

Saphenous neuropathy in a string musician

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Abstract

Instrumental musicians are prone to numerous musculoskeletal issues due to the asymmetric posture and repetitive movements maintained through long periods of practice. In this case report, the authors present an 18-year-old female cello player who complained of neuropathic pain in her left lower extremity from the medial aspect of her knee down to the medial malleolus. The symptoms were worsened by playing the cello and had become distressing enough to discourage further practice. She had initially been misdiagnosed with a medial meniscus tear and presented to our clinic with an extensive workup that included unremarkable labs and imaging studies. Physical exam showed tenderness to palpation over the exit point of the saphenous nerve at the subsartorial canal and saphenous nerve stretch test recreated the patient's paresthesia. The diagnosis of saphenous neuropathy was confirmed with an ultrasound-guided nerve block. A conservative rehabilitation regimen led to complete resolution of symptoms within eight weeks. This case elucidates the importance of a proper physical exam and an awareness of the less-common causes of lower extremity pain to avoid unnecessary diagnostic tests and to expedite return to play for the musician.

Keywords

Saphenous nerve; Peripheral neuropathy; Cello.

Abbreviations

MRI: Magnetic Resonance Imaging; OMT: Osteopathic Manipulative Techniques.

Introduction

The saphenous nerve is the largest cutaneous branch of the femoral nerve with roots at the L3-L4 level [1]. It travels with the femoral artery and deep femoral vein down the medial thigh before exiting at the subsartorial canal (a.k.a. Hunter's canal or adductor canal) and continuing its course alongside the saphenous vein [2]. The nerve is commonly compressed or damaged at the subsartorial canal due to its sharp angulation and superficial position [3,4]. The saphenous nerve provides purely sensory innervation to the

medial aspect of the lower extremities, so neuropathy does not result in loss of motor function [1-3]. The infrapatellar branch of the saphenous nerve provides innervation to the prepatellar skin and, when damaged, can often be misdiagnosed as a more common disorder such as a medial meniscus or medial ligament injury [4-7]. This issue is often encountered in patients who have had knee surgery, since intra-operative damage to the infrapatellar branch of the saphenous nerve is relatively common and can make post-operative knee pain difficult to properly diagnose and manage [7-9]. Irritation or damage to the saphenous nerve at any point along its course can lead to unpleasant sensations such as paresthesia, hypoesthesia, hyperalgesia, and allodynia. While isolated injury to the saphenous nerve should not result in motor dysfunction, neuropathy can lead to distressing symptoms that affect an individual's daily activities.

In this case report, we present a patient with saphenous neuropathy who was misdiagnosed with a medial meniscus tear. This resulted in a workup that was unnecessary, expensive, and drastically prolonged the patient's return to play time. This case will highlight the importance of considering peripheral neuropathy higher in the differential when diagnosing lower extremity pain in certain populations and conducting a thorough and appropriate physical exam.

Case Report

An 18-year-old female cello player with no relevant past medical or surgical history presented to her primary care physician complaining of one year of worsening pain and paresthesia starting from a point roughly four centimeters above the medial aspect of her left knee and radiating down to her medial malleolus. She was a high school student who would practice the cello 3-4 hours per day and was about to begin college with the intention of becoming a professional musician. The neuropathic symptoms began gradually without any inciting event and were described as a "pins-and-needles" sensation with intermittent burning. The pain was most notable while playing the cello, which had begun to deter her from practice. She had initially seen a nurse practitioner several months earlier who had diagnosed her with a medial meniscus tear, ordered plain radiographs followed by magnetic resonance imaging (MRI) of the left knee and referred her to orthopedic surgery. The radiographs and MRI were read by both a radiologist and the orthopedic surgeon as being normal, so the surgeon advised her to return to her primary care provider for further treatment and follow up.

On our exam, the patient had a body mass index of 18.9 kg/m² with a height of 5'10" and a body weight of 132 lbs. The bilateral lower extremities had full active/passive range of motion, full strength, full sensation, and normal reflexes. The straight leg test, crossed straight leg test, and femoral nerve stretch test were all negative for lumbosacral radiculopathy. All relevant knee and hip exam techniques were also negative, including the knee varus/valgus stress test, the McMurray test, the Thessaly test, the knee anterior/posterior drawer test, the hip log roll, the Scour test, and the FABER/FADIR tests. However, deep palpation over the subsartorial canal, roughly four centimeters proximal to the medial femoral condyle, elicited pain and paresthesia at the medial knee down to the medial malleolus. The nerve stretch test targeted toward the saphenous nerve (left hip extension and abduction with the knee in flexion) elicited similar positive symptoms as above. Lastly, the Thomas test was positive for shortening of the hip flexors bilaterally, with

greater severity on the left. Laboratory studies included a complete metabolic panel, complete blood count, vitamin B12 level, folate level, and hemoglobin A1c, all of which were within normal limits. An ultrasound-guided nerve block of the saphenous nerve using 1% lidocaine administered over the subsartorial canal provided immediate relief of symptoms. The patient’s clinical history, physical exam, imaging results, and the effects of the nerve block were most consistent with a diagnosis of saphenous neuropathy.

Treatment was begun immediately with in-office Osteopathic Manipulative Techniques (OMT) and a conservative rehabilitation regimen (Table 1) involving physiotherapy, patient education, home stretches/exercises, and additional in-office OMT treatments. The goal of the physiotherapy and home exercise regimen was to improve the patient’s posture, strengthen core muscles, and stretch the shortened muscle fibers to relieve any existing nerve compression. Patient education included a lengthy discussion on the pathophysiology of neuropathy, particularly the mechanism of nerve compression by surrounding musculature. Moreover, we emphasized the importance of minimizing direct pressure on the saphenous nerve by the c-bout of the cello through use of a towel or similar soft appliance that was to be placed between the instrument and the patient’s left thigh.

The patient’s symptoms were significantly improved on four-week follow-up and completely resolved by the eight-week follow-up. She completed the one-month course of physiotherapy and continued with the daily home exercises and stretches up through the eight-week visit. Reexamination of the patient showed no tenderness to palpation over the subsartorial canal, a negative saphenous nerve stretch test, and improvement in the discrepancy of flexibility of the bilateral hip flexors.

Table 1: Conservative Intervention Program for Saphenous Neuropathy.

Osteopathic Manipulative Techniques	In-office treatment at 0-, 4-, and 8-week visits with various muscle energy and soft tissue techniques targeted toward the lumbar spine, pelvis, and thighs (e.g. lumbar soft tissue, lumbar walk around muscle energy, hamstring tension muscle energy, rectus femoris muscle energy with patient prone).
Patient and Family Education	Explanation of neuropathy pathophysiology and prevention strategies (e.g., placing soft appliance between c-bout of cello and the patient’s left thigh), with emphasis on continuing home exercises and stretches to prevent recurrence and progression.
Physiotherapy	Four total therapy sessions over one month consisting of manual intervention (active release techniques and post-isometric relaxation applied to hip flexors and the sacroiliac complex) and home exercise prescription.
Home Stretches and Exercises	General exercises and stretches targeted toward the core muscles, with the goal of mobilization and strengthening the lower back and pelvis and improving posture.

Discussion

While saphenous neuropathy does not cause motor deficits due to the purely sensory function of the nerve, it can be distressing and is often confused for more common disorders affecting the lower extremities. In many cases including the one presented above, these would be medial meniscus or ligament injuries, leading to a more extensive and costly workup with additional imaging, labs, and surgical referral. Given that musicians are prone to neuropathic disorders because of their long practice hours in distorted body positions, it is important to consider peripheral neuropathy on the differential in order to reach the correct diagnosis and promptly begin appropriate treatment [10]. In our case, conservative management was sufficient in quickly relieving symptoms likely because of the patient’s young age and favorable health status. We believe that her low BMI made her susceptible to nerve compression and irritation from an

external source, such as from the c-bout of her cello, along with concurrent muscular compression that typically comes from the flexed position seen in cello players, which allowed for successful correction when the shortened/tight musculature was stretched through physiotherapy, OMT and home exercises.

However, in the general population, neuropathic pain can be due to other etiologies such as uncontrolled diabetes, toxic insult (e.g., chemotherapy), metabolic abnormalities, or autoimmune disease [11-13]. Conservative measures with physiotherapy, exercise, and lifestyle changes are the preferred initial approach, since factors such as a diet high in inflammatory foods, prolonged maintenance of an asymmetric posture leading to tightening of musculature, and external compression are major culprits in the development of neuropathic pain [11-14]. First-line medical management includes gabapentin, pregabalin, tricyclic antidepressants, and serotonin-norepinephrine reuptake inhibitors [11,14]. In the case of toxic or diabetic neuropathy, supplementation with alpha-lipoic acid and acetyl-L carnitine has also shown favorable outcomes [14]. Further treatment options include topical applications (e.g. lidocaine or capsaicin), local steroid/lidocaine injections, interventional neurological procedures (chemical/magnetic/electrical neuromodulation of the spinal cord, brain, or peripheral nervous system), or surgical intervention [14,15]. Certain medications with alternative indications have also been shown to improve neuropathic pain (e.g. botulinum toxin, oxcarbazepine, topiramate, phenytoin) and there are numerous experimental drugs in development, including various subtype-selective sodium channel blockers, angiotensin type II antagonists, and nerve growth factor antagonists [14-16]. However, appropriate treatment must be tailored to the individual after reaching the correct diagnosis, which is best obtained through a comprehensive history and physical exam. Despite the relative infrequency of saphenous neuropathy as a cause of medial knee and lower extremity pain, it is important for clinicians to consider this etiology in their differential.

Conclusion

We present a case of saphenous neuropathy that was misdiagnosed as a medial meniscus tear, leading to unnecessary imaging and delayed treatment. Peripheral neuropathy should be high on the differential of every clinician who is caring for a musician, as this population is more susceptible due to the repetitive movements and asymmetric postures maintained throughout practice. Conservative management should be initiated immediately to shorten return to play time.

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