Case Report

BJMP 2011;4(3):a431

Painful legs and moving toes – Case report and Review of literature

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ABSTRACT

Objective: Painful legs and moving toes (PLMT) is a syndrome consisting of pain in the lower legs with involuntary movements of the toes or feet. Its incidence and prevalence remain largely unknown since it is still a relatively rare disorder. We are reporting a case of PLMT along with the first review of literature on all previously reported cases and a discussion on its clinical management.

Methods: A review of published literature on PLMT was done using MEDLINE and PubMed databases. Searches were conducted to find articles from 1971 – 2010. Medical subject headings used to search the databases included PLMT with subheadings of painful legs/moving toes, electromyography, polysomnography, as well as keyword search using "PLMT". Single author reviewed titles and abstracts of potentially relevant articles.

Results: We reviewed approximately 19 PLMT articles that have been published to date, with a total of 72 patients: 30.5% males and 69.5% females (median age 55 & 64 yrs, respectively). The most common predisposing conditions were neuropathy and radiculopathy. Numerous treatments including antiepileptics, benzodiazepines, antispasmodic agents, and antidepressants have been tried with little success. GABAergic agents such as gabapentin and pregabalin were the most effective in attenuating the pain and the movements, possibly via both central and peripheral mechanisms.

Conclusion: Physicians should be aware of this rare debilitating condition. Though much progress has been made in elucidating its etiology, the exact mechanism still remains a mystery. It is important to consider PLMT in a patient with painful legs and/or restless leg syndrome without any significant history of neurological disease or trauma. Diagnosis is essentially clinical and treatment is complex, which includes different combinations of medications and invasive techniques that generally produce a poor outcome.

KEYWORDS

Painful legs, Moving toes, GABA agonists, Peripheral Neuropathy

Introduction

First described in 1971 by Spillane et al.[1], painful legs and moving toes (PLMT) is a syndrome consisting of pain in lower legs with involuntary movements of the toes or feet. Pain varies from moderate discomfort to diffuse and deep and usually precedes movements by days to years. The movements themselves are often irregular and range from flexion/extension, abduction/adduction to clawing/straightening and fanning/ circular movements of the toes.[1,2] This syndrome may affect one leg or spread to involve both legs.[3]

PMLT incidence and prevalence remain largely unknown since it is still a relatively rare disorder worldwide. Age of onset is between the second and seventh decades of life. It has been postulated that lesions of the peripheral or central nervous system after nerve or tissue damage might lead to impulse generation that subsequently causes the symptoms seen in PLMT.[4] We report a case of PMLT that presented to our Neurology Movement Disorder Clinic along with a discussion on the pathophysiology, differential diagnosis and clinical management of this rare debilitating condition.

Case report

63 year old, morbidly obese (BMI 41.7) Caucasian male patient with past medical history of stroke 10 years ago, on long term anticoagulation, hypertension, type II controlled diabetes mellitus, asbestos exposure, bilateral hip and knee osteoarthritis, left total knee replacement 2 years ago, and non-traumatic ruptured Achilles tendon; presented with complaints of involuntary movements in both legs over the last 8-10 years.

He had unprovoked flexion and extension of the toes along with feet movement at all times with no diurnal variation. He admitted to having a constant severe pain described as 'twisting a rubber band' with 10/10 intensity that radiated up to his calf accompanied by numbness and dorsal swelling of both feet for many months. He claimed to have partial relief whilst walking but had difficulty walking without a cane as he '"could not balance with constantly moving [his] feet"'. Tylenol 500mg as required and amitriptyline 20mg at night prescribed by his primary care physician provided no relief. He also has a history of snoring, daytime fatigue, and non-restorative sleep with frequent nocturnal awakenings due to bilateral feet pain. He recalled having a stroke with transient confusion and focal hand weakness along with visual problems about 10 years previously. All laboratory and radiological investigations were negative and he recovered fully. He had previously served with the US armed forces and had been exposed to 'Agent Orange' in Vietnam.

He had no medical allergies and his current medications include amitriptyline 25mg at night, hydrochlorothiazide 25mg once daily, lisinopril 10mg once daily, loradatine 10mg once daily, metoprolol tartrate 20mg twice daily, simvastatin 20mg once

daily, vitamin B complex one tablet once daily and warfarin once daily. He denied any history of alcohol, tobacco, or recreational drug abuse in the past. His mother had a history of hypertension and chronic low back pain; no members of his family had any neurological or movement disorders.

Physical examination revealed an alert, awake, and well oriented male with bilateral lower extremity varicose veins. He was observed to have semi-rhythmic flexion-extension and occasionally abduction movements of the phalanges, especially in the great toes. There was a profound decrease in vibration sense below both knees and it was almost absent on both feet, decreased reflexes in both feet, and absent proprioception in the phalangeal joints. He was also observed to have decreased pinprick and monofilament sensation in both legs below the knee. Bilateral ankle reflexes were diminished with negative Babinski sign. Both lower extremity dorsalis pedis and posterior tibial pulsations were palpable. He did not have any cerebellar signs. He did have pitting oedema up to his shins in both lower extremities, extending from his feet to upper one third of the legs. There were no abnormalities noted on the bilateral lower extremity EMG and there was no electrodiagnostic evidence of large-fiber neuropathy.

He was diagnosed with painful legs and moving toes syndrome and started on a trial of gabapentin 300mg at night. He was advised to increase it to 1200mg and to continue taking his amitriptyline 25mg at night. Scheduled MRI of the brain could not be done due to his morbid obesity. He was arranged follow up in three months in the clinic.

Methods

A review of published literature on PLMT was done using MEDLINE and PubMed databases. Searches were conducted to find articles from 1971 – 2010. Medical subject headings used to search the databases included PLMT with subheadings of Movement disorder, Electromyography, and Polysomnography as well as keyword search using 'PLMT". Single author reviewed titles and abstracts of potentially relevant articles.

Review of current literature

We reviewed approximately 19 PLMT articles that have been published to date with a total of 72 patients: 30.5% males, 69.5% females (median age 55 & 64 years, respectively). Clinical presentations in the majority of the cases were burning pain in lower extremities and involuntary movements of the toes. The most common predisposing conditions were neuropathy and radiculopathy (see Table 1).

In 1981 Schott GD et al reported that in 3 PLMT patients the EMG revealed evidence of denervation in the affected muscles. Montagna et al of the University of Bologna, Italy reported 3 cases of PLMT that exhibited evidence of peripheral neuropathy on EMG. Polysomnography (PSG) studies on these patients showed reduced movements during sleep with increase in slow wave or rapid eye movement sleep.[5] This suggested the movements could have arisen centrally.

Guimaraes et al of the Universidade Nova Lisboa, Portugal reported one patient with a history of Hashimoto's disease whose lower extremity EMG showed spontaneous arrhythmic bursts of the affected muscles during wakefulness which disappeared during sleep[6]. Both suggested the movements could have arisen centrally.

Alvarez et al of the Mayo Clinic described 14 cases of PLMT in 2008 in which burning pain often preceded the movements. PSG studies confirmed these movements would also persist in light stages of sleep which pointed to a central origin.[7] Eisa et al of Yale University School of Medicine, Connecticut described 2 cases of PLMT in which one patient had a past history of lumbosacral root injury and the other systemic lupus erythematosus with peripheral neuropathy on EMG.[8] Interestingly, in the latter patient her pain occurred years after the onset of involuntary toe movements.[8]

Discussion

Spinal cord and cauda equina diseases, neuropathies, radiculopathies, drugs and other systemic diseases are the main cause of this syndrome although many cases are still idiopathic. The most common predisposing conditions were neuropathy (i.e. polyneuropathy from alcoholism, hypertrophic mononeuritis, or tarsal tunnel syndrome) and radiculopathy.[7] Other etiologies include nerve root lesions, peripheral nerve trauma, spinal ganglia lesions, cauda equina lesion, Wilson's disease, herpes zoster myelitis, HIV, neuroleptics, and chemotherapeutic agents.[9-19]

The involuntary movements appeared bilaterally in the toes in our patient, which suggests that central reorganization (especially in the spinal level) is the cause of PLMT. EMG and nerve conduction studies have proven helpful in demonstrating spontaneous arrhythmic bursts of affected muscles and underlying neuropathy in some patients. Although the exact mechanism remains elusive, it has been proposed that impulses generated in lesioned peripheral nerve, posterior nerve root/ganglion, or afferent fibers pass into the spinal cord - some to higher areas to cause pain, while others into the local interneuron and motor neurons to generate involuntary movements of the toes.[5]

In patients with clinical or electrophysiological evidence of peripheral nerve or root problem, these lesions can initiate or even alter afferent input to the spinal cord and cause subsequent central and efferent motor reorganization, which may explain the limited success these patients had with nerve blocks or lumbar sympathetic blockade.[2] Similarly, some have suggested that even though the radiation of pain following local trauma seemed to resemble causalgia,[20] there was a lack of hyperpathia and changes in the soft tissue, bones, and blood vessels as well

Table 1 - Painful Legs & Moving Toes Syndrome ~ Review of Literature (1971- 2010)

Author	Year	Sex/Subjects	Subject age	# of cases	Clinical presentation
Spillane et al	1971	M (4) F (2)	51, 52, 52, 53 66, 68	6	Burning/throbbing LE pain followed by writhing/clawing and flexion/extension movements of the toes
Dressler et al	1994	M (4) F (16)	28, 36, 54, 73 28-76	20	Pain in LE followed by involuntary flexion/extension and abducion/adduction of the toes
Shime et al	1998	F (1)	63	1	Involuntary flexion/extension of the toes bilaterally and aching/crampy pain in both feet
Schott et al	1981	M (1) F (4)	66 56, 57, 69, 77	5	Crushing pain in both feet followed by involuntary writhing and flexion/extension of the toes; burning pain in foot followed by writhing toe movements
Montagna et al	1983	M (1) F (2)	57 74, 76	3	Burning pain in one or both LE followed by involuntary flexion/extension, abduction/adduction, and fanning/clawing of the toes
Shime et al	1998	F (1)	63	1	Involuntary flexion/extension of the toes bilaterally and aching/crampy pain in both feet
Villarejo et al	2004	M (1)	66	1	Paresthesias/burning pain in both feet followed by involuntary flexion/extension and abduction/adduction of the toes
Aizawa et al	2007	F (1)	73	1	Tingling pain in both feet followed by involuntary abduction/adduction of the toes
Guimaraes et al	2007	M (1)	60	1	Wringing-like pain in in L foot and R leg followed by flexion/extension and abduction/adduction of the toes
Eisa et al	2008	M (1) F (1)	62 76	2	Burning pain in bilateral LE followed by semirhythmic flexsion/extension of the toes
Alvarez et al	2008	M (6) F (8)	25-84 (mean 69)	14	Burning pain of LE followed by involuntary flexion/extension, abduction/adduction, fanning, or clawing of the toes
Tan et al	1996	F (1)	57	1	Severe burning pain in both LE followed by involuntary flexion/extension and abduction of the toes
Dressler et al	1994	M (4) F (16)	28, 36, 54, 73 28-76	20	Pain in LE followed by involuntary flexion/extension and abducion/adduction of the toes
Yoon et al	2001	F (1)	56	1	Burning pain in R foot with flexion and lateral deviation of the toes
Miyakawa et al	2010	M (1) F (1)	36 26	2	Burning pain in R arm followed by involuntary flexion/extension of R thumb; pain in L leg accompanied by flexion/extension and abduction/adduction of L toes
Schoenen et al	1984	M (2) F (4)	49, 74 68, 69, 71, 80	6	Burning/aching pain in LE followed by involuntary flexion/extension and writhing of the toes
Sanders et al	1999	F (1)	76	1	Deep/throbbing pain in L leg followed by invloluntary flexion/extension and abduction/adduction of L toes
Ikeda et al	2004	F (1)	75	1	Involuntary flexion/extension of the toes bilaterally followed by pain in both legs
Kwon et al	2008	F (1)	75	1	Painless wriggling movements of the toes in both feet

Total Number of articles reviewed = 19
Total Number of Cases: Male = 22 (Median Age = 55 years); Female = 50 (Median Age = 64 years)
Author/Article References in chronological order (Top to below): 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 16, 17, 23, 24, 25, 29, 31, 32, 33

as a poor response to sympathetic blockade, thus making clinical features of PLMT inconsistent with known radicular disorders.[3]

Interestingly, some believed that the central nervous system played an essential role in PLMT via a central oscillator.[21] It has also been proposed that hyper-excitability of the damaged peripheral nerves could cause symptoms of PLMT by way of the sympathetic nervous system. More specifically, the sympathetic nervous system could potentially serve as a bridge between injured afferent fibers and sympathetic nerve fibers,[22] allowing abnormal afferent impulse to travel to efferent fibers and ultimately leading to continuous pain with involuntary movements. This was evident in the fact that lumbar sympathetic ganglion blockade provided moderate symptomatic relief for some patients even though it was short-lived.[4] Interestingly, one of the explanations put forth was the possibility of spinal/supraspinal reorganization,[23] which coincided with the hypothesis of central reorganization mentioned above.

Clinical Management

Numerous treatments including antiepileptics, benzodiazepines, antispasmodic agents, and antidepressants have been tried with little success.[1,2,24,25] However, temporary success was observed with local anesthetic nerve blocks, epidural blocks, sympathectomy/sympathetic blockade, neurectomies, botulinum toxin type A injection, transcutaneous electrical nerve stimulation, vibratory stimulation, and epidural spinal cord stimulation.[1,2,15,26,27] Analgesics, steroids, anti-inflammatory agents, vitamin B12 injections, propranolol,

quinine sulphate, and local anesthetics only offered temporary relief as well.[3] GABAergic agents such as gabapentin and pregabalin were the most effective in attenuating the pain and the movements, possibly via both central and peripheral mechanisms.[7,24,25] It has been reported that gabapentin as high as 600mg three times daily could control symptoms of PLMT long-term.[25]

Treatment of PLMT has also been attempted with botulinum toxin A at the level of lumbosacral roots and peripheral nerves with moderate relief of symptoms, although toe movements did return after a few months.[8] It was suggested that botulinum toxin A might have acted via reduction of muscle spindle discharge leading to decreased central sensitization, as well as antisympathetic, antiglutamergic, or anti-inflammatory effects.[28]

Differential Diagnosis

The syndrome of PLMT exhibits certain features similar to the restless leg syndrome (RLS). In RLS the sensation in the legs could be burning, creeping, or tingling coupled with an urge to move them, especially early in the night. Movements such as walking or stretching relieve the symptoms whereas rest makes them worse. However, in PLMT pain is severe, constant, unrelated to the sleep-wake cycle, and is not relieved by movements or walking.[23] In addition, its involuntary movements of the toes or feet also differ from the myoclonic jerks of RLS.

In conditions such as thalamic syndrome and limb pain with myoclonus, patients may experience pain and involuntary movements as well but they often occur simultaneously as opposed to in PLMT where pain often precedes the movements.[17] In disorders such as Parkinson's disease and dystonia, sustained involuntary movements in the feet can be present and pain can be an associated feature. But the movements are typically sustained muscle contractions, which are different from the typical movements associated with PLMT.

Prognosis

PLMT is a newly discovered syndrome and since there has not been a systematic study following these patients long-term, it is currently quite difficult to predict the outcome of this syndrome and its effect on lifespan, though there has yet been a report of a patient actually dying from this syndrome. However, it is known that PLMT is a debilitating condition that greatly reduces patients' quality of life.

Conclusion

Since Spillane et al first described it in 1971, there have been more reported cases of PLMT and its variants over the years. Though much progress has been made in elucidating its etiology, its exact mechanism still remains a mystery. Similarly, even though EMG and nerve conduction studies have proven helpful in demonstrating spontaneous arrhythmic bursts of affected muscles and underlying neuropathy in some patients, diagnosis of PLMT remains largely on history and clinical presentation.

Physicians should be aware of this rare debilitating condition. It is important to consider PLMT in a patient with painful legs and/or restless leg syndrome without any significant history of neurological disease or trauma. Treatments such as different combinations of medications and invasive techniques are complex and generally lead to a poor outcome.

Competing Interests
No sources of funding were used to assist in the preparation of this case report. Dr Serena Hung is a full time employee of Biogen Idec and owns stock in the company. The authors have no conflict of interests that are directly relevant to the content of this case report and review of literature.
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