial neurovascular bundle. (D) Surgical excision was done and biopsy was schwannoma.



**Fig 2:** (A) Case 2: A 40-year old female patient presented with a painful swelling in the antibrachial region of the arm. (B) The lesion was found along the course of the median nerve. It was painful with positive Tinel sign and increased in size recently. It was around 2x2.5x2.3 dimensions.



**Fig 3:** (A) Case 3: A 35-year old male patient presented by a painful swelling above the wrist along the course of the median nerve with positive Tinel sign. (B) Intraoperative photo during surgical excision.



**Fig 4:** Case 4: (A) A 12 year old male patient presented by 3 palpable painful swellings in the left leg. MRI was done and suggested posterior tibial nerve multiple schwannomas. (B) The swellings after surgical excision.

No	Age/Sex	Site	Size	Complaint	Duration	Postoperative
1	70/M	Left Posterior tibial at the ankle	1.5x1.8x1.7 cm	Spontaneous pain and hyperalgesia with tenderness and aggravation of symptoms on touch with positive Tinel sign. VAS score 7	Swelling noticed for 7 years but pain started 6 months before surgery.	Total resolution of symptoms within 3 month with causalgia like symptoms
2	40/F	Left median at the elbow region	2x2.5x2.3 cm	Growing mass, tenderness and pain and easy fatiguability on writing with positive Tinel sign VAS score 5	The lesion increased in size for 3 months with tenderness and positive Tinel sign	Transient weakness improved within 2 weeks with pain resolution
3	35/M	Right median nerve above the wrist	2x2.5x2 cm	Allodynia with extreme discomfort even with minor touch with positive Tinel sign. VAS score 6	No size increase but recent onset pain progressively increasing in severity over 1 year	Improved immediate postoperative
4	12/M	Left posterior tibial	3 lesions with variable sizes along the whole length of the nerve	Pain in the lesion close to the ankle, the other proximal lesions were painless. VAS score 7	Recent pain with difficulty wearing shoes	Pain improved within 1 month
5	15/F	Right Median nerve in the arm distal to axilla	3x3x3.5 cm	Painful swelling with hypersensitive skin overlying the lesion. Positive Tinel sign. VAS score 5	Mass noticed over 1 year but with recent increase in size.	Patient improved over 2 weeks
6	23/M	Left median nerve in the mid forearm	2x3x2 cm	Painful lesion tender to touch. Positive Tinel sign. VAS score 5	Pain increased in severity and became constant over the last 3 months	Immediate improvement of symptoms 2 days postoperatively
7	18/M	Right posterior tibial distal to the knee	2x2x2.5 cm	Painful lesion noticed following trauma with no significant tenderness. Positive Tinel sign VAS score 4	Intermittent pain and sense of discomfort noticed 3 months before surgery	Improved over 1 month with pain episodes related to knee pathology
8	11/M	Right posterior tibial in the calf	2x3x2 cm	Pain noticed with effort. No Tinel sign. VAS score 4	Pain of variable intensities 6 months before surgery	Immediate improvement
9	10/M	Left sciatic nerve in the thigh	7x4x4 cm	Painful swelling more noticeable while sitting. Positive Tinel sign. VAS score 4	Pain became constant 3 months before surgery	Improved over 2 weeks
10	16/M	Right pectoral nerve in the axilla	8x4x3 cm	Painful lesion with significant local tenderness. No Tinel sign. VAS score 4	Noticeable increase in size over 2 months period	Improved over 3 months

## DISCUSSION

Benign tumors of the soft tissue involving the peripheral nerves, namely schwannomas, usually occur as isolated lesions and are not common in the lower limbs, representing around 10% of the tumors of the soft tissue in this location.<sup>11,12</sup>

In our study, we had 4 patients with schwannomas involving the posterior tibial nerve with delay of diagnosis because of the absence of early symptoms and slowly growing nature of the lesion with average of 2 years before the diagnosis.

In a study by Nawabi,<sup>6</sup> he had 25 patients having schwannomas of the posterior tibial nerve with delay of

diagnosis for 86.5 months. He stated that the delay of diagnosis was due to absence of palpable lesions because of small size and the neuropathic pain was attributed to other causes as radiculopathy or compressive neuropathy and they recommended using MRI for investigating those patients.

We had one patient and who 3 lesions along the posterior tibial nerve who had symptoms of foot pain simulating tarsal tunnel syndrome for a period of 1 year before surgery. Those lesions were resected simultaneously in one session and the patient was pain free after surgery for 2 years follow up period.

Von Deimling et al,<sup>14</sup> reported a 46 year old male who had 18 separate lesions along the medial plantar division



of the posterior tibial nerve who had a history of pain in his foot for 18 months prior to the diagnosis and surgery.

Joyce et al,<sup>15</sup> described a male patient who had 4 lesions along the posterior tibial nerve and medial plantar nerves with total resolution of symptoms following resection.

Schweitzer Jr et al,<sup>12</sup> described his surgery on 2 patients one harboring 5 lesions and the other with 3 lesions along the posterior tibial nerve who remained asymptomatic for a long period before diagnosis was made. Lesions were resected and the patients recovered with total resolution of the preoperative symptoms.

Knight et al,<sup>16</sup> stated that 64 cases of his 234 cases were in the pelvis and the lower limbs where the sciatic nerve was the most commonly affected nerve followed by the posterior tibial nerve.

We used ultrasound as the primary imaging modality in all cases and MRI was used as a confirmatory tool before surgical intervention.

Albert P et al,<sup>17</sup> stated that his patients presented as slowly growing soft tissue masses with pain and parasthesia and positive Tinel sign with pain elicited upon percussion of the swelling. They also recommended using ultrasound first next MRI with gadolinium for better evaluation of the mass and to exclude other differential diagnoses.

## CONCLUSION

Schwannomas should be suspected whenever there is pain in the distribution of a named nerve with a palpable swelling along the course of the nerve. Investigations should include ultrasound and magnetic resonance imaging and electrophysiological studies. Surgical resection is a safe and effective tool for managing those patients with good postoperative outcomes.

## List of abbreviations

CT: Computed tomography.

MRI: Magnetic resonance imaging.

VAS: Visual analogue scale.

## Disclosure

The authors report no conflict of interest in the materials or methods used in this study or the findings specified in this paper.

## Funding

The authors received no financial support for the research, authorship, and/or publication of this paper.

## REFERENCES

1. Mangrulkar VH, Brunetti VA, Gould ES, Howell N. Unusually large pedal schwannoma. *J Foot Ankle Surg.* 2007;46(5):398-402.
2. Lin J, Martel W. Cross-sectional imaging of peripheral nerve sheath tumors: Characteristic signs on CT, MR imaging, and sonography. *AJR Am J*

*Roentgenol.* 2001;176(1):75-82.

3. Carpintero P, Gascón E, Abad JA, Ruza M. Foot schwannomas that mimic nerve-entrapment syndromes: A report of three cases. *J Am Podiatr Med Assoc.* 2006;96(4):344-347.
4. Jack CM, Jones G, Edwards MR, Singh SK. A case report of three peripheral schwannomas attached to the Achilles paratenon. *Foot (Edinb).* 2010;20(2-3):78-80.
5. Pasternack WA, Winter-Reiken DJ. Unusually large cellular schwannoma of the foot. *J Am Podiatr Med Assoc.* 2005;95(2):157-160.
6. Nawabi DH, Sinisi M. Schwannoma of the posterior tibial nerve: The problem of delay in diagnosis. *J Bone Joint Surg Br.* 2007;89(6):814-816.
7. Aydin AT, Karaveli S, Tuzuner S. Tarsal tunnel syndrome secondary to neurilemoma of the medial plantar nerve. *J Foot Surg.* 1991;30(2):114-116.
8. Moholkar S, Sawhney JS, Bhatt R. Imaging benign soft tissue lesions of the foot. *Appl Radiol.* 2009;38(10):10.
9. Milnes HL, Pavier JC. Schwannoma of the tibial nerve sheath as a cause of tarsal tunnel syndrome-A case study. *Foot (Edinb).* 2012;22(3):243-246.
10. Rockwell GM, Thoma A, Salama S. Schwannoma of the hand and wrist. *Plast Reconstr Surg.* 2003;111(3):1227-1232.
11. Carvajal JA, Cuartas E, Qadir R, Levi AD, Temple HT. Peripheral nerve sheath tumors of the foot and ankle. *Foot Ankle Int.* 2011;32(2):163-167.
12. Schweitzer KM Jr, Adams SB Jr, Nunley JA. Multiple schwannomas of the posterior tibial nerve: A case series. *Foot Ankle Int.* 2013;34(4):607-611.
13. Jha AJ, Basetty CR, Viner GC, Tedder C, Shah A. Posterior tibial nerve schwannoma presenting as tarsal tunnel syndrome. *Cureus.* 2019;11(8).
14. Warade A, Roy R, Pattankar S, Pasricha P, Desai K. Segmental schwannomatosis of the lower extremity—A case series. *Neurol India.* 2022;70(5):2132-2136.
15. Joyce M, Laing AJ, Mullet H, et al. Multiple schwannomas of the posterior tibial nerve. *Foot Ankle Surg.* 2002;8(2):101-103.
16. Knight DM, Birch R, Pringle J. Benign solitary schwannomas: A review of 234 cases. *J Bone Joint Surg Br.* 2007;89(3):382-387.
17. Albert P, Patel J, Badawy K, et al. Peripheral nerve schwannoma: A review of varying clinical presentations and imaging findings. *J Foot Ankle Surg.* 2017;56(3):632-637.