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Schwannoma causing chronic medial calf pain in a recreational skiing and running athlete: a case report

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Background: *Soft tissue masses in the extremities of athletes present commonly in clinical practice. Clinicians focusing on musculoskeletal care will be familiar with common causes such as myofascial trigger points, hematomas and even lipomas, but may overlook less common causes such as benign or metastatic tumours. This paper describes a case of a schwannoma, a benign nerve tumour.*

Case Presentation: *A 28-year-old recreational athlete presented with a five-year history of progressive calf pain and a palpable nodule unresponsive to conservative care. Imaging revealed a well-circumscribed intramuscular mass with vascular features. Surgical excision and histopathology confirmed a schwannoma. Postoperatively, the patient returned to full activity with resolution of pain.*

Un schwannome causant des douleurs chroniques au mollet médial chez un athlète de ski et de course récréatif : un rapport de cas

Context: *Les masses de tissus mous dans les extrémités des athlètes se présentent couramment dans la pratique clinique. Les cliniciens se concentrant sur les soins musculosquelettiques seront familiers avec des causes courantes comme les points de déclenchement myofasciaux, les hématomes et même les lipomes, mais peuvent négliger des causes moins courantes comme les tumeurs bénignes ou métastatiques. Ce document décrit un cas de schwannome, une tumeur nerveuse bénigne.*

Présentation de cas: *Un athlète récréatif de 28 ans s'est présenté avec un antécédent de cinq ans de douleur progressive au mollet et un nodule palpable non réactif aux soins conservateurs. Les examens d'imagerie ont révélé une masse intramusculaire bien circonscrite avec des caractéristiques vasculaires. L'excision chirurgicale et l'histopathologie ont confirmé un schwannome. Après l'opération, le patient est revenu à une activité normale avec une résolution de la douleur.*

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Summary: *This case underscores the necessity of maintaining a broad differential and reinforces the importance of reevaluating diagnoses when conservative interventions fail. Early recognition and referral for imaging are critical to avoid prolonged mismanagement.*

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KEY WORDS: athletic injuries, chronic leg pain, intramuscular mass, peripheral nerve sheath tumor, schwannoma, soft tissue mass

Résumé: *Ce cas souligne la nécessité de maintenir un large éventail de diagnostics différentiels et renforce l'importance de réévaluer les diagnostics lorsque les interventions conservatrices échouent. La reconnaissance précoce et la référence pour l'imagerie sont essentielles pour éviter une mauvaise gestion prolongée.*

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MOTS CLÉS: lésions athlétiques, douleur chronique à la jambe, masse intramusculaire, tumeur de la gaine nerveuse périphérique, schwannome, masse de tissus mous

Introduction

Athletes frequently report leg pain, with causes ranging from sprains, strains, contusions and myofascial pain to less common but potentially more serious conditions such as blood clots or soft tissue tumours.[1] While acute injuries are often easily recognized and addressed, chronic or slowly progressing abnormalities, especially those that are initially asymptomatic, may go unnoticed.[2,3] Among these less obvious conditions are benign soft tissue masses such as schwannomas and neurofibromas.[2] These growths are typically painless until they enlarge to the point of compressing nearby structures or are subjected to regular external pressure, such as from tight clothing or athletic gear.[4]

Schwannomas are benign, encapsulated tumors arising from Schwann cells, which create the myelin sheaths around peripheral nerves. Although they can occur anywhere in the body, they are relatively rare and often slow-growing.[5] Symptoms, when present, are usually related to compression of the associated nerve, leading to localized discomfort, numbness, or functional impairment.[6] Schwannomas are often differentially diagnosed against neurofibromas, the most common type of peripheral nerve sheath tumor, due to the similarities in their pathology and clinical presentation.[7]

It is the clinical experience of the authors, and colleagues around them, that small nodules are commonly palpated during the course of assessment and diagnosis of patients and athletes. Some differentials may include lipomas, fibrolipomas, neurofibromas, schwannomas, arteriovenous malformations, myositis ossificans or small calcifications. The purpose of this case report is to remind manual therapists to be aware of and consider less common differential diagnoses before dismissing masses as inconsequential. This is especially true if the mass becomes symptomatic or does not respond to treatment as expected.

Case Presentation

In-office assessment

A 28-year-old female recreational skier presented to the clinic for a second opinion on her chronic calf tension with a "tight band/nodule" and intermittent shooting pain that began around five years prior but had been worsening over the last one to two years. This athlete reported having seen various other healthcare providers for treatment which produced temporary improvement in perceived calf 'tightness' without changes to size or sensitivity of the nodule. Prior treatment included soft tissue massage, intramuscular stimulation (IMS) needling, shockwave therapy, strength training, load management and stretching. At the point where the athlete presented to the office, she noted that she was no longer able to run and jump due to pain and skiing was very uncomfortable.

During the initial examination, a firm, ovoid nodule was identified in the medial proximal aspect of the gastrocnemius. Palpation of the nodule was intensely painful to the patient. The pain was reported as sharp and shooting with pain referring into the medial arch of the foot. Palpation of the deep calf musculature surrounding the nodule was non-painful.

Resisted muscle testing of the quadriceps, hamstrings, gastrocnemius, soleus, tibialis anterior and extensor hallucis longus was full, equal and painless bilaterally. No neurologic deficits were present. Crude touch was intact and symmetric bilaterally throughout the L4 – S1 dermatomes and deep tendon reflexes of the patella and Achilles were graded +2 and equal bilaterally. Based on the reported failure to improve from past treatments and the progressive worsening of symptoms, she was referred to her primary care physician for a second opinion and received a requisition for ultrasound imaging, to assist in establishing a working diagnosis.

Imaging

Ultrasound imaging was performed on the right upper medial calf. The report noted a "smooth contoured, well-circumscribed, heterogeneous isoechoic soft tissue lesion confined within the intramuscular compartment. It measures 3.8 x 2.6 x 1.9 cm and has intrinsic vascularity but no discrete calcifications or cystic components. Posterior acoustic enhancement is not seen. No surrounding inflammatory changes are apparent."

The report stated "The well-circumscribed lesion … probably represents an intramuscular fibrolipoma. It does not have the typical characteristics of an intramuscular myxoma. A local soft tissue sarcoma is considered less probable from the provided history. Elective MRI may be considered for further characterisation of the lesion, together with a surgical opinion from a sarcoma specialist." The athlete was scheduled for the initial appointment with an orthopedic surgeon that specializes in soft tissue tumours prior to acquiring the MRI imaging. At that appointment, the surgeon's working diagnosis was an arteriovenous malformation, however wanted the MRI imaging to confirm.

Two weeks later, a multiplanar non-contrast MRI was performed with fiducial markers. Within the medial head of the gastrocnemius a 4.7 x 2.2 x 2.2 cm well-cir-

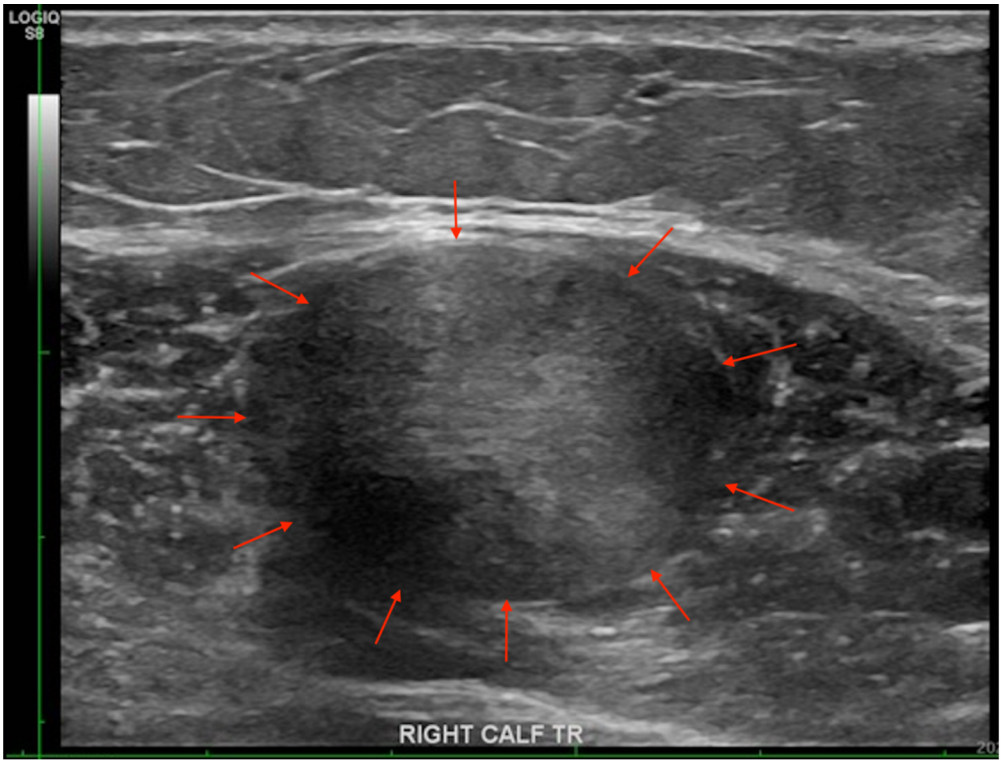

Figure 1.
Ultrasound image showing a well-circumscribed soft tissue nodule, clearly distinct from surrounding gastrocnemius muscle.

cumscribed ovoid lesion was visualized, demonstrating high signal on fluid sensitive sequences with no internal fat signal seen. Trace surrounding muscular edema was noted. The impressions noted "a peripheral nerve sheath tumor would seem most likely", but stated the appearance was not pathognomonic.

A month after the MRI, a second consultation occurred with the specialist, and the diagnosis of a nerve sheath tumor was finalized. Surgical excision was recommended considering the limitations to the patient's activities and quality of life. Based on the location of the lesion, off of an intramuscular branch in the medial gastrocnemius, the risk of secondary neurologic deficit or muscular atrophy was low. As this case was non-malignant, it was deemed non-emergent, resulting in a six month wait.

Surgical intervention

The tumour was surgically removed without complication and histopathological analysis confirmed the diagnosis of schwannoma. At the post operative check-up, the patient demonstrated loss of sensation to light touch over the right medial calf in the saphenous distribution but full function and no significant loss of strength in the gastrocnemius. The athlete was cleared to return to activity at her 6 week follow up with the surgeon. In this case, the athlete did not need any post-surgical rehabilitation program as their function was sufficient for them to return to activities of daily living and required only guidance on returning to sport as tolerated. By 16 weeks post-surgery, she was able to run 5km pain free and had returned to skiing with no reported deficits.

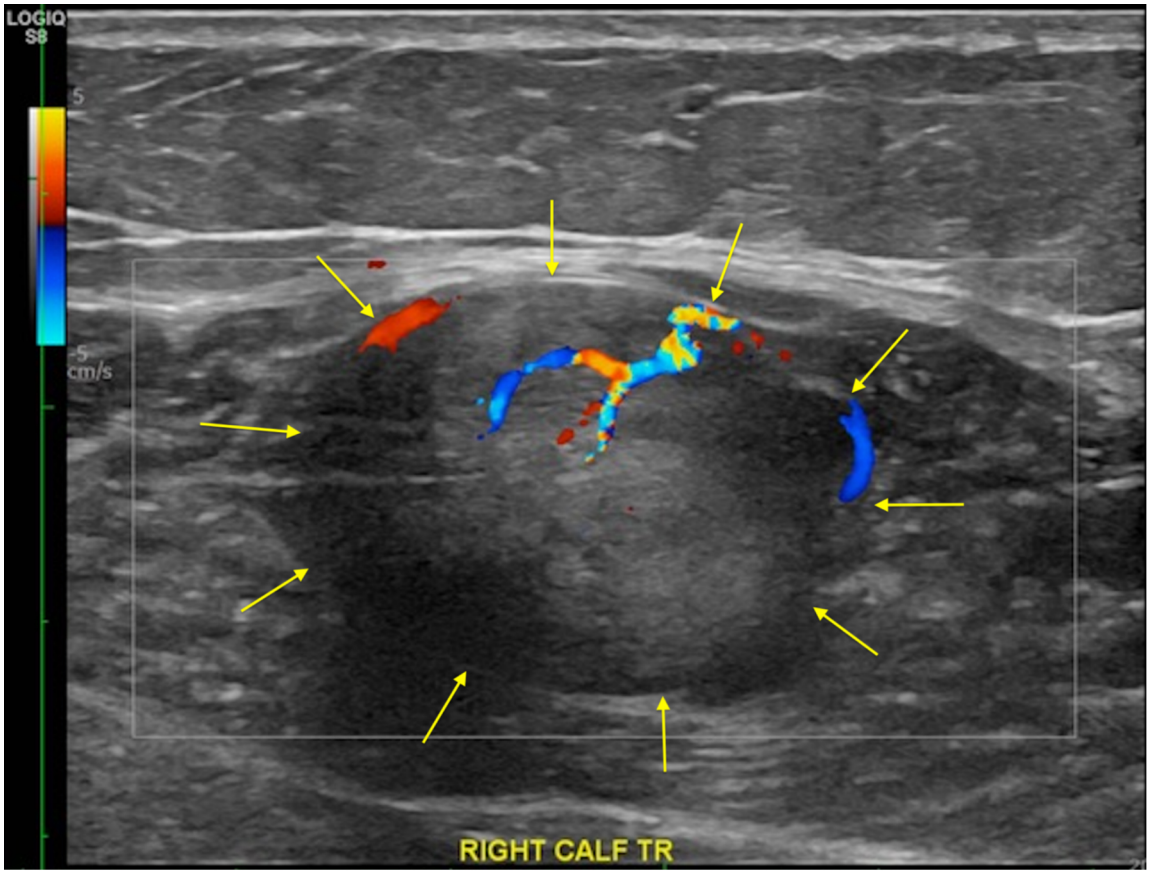

Figure 2.
Doppler Ultrasound image showing internal vascularity of the lesion, which prompted the working diagnosis of an arteriovenous malformation prior to MRI imaging.

Discussion

Posterior leg pain is common amongst athletes; however, it is often associated with conditions that do not commonly present as a palpable mass.[1] This case demonstrated the challenges of diagnosing less common causes of painful intramuscular nodules since atypical symptoms were repeatedly managed within the narrow framework of common musculoskeletal conditions, delaying appropriate diagnosis and intervention. When initial conservative management fails to yield lasting improvement, providers need to consider alternative diagnoses and refer for advanced imaging or specialist consultation.

Peripheral nerve sheath tumors, including neurofibromas and schwannomas, typically present as well-circumscribed, slow-growing soft tissue masses that may be associated with localized pain, paresthesia or motor deficits, depending on their anatomical relationship to the involved nerve.[8, 9] While they are more commonly found in the head, neck and upper extremities they can also occur in the lower limb, particularly along major nerve trunks such as the tibial or fibular nerves.[10] Schwannomas are the most common benign peripheral nerve sheath tumour, accounting for approximately 5% of all soft tissue tumours.[8,10] When left untreated, these tumors may continue to grow, leading to progressive nerve compression and resulting in neuropathic symptoms, including chronic pain, paresthesia, and motor dysfunction.[8] Thankfully, malignant transformation is low, estimated to be less than 1%.[8] Regardless, misdiagnosis or mismanagement can carry significant risk, especially if therapeutic modalities pose a risk of further injury or aggravation.

In this case, the intramuscular location of the nodule increased the difficulty of the diagnosis. Active Release Technique (ART) and Graston technique (instrument assisted soft tissue therapy) as well as acupuncture and intramuscular stimulation (IMS) needling were attempted as treatments from prior practitioners. ART and Graston techniques apply physical pressure, localized tension, sometimes vigorous, with the intent to break down or soften soft tissue adhesions or muscular tightness. If these forces are mistakenly applied to a tumour such as a schwannoma, such manipulations may lead to localized inflammation, nerve irritation, or even iatrogenic trauma.[11] Intramuscular Stimulation (IMS) and acupuncture, which involve needle insertion into muscular or fascial structures, pose a unique risk if a tumor is present but undiagnosed. Deep needling near a peripheral nerve can cause direct trauma to the nerve or tumor capsule, leading to hemorrhage, increased pain, or paresthesia.[12] Additionally, a study by Domingo *et al*.[13] showed that intramuscular nerves in a healthy mouse specimen underwent Wallerian degeneration following repeated application of dry needling.

When the athlete was asked about each individual modality, they noted that they were all much more sore than her previous experiences with these therapies and often caused post treatment soreness for multiple days. ART was the least painful and felt generally good in the surrounding musculature, but did not change the area of complaint. Dry needling was the most painful, with the athlete reporting it felt like the muscle was ripping off the attachment and extreme sharp pain would refer into to her foot.

In this case, the schwannoma was initially misdiagnosed as both a myofascial trigger point and as a lipoma. Trigger points are classified as either active or latent, with active MTrPs being spontaneously painful and often reproduce a patient's familiar pain pattern upon palpation. In contrast, latent MTrPs are not painful unless compressed, at which point they may elicit localized or referred pain.[14, 15] Lipomas typically present as soft, mobile and painless subcutaneous nodules, often identified by a characteristic "slippage sign" on palpation.[16] Although extremely rare and not considered in this case, intramuscular Baker's cyst have been reported with a few case studies including gastrocnemius and vastus lateralis locations.[17, 18]

As healthcare providers, it is important to recognize when conservative treatment has been unsuccessful and follow ideal referral pathways. In this case, the ideal referral was delayed for several years until the athlete's activities were significantly limited. Ideally, this case would have been referred after the first or second failed trial of conservative care. While ultrasound is very useful and typically more timely, MRI is the imaging modality of choice to assess soft tissue tumours.[19] Typical treatment involves surgical excision, particularly for symptomatic lesions. In the current case, the lesion's intramuscular location, firm consistency, and intrinsic vascularity raised suspicion for a peripheral nerve sheath tumor. Although imaging findings supported the consideration of this diagnosis, the absence of classic radiologic signs such as target sign, eccentric location on the nerve or well-estab-

lished encapsulation and the lack of definitive neurologic symptoms made it difficult to conclusively differentiate between schwannoma and neurofibroma. Preoperative diagnosis is often difficult, therefore final diagnosis was dependent on histopathological evaluation following surgical excision.

Limitations

This case report represents the management of a single patient with their own unique health history. Conclusions cannot be drawn relating to treatments or management recommendations for the broader population or other cases of schwannomas. The authors also recognize that our clinical biases and opinions influenced our writing and earnest recommendations for referral and consideration of non-MSK conditions.

Summary

This case highlights the importance of staying aware of and vigilant for the possibility of less common differentials in otherwise familiar presentations such as soft tissue nodules in musculoskeletal care. While posterior leg pain in athletes is often attributed to common overuse injuries, persistent symptoms and non-responsiveness to conservative management must prompt a re-evaluation of the working diagnosis. The failure to consider rare but significant pathologies, such as intramuscular schwannomas, can lead to years of mismanagement and patient distress. Clinicians must maintain diagnostic vigilance and be prepared to escalate investigations when presentations deviate from expected clinical patterns, ensuring that uncommon but clinically relevant conditions are not overlooked.

References

1. Brewer RB, Gregory AJ. Chronic lower leg pain in athletes: a guide for the differential diagnosis, evaluation, and treatment. Sports Health. 2012; 4(2): 121–127. https://doi.org/10.1177/1941738111426115
2. Devilbiss Z, Hess M, Ho GWK. Myositis ossificans in sport: a review. Curr Sports Med Rep. 2018; 17(9): 290–295. https://doi.org/10.1249/JSR.0000000000000527
3. Elghoul, N., Zaddoug, O., Tbouda, M., Benchakroun, M., & Jaafar, A. Unusual Etiology of Chronic Posterior Leg Pain in a Running Athlete: Could It Be a Schwannoma? A Case Report and Review of the Literature. Case reports in orthopedics, 2019; 2307153. https://doi.org/10.1155/2019/2307153
4. Erickson, B. J., Chalmers, P. N., & Bush-Joseph, C. A. The evaluation of leg pain in athletes. Journal of the American Academy of Orthopaedic Surgeons. 2012; 20(8), 477–486. https://doi.org/10.5435/JAAOS-20-08-477
5. Knight, D. M., Birch, R., & Pringle, J. Benign solitary schwannomas: a review of 234 cases. The Journal of Bone and Joint Surgery. British Volume. 2007; 89(3), 382–387. https://doi.org/10.1302/0301-620X.89B3.18402
6. Gosk, J., Gutkowska, O., Urban, M., Wnukiewicz, W., Reichert, P., & Ziółkowski, P. Results of surgical treatment of schwannomas arising from extremities. BioMed research international. 2015; 547926. https://doi.org/10.1155/2015/547926
7. Ferner, R. E., & O'Doherty, M. J. Neurofibroma and schwannoma. Current opinion in neurology. 2002; 15(6), 679–684. https://doi.org/10.1097/01.wco.0000044763.39452.aa
8. Pilavaki, M., Chourmouzi, D., Kiziridou, A., Skordalaki, A., Zarampoukas, T., & Drevelengas, A. Imaging of peripheral nerve sheath tumors with pathologic correlation: Pictorial review. European Journal of Radiology. 2004; 52(3), 229–239. https://doi.org/10.1016/j.ejrad.2003.12.006
9. Beaman, F. D., et al. Schwannoma: radiologic-pathologic correlation. Radiographics. 2004; 24(5), 1477–1491.
10. Adani, R., Baccarani, A., Guidi, E., Tarallo, L., & Marcuzzi, A. Schwannomas of the upper extremity: Diagnosis and treatment. Acta Neurochirurgica. 2012; 154(5), 929–934. https://doi.org/10.1007/s00701-012-1272-7
11. Reynolds, J. M., & Dillingham, T. R. Iatrogenic peripheral nerve injuries: Prevention, recognition, and management. Physical Medicine and Rehabilitation Clinics of North America. 2018; 29(1), 65–77. https://doi.org/10.1016/j.pmr.2017.08.003
12. Wang, Y., Qian, J., & Wu, X. Peripheral nerve injury caused by acupuncture: A systematic review. Acupuncture in Medicine. 2013; 31(1), 17–23. https://doi.org/10.1136/acupmed-2012-010217
13. Domingo, A., Mayoral, O., Monterde, S., & Santafé, M. M. Neuromuscular damage and repair after dry needling in mice. Evidence-based complementary and alternative medicine : eCAM. 2013; 260806. https://doi.org/10.1155/2013/260806
14. Simons, D. G. Review of enigmatic MTrPs as a common cause of enigmatic musculoskeletal pain and dysfunction. Journal of Electromyography and Kinesiology. 2004; 14(1), 95–107. https://doi.org/10.1016/j.jelekin.2003.09.018
15. Simons, D. G., Travell, J. G., & Simons, L. S. Myofascial Pain and Dysfunction: The Trigger Point Manual. Vol. 1. Lippincott Williams & Wilkins. 1999.

16. Calonje, E., & Brenn, T. McKee's Pathology of the Skin: With Clinical Correlations. 4th ed. Elsevier Saunders. 2011.
17. Fang, C.S.J., McCarthy, C.L. & McNally, E.G. Intramuscular dissection of Baker's cysts: report on three cases. Skeletal Radiol. 2004; 33, 367–371 https://doi.org/10.1007/s00256-004-0756-z
18. Kim TW, Suh JT, Son SM, Moon TY, Lee IS, Choi KU, Kim JI. Baker's Cyst with Intramuscular Extension into Vastus Medialis Muscle. Knee Surg Relat Res. 2012; 24(4):249-53. doi: 10.5792/ksrr.2012.24.4.249.
19. Maroldi, R., & Farina, D. Imaging of soft tissue tumors. In: Imaging in Treatment Planning for Sinonasal Diseases. European Journal of Radiology. 2006; 66, 173–183. Springer. https://doi.org/10.1007/3-540-31720-8_10