

Schwannoma: A case report

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Schwannomas are tumors derived from the myelin sheath of nerves. As schwannomas grow they can displace and compress nerves causing pain, weakness and numbness. Schwannomas usually exist as a solitary mass and can occur at random. Having no racial or sexual predilection, schwannomas usually occur in individuals between the ages of 20-50 years old. The most common sites for schwannomas are the head, flexor surfaces, upper extremity, lower extremity and trunk. It is very rare for schwannomas to become malignant, but surgery is still the principal treatment to eliminate symptoms that may persist and to correctly diagnosis the tumor. We discuss one case of a schwannoma found in the foot.

Key Words: Schwannoma, neurilemmona, peripheral nervous system tumors, Magnetic resonance imaging.

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Verocey was one of the first to describe a nerve tumor derived from the myelin sheath in 1908, termed neurinoma.⁵ Later in 1935, Stout reported on tumors arising from the nerve sheath and specifically described tumors of neuroectodermal origin.¹ The neuroectoderm consist of Schwann cells and collagen fibers.² Schwannomas are tumors that arise from the myelin sheath of nerves and are the most common solitary nerve tumor of the body.³

Schwannomas can be found in various parts of the body with the most common site being the head. However, in the lower extremity they are most commonly found in the deep tissues of the foot.¹⁰ Unlike neurofibromas, Schwannomas rarely metastasize.⁴ As a schwannomas grows along the nerve sheath the fibers begin to push outward.

Studies relate a correlation between size of the nerve trunk and size of the lesion.⁷ Lesions can be small or large, usually with a diameter less than 8cm when located in the foot.^{11,12} Clinical evaluation of symptoms is sometimes a great indicator of what the lesion may be, but Magnetic Resonance Imaging (MRI) of the lesion is standard for obtaining differential diagnosis and determining the size and depth of the lesion. Once a lesion of this type is identified on MRI it must be surgically removed. The specimen is then sent to pathology, which allows the definitive diagnosis of Schwannoma.

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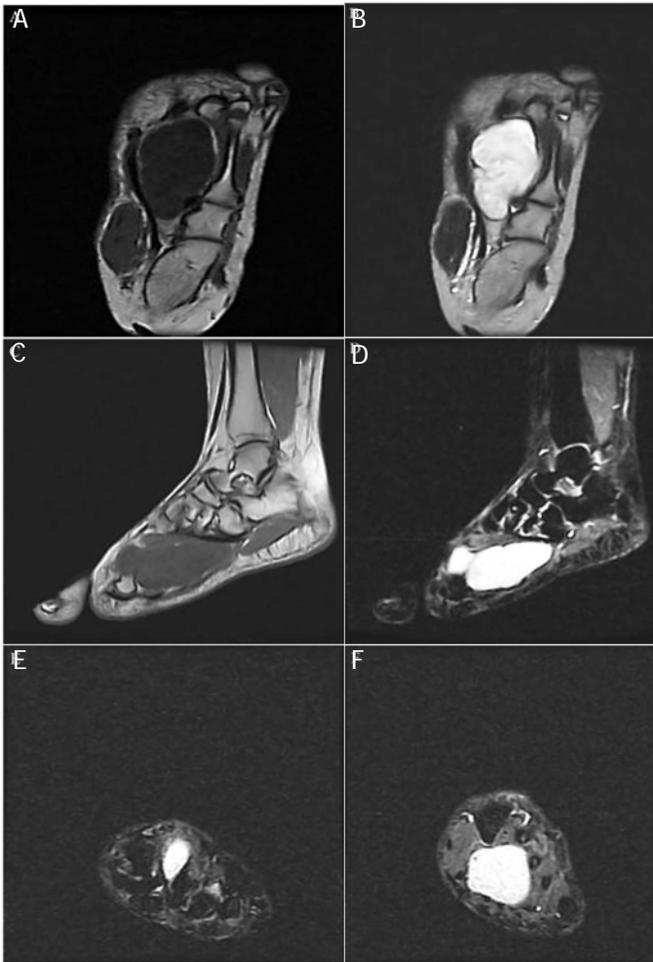
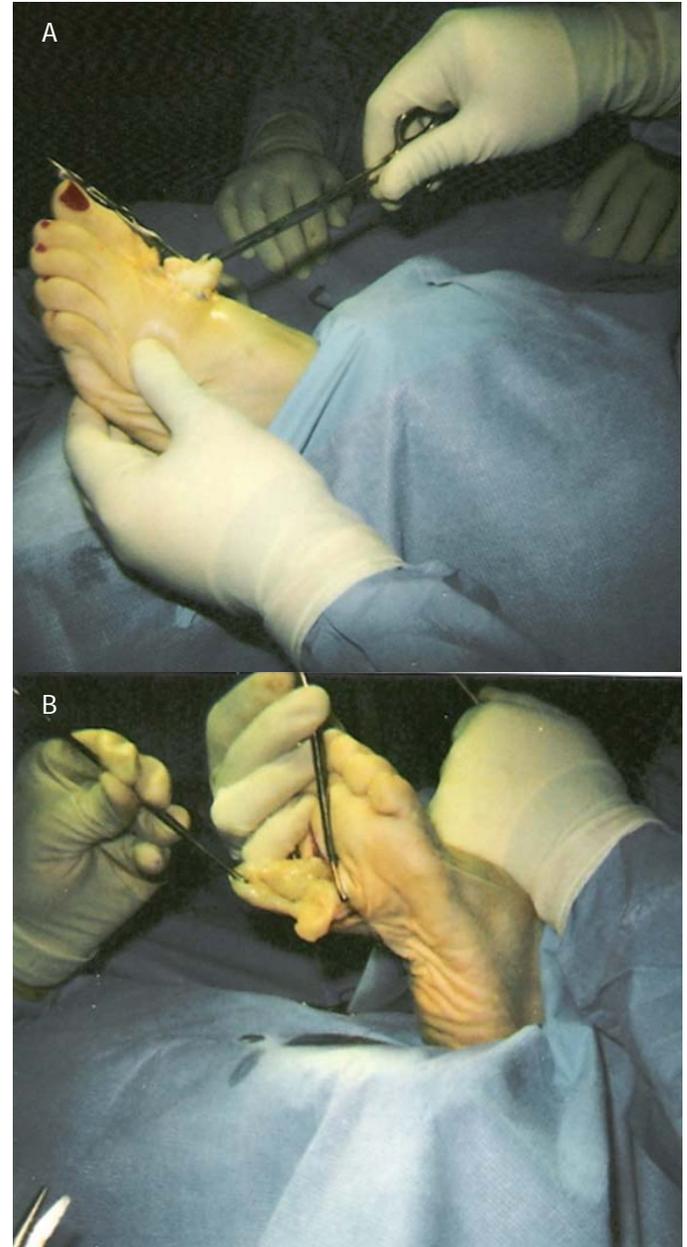


Figure 1A.- F. Sagittal, Axial and coronal T1, T2, gradient echo/inversion recovery sequences were performed on MRI. (A-F) A very large cystic fluid collection plantarly, deep to the metatarsal bones, extending from the cuboid posteriorly, to the proximal metatarsophalangeal junction. (A-F) Lesion invaginates between 1st and 2nd metatarsals with some upward extension. Adjacent musculature uninvolved, but displaced. No definitive bony involvement seen. (E and F)

Case Report

A 56 year-old female with a past medical history of hypertension, depression, and hypothyroidism first presented at age 54 with complaints of left foot pain and swelling of about one year duration. She related that she was bitten by a bug in the Caribbean and had swelling and discomfort since then. She denied any injury or trauma.



Figures 2A and B. Intraoperative view of Schwannoma being excised from foot. Dorsal view of schwannoma. Attempt to remove the lesion from dorsal approach. (A) Plantar view of schwannoma being removed from between 1st and 2nd metatarsals. (B)

She also denied constitutional signs of infection. Initial radiographs failed to reveal any bony abnormalities or tumor like masses. The patient was then treated conservatively with an NSAID and change of shoe gear.



Figure 3 Intraoperative measurement of schwannoma removed from the plantar left foot. The Schwannoma measures 8cm (with adjacent stump total length 12cm).

A year later she returned complaining of an increase in the size of the left foot. She explained that her symptoms had never completely resolved and she noticed that her left foot was getting larger and more painful in her shoes which also were not fitting properly. An MRI was obtained which identified a large cystic lesion beneath the metatarsals extending from the cuboid to the metatarsophalangeal joints. (Figs.1 A – F) The lesion measured 8.0cm length, 2.8cm in depth and 3.1cm in width. The lesion coursed distally between the first and second metatarsals. Following the MRI the patient was scheduled for surgical removal of the mass in her left foot. (Figs.2 and 3) Initial histological report suggested neurofibromatosis but further analysis determined the lesion was a schwannoma with no evidence of sarcomatous transformation. The patient's swelling was resolved within several weeks but she continued to complain of numbness between the first and second metatarsals. This was an ongoing complaint up to 5 months post-operatively. At that time she was told that she may have some permanent numbness, which is not uncommon for a lesion of this size and in this area.

Discussion

Schwannomas are derived from Schwann cells of the neuroectoderm. Their function is to form the myelin sheath of nerves in the peripheral nervous system, which insulates the nerve and facilitates the transmission of an impulse. Also categorized with a neurinoma, neurilemma, or neurofibroma, the schwannoma is a benign encapsulated slow growing tumor.^{12,13} Unlike neurofibromas, schwannomas do not traverse through the nerve but remain in the sheath lying on top of the nerve. They have a low risk of metastasizing and do not usually present with underlying systemic disease, such as neurofibromatosis. Schwannomas were found to have some transmission types that were autosomal dominant.¹³ As mentioned previously, schwannomas are most common in patients in the second through the fifth decades of life and have no gender or racial predilection.¹² Their size ranges from about 2-20cm in diameter with the smaller tumors appearing white, fusiform, round and firm. The larger tumors are usually irregular, lobulated and grey or yellowish white.⁹

Schwannomas can present with no symptoms, mild symptoms or severe symptoms mostly affecting the nerves. The first case of a solitary neurilemma was discussed by Liebau, who stated that schwannomas should be looked for in all cases where patients present with pain, paresthesia of leg and foot, especially if all other injury has been excluded.¹⁴ Much like the case presented above, research agrees that most patients present after a long delay with complaints of an isolated superficial palpable mass.¹⁵ The tumor was encompassing the plantar aspect of the patient's foot in this case and her main symptoms were swollen foot which induced pain when wearing shoe gear. Schwannomas can also appear throughout the body usually extracranial, but also found in the pelvis, upper and lower extremity. Schwannomas are commonly found on the flexor surface most likely because nerves trunks are generally larger at this aspect.^{1,16} Persing, et al., discussed how a proximal invasion of this tumor at the sciatic nerve caused tarsal tunnel like symptoms.¹⁸

He spoke of how his patient had an unsuccessful tarsal tunnel release then later removal of the schwannoma from the sciatic nerve alleviated all symptoms in the foot.¹⁷ A similar study by Gominak presents a case in which the posterior tibial nerve was thought to be compressed by the flexor retinaculum.¹⁶ Release of the retinaculum was performed ineffectively. It was later determined that the patient had a thigh schwannoma which, when resected, alleviated all lower extremity symptoms. Therefore when a patient presents with pain in the foot and ankle a more proximal tumor should be investigated if symptoms persist after failed treatment. Nerve sheath tumors are usually initially recognized by MRI. They have an intermediate to moderately bright signal on T1-weighted images, and a bright, heterogeneous signal on T2-weighted images.¹² MRI is useful in identifying the exact location and size of the tumor. However, it is impossible to actually diagnose a schwannoma utilizing MRI alone. The tumor must be surgically excised and sent for pathological evaluation. The pathology report will give the definitive diagnosis of schwannoma and establish whether the lesion is benign or malignant. After surgery symptoms should subside but the patient may continue to have paraesthesia, as the above patient. Motor and sensory abnormalities usually return to normal if the schwannoma is found and resected promptly following initial finding. When they are resected the function of the nerve should not be compromised.¹³ With most surgical procedures patients are warned of risk of nerve damage, we must especially warn them of an increase in this risk with surgical excision of a schwannoma. The patient in this case study endured several months of post operative numbness. She has been followed since then and relates no symptoms at this time.

In conclusion, schwannomas are rare solitary nerve sheath tumors. They should always be considered as a differential diagnosis when tarsal tunnel syndrome, neuromas, nerve entrapment or radiculopathy¹⁸ is suspected. Schwannomas found in the proximal aspect of the lower extremity can also cause distal symptoms or injury, so this must also be considered, especially if the previous differentials have been ruled out. Early diagnosis can prevent permanent nerve damage, soft tissue or bony deformity.

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