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Tips, Quips, and Pearls

"Tips, Quips, and Pearls" is a special section in The Journal of Foot & Ankle Surgery®, which is devoted to the sharing of ideas to make the practice of foot and ankle surgery easier. We invite our readers to share ideas with us in the form of special tips regarding diagnostic or surgical procedures, new devices or modifications of devices for making a surgical procedure a little bit easier, or virtually any other "pearl" that the reader believes will assist the foot and ankle surgeon in providing better care.

Schwannomas of the Foot and Ankle: A Technical Report



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ABSTRACT

The present technical report provides a detailed description of open surgical resection of peripheral nerve sheath tumors in the foot and ankle. We present 3 cases to illustrate important differences in the technique based on the presentation, anatomic location, and intraoperative neurophysiologic monitoring findings. It is important for surgeons to understand that surgical excision of many peripheral nerve sheath tumors can be undertaken without en bloc resection of the entire nerve trunk.

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Schwannomas are benign encapsulated tumors that originate from Schwann cells in the peripheral nervous system (1) and, compared with neurofibromas, are the more common of these 2 principal subtypes of benign peripheral nerve sheath tumors (PNSTs) (2,3). Although classically associated with neurofibromatosis types 1 and 2, PNSTs can also occur as solitary lesions in the general population. The location of PNSTs can be quite diverse (3,4), with the head and neck being the most common sites (5) and the foot and ankle relatively less common (6,7). In 1 single-center retrospective review, only 14 of 137 identified PNSTs (10.2%) were located in the foot and/or ankle (4). In another series, 12 of 104 (11.5%) solitary benign PNSTs identified in a single hospital during a 32-year period were located in the foot and/or ankle (8).

The clinical presentation of a patient with a PNST in the foot or ankle will depend on the precise location and size of the lesion. The signs and symptoms will typically result from the mass effect and/or direct involvement of the nerve and surrounding tissues (9). Owing to the slow growth of these tumors and the nonspecific nature of the associated signs and symptoms, PNSTs often go undiagnosed for many years, until the tumor has become large enough to produce an easily palpable lump or grossly evident mass effect (5,10). Furthermore, the signs and symptoms of PNST can be incorrectly attributed to some

other, more common clinical entity. For instance, PNSTs are a rare cause of tarsal tunnel syndrome when they occur in a location that allows for impingement of the posterior tibial nerve. Thus, PNSTs in this location are often misdiagnosed initially as entrapment neuropathy or lumbosacral radiculopathy (5,10).

Importantly, surgical resection of PNSTs in the foot and ankle is associated with minimal postoperative morbidity and rare recurrence, if resected properly (4,11). Therefore, it is necessary to consider PNST in any patient with nonspecific signs and symptoms of a foot or ankle mass lesion or nerve injury of unknown etiology and to be familiar with the proper technique of surgical resection for when such lesions are identified. We have reviewed a single surgeon's technique of surgical resection of such lesions by reviewing 3 cases of World Health Organization grade 1 schwannomas located in the foot and ankle.

Surgical Technique

Each of the 3 cases of foot and/or ankle schwannoma has been discussed separately. The clinical presentation and diagnostic workup have been reviewed only briefly, followed by a description of the open surgical resection of the tumor, the focus of the present report. Although each of the cases discussed pertains to a pathologically confirmed schwannoma of the foot and/or ankle, the particular nerve affected was different in each patient, and, therefore, the nuances of the surgical resection varied among the cases. The operative technique has been reviewed in detail for patient 1, and the relevant discussion for the subsequent cases highlighted the distinguishing features of each particular case.

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Fig. 1. Intraoperative photograph showing the surgical approach with the patient in the supine position. The incision (solid line) is directly over the tibial nerve within the tarsal tunnel; the nerve sheath tumor is indicated by the dotted line.

Patient 1

Patient 1 presented with a 3-year history of aching pain along the left medial ankle just behind the medial malleolus. It was periodically associated with pain and/or numbness in the heel and foot. He had initially presented to a podiatrist, who had noted a palpable mass 1 to 2 cm in diameter along the course of the tibial nerve just posterior to the ankle, with associated swelling. Furthermore, Tinel's sign was elicited on examination that radiated into the plantar aspect of the patient's foot. A tumor was suspected, and a subsequent magnetic resonance imaging scan demonstrated a well-circumscribed, enhancing lesion in the region of the tarsal tunnel, consistent with the suspicion of PNST. Because of the bothersome symptoms attributed to this lesion and the location of the tumor within the confined space of the tarsal tunnel, the patient elected to undergo surgical resection.

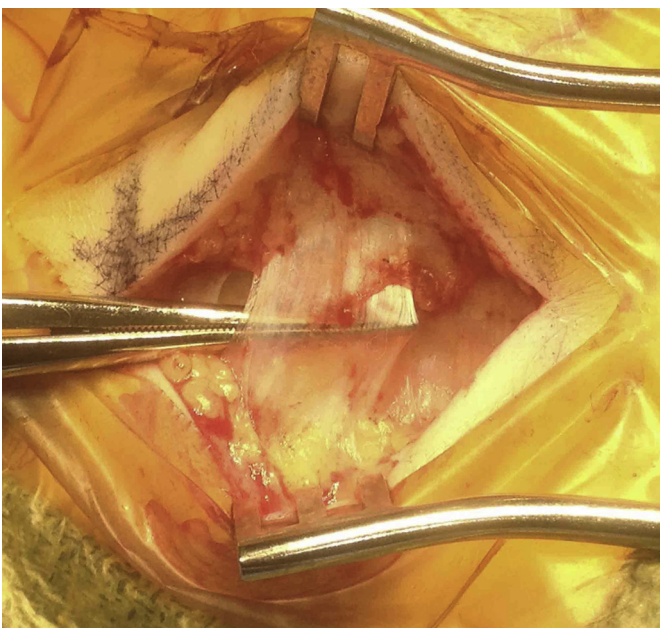


Fig. 2. Intraoperative photograph showing the ligamentous roof over the tarsal tunnel, which must be incised to permit exposure of the tibial nerve at this level.

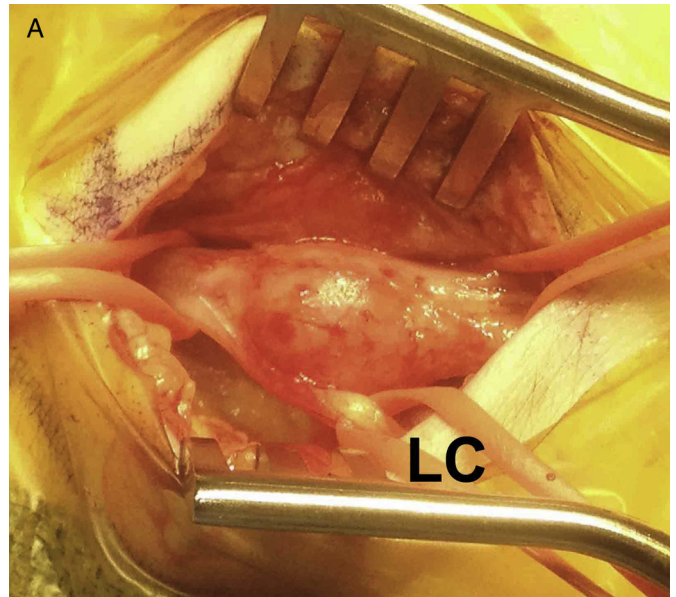


Fig. 3. Intraoperative photograph showing exposure and intraoperative stimulation of the tumor. (A) Tibial nerve and tumor have been subjected to external neurolysis. The proximal and distal nerve segments and the lateral calcaneal branch of the tibial nerve (LC) have all been tagged with vessel loops. (B) Intraoperative nerve stimulation was used to identify a quiescent portion of the nerve over the tumor that does not elicit an electromyographic response. This is often the thinnest portion of the nerve over the tumor and represents the safest area for the longitudinal incision to permit tumor removal.

In the operating room, the patient was placed in the supine position with the left leg externally rotated and the ankle slightly dorsiflexed, and the site of the surgical approach was marked (Fig. 1). Care was taken to ensure that all pressure points were appropriately padded. Preoperative antibiotics were administered, and general anesthesia was induced. Neurophysiology electrodes were placed to facilitate intraoperative monitoring of nerve function, and the patient was then prepared and draped in the usual sterile fashion. After injection of lidocaine, bupivacaine, and epinephrine, a 2-in. incision was made along the course of the tibial nerve at the level of the tarsal tunnel just behind the medial malleolus, and dissection was carried down to the subcutaneous tissues before a self-retaining retractor was placed. The flexor retinaculum (or

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