Meralgia Paresthetica

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AUTHOR AND EDITOR INFORMATION

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Author and Editor Disclosure

Synonyms and related keywords: meralgia paresthetica, Bernhardt-Roth syndrome, lateral femoral cutaneous neuropathy

Patient Education

Click here for patient education.

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INTRODUCTION

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Background

Meralgia paresthetica (MP) is pain or an irritating sensation felt over the anterior or anterolateral aspect of the thigh due to injury, compression, or disease of the lateral femoral cutaneous nerve (LFCN). Early investigators of MP include Bernhardt, who first described the condition in 1878; Hagar, who attributed the pain to compression of the LFCN; and Roth, who coined the term meralgia paresthetica (thigh pain).

Diagnosis of MP is based on history and examination. Nerve conduction studies are used to verify the presence of the neuropathy and rule out other causes for the symptoms. Treatment for uncomplicated or benign forms of MP includes conservative measures initially, followed by surgical intervention for chronic discomfort. Malignant pathologic processes can produce symptoms of MP and, therefore, must be ruled out before conservative treatments are initiated.

Pathophysiology

The LFCN is formed by the fusion of the posterior branches of the second and third lumbar nerves. This purely sensory nerve traverses the retroperitoneum around the lateral circumference of the ileum to the inguinal ligament (IL). Just medial to the anterosuperior iliac spine (ASIS), the LFCN passes underneath the IL and enters the anterior thigh beneath its fascia (see Image 1). Ordinarily, a few centimeters distal to the IL, the LFCN divides into anterior and posterior branches. Tributaries of these branches perforate thigh fascia and receive sensory information from portions of the associated dermatomes L2-L3. Typically, this area encompasses the anterior lateral thigh from just below the hip to above the knee. Variations in the anatomy of the LFCN, such as splitting by the inguinal ligament, are hypothesized to predispose it to neuropathic processes.

Nerve entrapment can occur at 3 potential sites including (1) beside the spinal column, (2) within the abdominal cavity as the nerve courses along the pelvis, and (3) as it exits the pelvis. The last site is the most common and may involve the sartorius muscle or may be caused by simple compression superficially near the iliac crest and ASIS by tight clothing or trauma.

The angulation of the LFCN across the iliac crest results in varying compressive forces with postural repositioning. One opinion is that fibrous bands within the fascia subject the LFCN to deleterious tensile forces. The relatively superficial trajectory of the LFCN as it enters the thigh compartment makes it extremely prone to injury due to compression against underlying bone.

The LFCN is subject to systemic processes that can affect any peripheral nerve detrimentally. Diabetes mellitus, for example, can result in diffuse or focal neuropathies, especially in nerves that are subject to excessive compressive forces such as the LFCN.

Movement of the hip changes angulation and tension of the nerve, which can affect symptoms. For example, hip extension may increase angulation and tension on the LFCN, and flexion can decrease these forces.

Frequency

United States

Considered uncommon but not rare, MP is probably under-recognized. Notably, 3 cases are reported per 10,000 general clinic patients. Also, it occurs in an estimated 7-35% of patients referred for leg discomfort. Finally, up to 20% of patients with MP have bilateral symptoms.

Mortality/Morbidity

Isolated MP secondary to compression or injury of the nerve unrelated to major trauma, systemic, or malignant processes is not associated with mortality or significant morbidity.

Sex

Males are affected with MP more often than females.

Age

MP is observed in all age groups, but the condition most commonly occurs in middle-aged adults.

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CLINICAL

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History

A patient whose MP is idiopathic or caused by mechanical injury near the IL may describe paresthesias or dysesthesias within the cutaneous distribution of the LFCN.

- Paresthesias are abnormal sensation perceptions, such as tingling, numbness, burning, itching, cold, and warmth, that are not triggered by obvious cutaneous physical stimulation.
- Dysesthesias are distorted perceptions of ordinary tactile or painful stimuli (eg, burning, tingling, itchiness).
- Changes in posture or prolonged sitting or standing may cause a fluctuation of symptoms. The discomfort may resolve spontaneously and reappear.
- The appearance of MP symptoms may accompany other factors such as a motor vehicle accident, pregnancy, surgery, weight loss, and weakness. The examiner should inquire about these associations, as LFCN pathology has several etiologies, some of which are benign and others of which require urgent investigation.

Physical

Isolated lesions of the LFCN result only in abnormalities on sensory examination. Reduced perception of pinprick or dysesthesias within the receptive fields of the LFCN is typical. Often, the clinician can plot the cutaneous boundaries of the LFCN with an ink marker on the thigh of a person with MP. A careful neurologic examination is necessary so that it is not assumed that the patient has a benign form of MP. Hip extension may elicit symptoms, while flexion may relieve them.

- If the neurologic examination reveals abnormalities in reflexes, power, gait, or sensation outside the boundaries of the LFCN, then processes concurrently affecting other nerves are considered. For example, reduced patellar reflex, weak leg extension, and symptoms of MP indicate possible pathology within the lumbar plexus such as a space-occupying lesion. This condition is a plexopathy, not MP.
- Application of pressure over the LFCN at the IL may elicit tenderness or exacerbate the symptoms of MP. This Tinel sign supports localization of the pathologic process to that region.

Causes

Several processes can affect the LFCN detrimentally along its course, causing sensory dysfunction perceived within its cutaneous distribution. The processes cited below cause classical MP (lesion of the LFCN at IL) and pathologies that produce symptoms of MP due to lesions at various points along the LFCN. In many of these diagnoses, additional

neurologic symptoms, signs, and examination findings may be present that would indicate LFCN pathology along with other nerve injuries (eg, lumbar or lumbosacral plexopathy, multiple level radiculopathy).

- Trauma
    - Acute compression of the LFCN at the IL from seatbelt forces in rapid deceleration during motor vehicle accidents
    - Pelvic fracture
- Iatrogenic: LFCN injury has been reported in the following surgical procedures:
    - Iliac crest bone grafting
    - Pelvic osteotomy
    - Shelf operations for acetabular insufficiency
    - Inguinal lymph node dissection
    - Appendectomy
    - Total abdominal hysterectomy
- Retroperitoneal subacute mechanical: The following processes may cause a plexopathy:
    - Tumor invasion
    - Hemorrhage
    - Abscess
- Obstetric/gynecologic
    - Endometriosis: MP pain recurs and abates with menses.
    - Fetal compression during the second and third trimesters
- Subacute and chronic mechanical compression or stretching at the IL: The following situations can cause classical MP:
    - Tight-fitting garments
    - Braces, trusses
    - Carpenter's belts
    - Belts for flag carriers
    - Obesity
- Other mechanical causes include the following:
    - Reservoir for intrathecal medications placed in the right lower abdominal quadrant (personal account)
    - Ascites

- L2, L3 root compressions
- In multiple radiculopathies (pathology at the nerve root), muscle groups, including lumbar paraspinal muscles supplied by the L2 or L3 nerve roots, are weak or show denervation changes on electromyogram (EMG) needle examination.

- Metabolic-related and immunologic-related causes include the following:
  - Diabetes
  - Plexitis
- Infectious conditions associated with MP include herpes zoster.
- Idiopathic causes

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DIFFERENTIALS

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Diabetic Lumbosacral Plexopathy
Lumbar Degenerative Disk Disease
Lumbar Facet Arthropathy
Lumbar Spondylolysis and Spondylolisthesis
Mononeuritis Multiplex
Neoplastic Lumbosacral Plexopathy

Other Problems to be Considered

Lumbar plexitis
Lumbar plexopathy
Upper lumbar radiculopathy
Pelvic fracture
Pelvic neoplasm
Polyneuropathy
Retroperitoneal hemorrhage

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WORKUP

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Lab Studies

- Indicated laboratory and radiologic studies for LFCN pathology depend on the suspected etiology and clinical impression. MP caused by obvious benign compressive forces requires no further investigation; however, the following scenarios might necessitate more testing:
  - MRI to investigate the lumbar plexus
  - Serum tests for diabetes
  - Radiograph for possible pelvic fracture or cancer

- CT scan for retroperitoneal hemorrhage in patients who have undergone anticoagulation therapy

- EMG is very helpful to rule out radiculopathy, plexopathy, generalized polyneuropathy, or other neuropathic causes for the symptoms. Nerve conduction studies and somatosensory evoked potentials of LFCN have shown abnormalities in patients with MP, but these tests are unreliable and are not necessary for the diagnosis.

- Caution: Discomfort over the anterolateral thigh may not be representative of LFCN injury. Referred pain can be caused by neoplastic invasion of nearby femoral or pelvic bone. In the author's experience, the pain associated with a neoplasm or bone fracture is deep, boring, and severe. MP discomfort is superficial with fluctuating dysesthesias, paresthesias, and cutaneous hypersensitivity; it is neuropathic in quality and usually is not disabling.

Procedures

- For classic MP, conservative therapy may be initiated without the necessity for invasive procedures. The diagnosis (ie, an MP secondary to trauma, irritation, or compression of the LFCN near the IL) can be verified by injecting a small quantity of lidocaine at the point of their intersection or at the point of tenderness. The discomfort should resolve transiently.

- Diagnosis of LFCN often is verified by nerve conduction studies. The LFCN is stimulated antidromically 1-2 cm medial to the ASIS above the IL; the response is recorded 12-20 cm distally over the lateral thigh. Excessively thick soft tissue makes surface stimulation technically difficult or inadequate; the examiner may choose needle stimulation instead. Right and left LFCNs are compared. Study findings are considered abnormal if there are significant side-to-side differences; there may be no response or a 50% drop in amplitude compared with the contralateral nerve. If there is no recordable response on the asymptomatic side, the results obtained when testing the symptomatic thigh are not interpretable. Asymptomatic individuals have widely variable LFCN action potentials in conduction studies.

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TREATMENT

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Rehabilitation Program

Physical Therapy

MP is treated with conservative therapy, such as physical therapy, weight reduction to reduce abdominal girth, heat application, and analgesics (see Medication). Patients should avoid wearing constrictive garments, belts, or braces that impart excessive focal pressure at the IL.

Physical therapy may be recommended as an adjunct to analgesic medications for pain control in patients with MP. In addition to moist heat, other modalities that may be recommended by the physical therapist include transcutaneous electrical nerve stimulation, interferential current, or low-intensity phonophoresis. These modalities are used to help alleviate pain and enable the patient to perform gentle stretching exercises with greater ease. Soft tissue techniques (eg, trigger point therapy) also may be beneficial for pain and tightness in the hip and thigh muscles. The physical therapist also may instruct the patient in a general fitness program to assist with weight reduction, as well as proper biomechanics and postural re-education.

Surgical Intervention

Patients failing conservative measures are referred to a surgeon for consideration of surgical decompression of the LFCN. Successful predictors of excellent surgical results include positive Tinel sign, abnormal EMG, and immediate relief of symptoms following LFCN block. Although surgical transection of the LFCN has been performed for treatment, outcomes for this procedure have not been reported systematically, and some patients report worse dysesthesias.

Other Treatment

Injection of lidocaine to block the LFCN at the IL results in only temporary relief of symptoms. This procedure is useful for exploring which patients may respond well to surgical manipulation of the LFCN, once conservative measures have been deemed inadequate and the patient complains of chronic discomfort.

- Improvement of symptoms also may occur with correction of leg length discrepancies. Use of shoe lifts or inserts may correct discrepancies sufficiently to minimize hip hyperextension on the affected side.
- Trigger point injections of the sartorius muscle may help to relieve symptoms.
- Steroid injections at the spinal or inguinal level may provide more chronic relief of symptoms.

Medications for treatment of MP discomfort include nonsteroidal anti-inflammatory drugs (NSAIDs), narcotics, and other agents such as amitriptyline, Neurontin, and Tegretol. In general, avoid prolonged use of NSAIDs and narcotics if possible.

A TCA or anticonvulsant is started at a low dosage and titrated upward until symptoms resolve or side effects dictate otherwise. These drugs are discontinued if there is no relief with maximal quantities. A common error is stopping the medication before serum levels reach therapeutic ranges.

Suggestions for initiating chemical treatment for MP follow. The treatment of neuropathic pain varies significantly among physicians. Consult the *Physicians' Desk Reference* (PDR) for more detailed drug information on the following agents.

Drug Category: *Tricyclic antidepressants*

Use for treatment of neuropathic symptoms; the exact mechanism is unknown.

Drug Name	Amitriptyline (Elavil)
Description	Good medication for neuropathic pain, often discontinued because of somnolence and dry mouth.
Adult Dose	10-25 mg PO qhs initially
Pediatric Dose	Not established

Contraindications	Documented hypersensitivity; patient has taken MAOIs in past 14 d; history of seizures, cardiac arrhythmias, glaucoma, and urinary retention
Interactions	Phenobarbital may decrease effects; coadministration with CYP2D6 enzyme system inhibitors (eg, cimetidine, quinidine) may increase levels; inhibits hypotensive effects of guanethidine; may interact with thyroid medications, alcohol, CNS depressants, barbiturates, and disulfiram
Pregnancy	C - Safety for use during pregnancy has not been established.
Precautions	Caution in cardiac conduction disturbances, history of hyperthyroidism, and renal or hepatic impairment; avoid using in elderly patients

Drug Category: *Anticonvulsants*

For treatment of neuropathic symptoms; exact mechanism is unknown. Used to manage severe muscle spasms and provide sedation in neuralgia

Drug Name	Carbamazepine (Tegretol)
Description	Because of adverse side effects and risks associated with carbamazepine, this compound is initiated judiciously; prolonged use is monitored carefully.
Adult Dose	100 mg PO bid initially
Pediatric Dose	Not established
Contraindications	Documented hypersensitivity; history of bone marrow depression; administration of MAOIs within last 14 d
Interactions	Serum levels may increase significantly within 30 days of danazol coadministration (avoid whenever possible); do not coadminister with MAOIs; cimetidine may increase toxicity especially if taken in first 4 wk of therapy; may decrease primidone and phenobarbital levels (their coadministration may increase carbamazepine levels)
Pregnancy	D - Unsafe in pregnancy
Precautions	Do not use to relieve minor aches or pains; caution with increased intraocular pressure; obtain CBC counts and serum-iron baseline prior to treatment, during first 2 months and yearly or every other year thereafter; can cause drowsiness, dizziness, and blurred vision; caution while driving or performing other tasks requiring alertness

Drug Name	Gabapentin (Neurontin)
Description	Has anticonvulsant properties and antineuralgic effects; however, exact mechanism of action is unknown. Structurally related to GABA but does not interact with GABA receptors. Titration to effect can take place over several days (300 mg on day 1, 300 mg bid on day 2, and 300 mg tid on day 3). Well-tolerated and safe medication that essentially is excreted 100%.
Adult Dose	300 mg PO qhs initially and increase to 300 mg tid over few d
Pediatric Dose	Not established
Contraindications	Documented hypersensitivity
Interactions	Antacids may reduce bioavailability of gabapentin significantly (administer at least 2 h following antacids); may increase norethindrone levels significantly
Pregnancy	C - Safety for use during pregnancy has not been established.
Precautions	Caution in severe renal disease

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FOLLOW-UP

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Prognosis

- Prognosis depends on the etiology of LFCN injury. Simple MP caused by external or benign mechanical injury often remits spontaneously. In one study where the surgical candidates were selected carefully, most patients who chose nerve decompression for chronic discomfort experienced relief. Factors that indicate excellent surgical outcome are outlined in Surgical Intervention.
- For most patients, this condition is self-limiting and, with education, patients learn to tolerate symptoms and modify activity, thus avoiding surgery or other aggressive treatments.

Patient Education

- Instruct patients to avoid activities that injure the LFCN.

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MISCELLANEOUS

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Medical/Legal Pitfalls

- The practitioner should not assume that a patient has benign MP and overlook early plexopathy caused by tumor invasion. Not all patients with MP-like discomfort require MRI or CT scans of the pelvis. Each individual's situation dictates those clinical decisions. Major red flags to recognize this condition are progressive worsening of symptoms, nonsensory abnormalities in the neurologic examination, and severe deep pain. EMG can help differentiate benign MP from other problems.

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MULTIMEDIA

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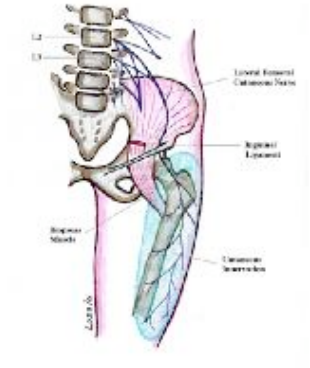
Media file 1: **Basic anatomy of the lateral femoral cutaneous sensory nerve. The colored blue region over the anterolateral thigh outlines the area of cutaneous innervation.**



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Meralgia Paresthetica excerpt

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