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Review Article

Meralgia paresthetica – Solving the diagnostic dilemma

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Abstract

Meralgia paraesthetica (MP) is a clinical syndrome produced by entrapment mono-neuropathy of lateral femoral cutaneous nerve (LFCN). It classically presents as numbness, paresthesia or dysesthesia of anterolateral aspect of thigh but sometime it may mimic conditions like lumbar radiculopathy, femoro-acetabular impingement, trochanteric bursitis, etc. Since it has wide spectrum of clinical presentation, it should be the diagnosis of exclusion when causes of anterolateral thigh pain is not explained by other known causes. The aim of this review is to provide an overview of this clinical condition with the emphasis on various clinical presentations and anatomical variations of the lateral femoral cutaneous nerve. Different methods of diagnosis and treatment are also explored and discussed in this paper.

Search methods: We have searched the most relevant published articles on Meralgia paresthetica from 1974 to 2017using the database PubMed, Cochrane, Clinical Keys and Google.

Keywords: Anterior thigh pain, Lumbar radiculopathy, Lateral femoral cutaneous nerve, Meralgia paresthetica (MP).

1. Introduction

Term "Meralgia Paresthetica" was coined by Karlovich Roth, a distinguished Russian neurologist, from the Greek words "meros", which means thigh, "algos" that means pain and "paraesthesia"- an unprovoked abnormal sensation. This entity was also described independently by a German neuropathologist Martin Bernhardt during the same period. So it is also called Bernhardt-Roth syndrome. [1,2]

Meralgia paraesthetica (MP) is a distinct clinical entity characterized by a localized area of paresthesia and numbness on the anterolateral aspect of the thigh due to entrapment mononeuropathy of lateral femoral cutaneous nerve (LFCN). [3] As the nerve reaches a point just medial to the anterior-superior iliac spine where it enters the thigh, it changes its course from nearly horizontal to vertical. This angulation is increased by extension and lessened by flexion of the thigh. This is the most common site of entrapment either because of external pressure or internal compression. The incidence rate of MP is 4.3 per 10,000 person year. It commonly occurs in the age group between 40 and 60 years. Males are more prone to develop this condition at a younger age. Obesity, pregnancy, carpal tunnel syndrome, diabetes and thyroid disorder are some of the risk factor for MP. [4-7] Children and athletes also suffer from this disorder. Many cases have been reported in this subset of people.[8-11]

2. Clinical features

MP generally present with unpleasant pin and needle sensation on the upper and outer aspect of thigh. Patients may describe the pain as burning, stinging, tingling, numbness, muscle aches, coldness, lightning pain, or vibrating cell phone. Prolonged standing, walking and sometimes tapping the inguinal ligament may aggravate the symptoms and sitting may relieve the symptoms. [12] Occasions when symptoms aggravated by sitting have been reported. [13] A retrospective population-based study found that the pain tends to be unchanged with positions including walking or standing. [14] The most commonly affected area of thigh is the lateral aspect, followed by the anterior aspect.[15] In most instances, the condition is unilateral; however, bilateral presentation is seen in 20% of the patients.[16]

It has been hypothesized that when the peripheral nerve is irritated by compression, the pain may radiate both proximally and distally as in carpal tunnel syndrome. So the patient may complain of low back pain, groin or hip pain, gluteal pain and thigh pain radiating to lateral aspect of calf. Because of this phenomenon MP has frequently been incorrectly diagnosed as lumbar radiculopathy and treated for a long time without any improvement. [17,18]

3. Etiology

Various causes for the compression of the lateral femoral cutaneous nerve have been described. This can be broadly classified into 1) mechanical, 2) metabolic and 3) iatrogenic. [19]

Mechanical compression of nerve is the most common cause of MP. Compression may be due to lumbosacral Braces/Corset, low-cut trouser or blunt trauma pelvis. Although rare, an increased intra-abdominal pressure as in pregnancy, obesity and pelvic tumor can also cause MP. Metabolic conditions like diabetes, hypothyroidism, lead poisoning, alcoholism have been reported to cause MP.[20] Possible pathogenic mechanisms include 1) mechanical compression by obesity, 2) nerve injury susceptibility by chronic hyperglycemia, or 3) free radical and inflammatory mediator injury in lead poisoning and alcoholism. [13]

Lateral femoral cutaneous nerve can be injured during various orthopedic surgeries like Iliac crest bone grafting, pelvic fixation or osteotomy, hip arthroplasty or fracture reduction/fixation, spine surgery [21-23] or in non-orthopedic surgeries like laparoscopic surgeries, e.g., myomectomy, hernia repair, cholecystectomy, Cesarean delivery, bariatric surgery, etc. [24-27]

The anatomical variability of the lateral femoral cutaneous nerve, excessive anterior pelvic tilt, contraction of the inguinal ligament, and shortening of the iliopsoas muscle, may all have contributed to the development of MP in the patient and it variable clinical presentations. [13]

4. Anatomy of lateral femoral cutaneous nerve and its variation

Lateral femoral cutaneous nerve (LFCN) is the sensory branch of lumbar plexus that arises from the posterior division of anterior rami of L2 and L3 spinal nerve. It emerges at the lateral edge of psoas major muscle inferior to the iliolumbar ligament. It then passes laterally on the iliac fossa over the iliacus deep to the iliac fascia. It leaves the abdomen by either passing through the gap between the inguinal ligament and the pelvic bone just medial to the anterior superior iliac spine (ASIS) or by passing directly through the inguinal ligament. It divides into anterior and posterior branches 8 to 10cm below ASIS. At this point it pierces the fascia latae to become subcutaneous.

The anterior branch supplies the anterior and lateral portion of the thigh up to the knee while the posterior branch supplies the lateral aspect of thigh from greater trochanter to mid-thigh.[28]

Several variations have been noticed in the branching pattern of lateral femoral cutaneous nerve which leads to the wide spectrum of clinical presentation.

There are four distinct branching patterns of the LFCN within the abdomen. The traditional LFCN has one distinct vertebral origin and crossed the inguinal ligament as a single process (86% of dissections). The first variant has two distinct branches from the lumbar plexus that joins together before traversing the inguinal ligament (8% of dissections). The second variant has one distinct vertebral origin, which split into two branches before traversing the inguinal ligament (3% of dissections). The third variant has two distinct branches from the lumbar plexus that does not join before traversing the inguinal ligament, but nonetheless innervates the anterolateral thigh (3% of dissections). [29]

There are three types of branching pattern of the LFCN at ASIS. Sartorius-Type a dominant anterior branch of the LFCN that course along the lateral border of the sartorius muscle. No other branch, or only a very thin posterior branch, can be found. Posterior-Type a strong posterior branch, equal in thickness to, or thicker than, the anterior branch, can be traced. The posterior branch of the LFCN consistently branch off laterally and cross the medial border of the tensor fascia latae muscle immediately distal to the ASIS. The posterior branch regularly run together with 1 or 2 fine vessels within a membranous layer that separate the superficial subcutaneous fat from the deep subcutaneous fat. Fan-Type multiple nerve branches of equal thickness spread over the anterolateral region of the proximal aspect of the thigh, crossing over the tensor fasciae latae muscle and the lateral border of the Sartorius.[30]

There are four possible sites for entrapment of LFCN. 1) At ASIS between head of inguinal ligament where it enters the thigh, it changes its course from nearly horizontal to vertical. It is the most common site of entrapment. 2) where the nerve emerges from the psoas muscle,3) the passage underneath the fascia latae, and 4) the area where the nerve leaves the fascia.

5. Diagnosis

Characteristic anterolateral thigh pain with localized sensory abnormality on examination without other neurological deficit is clue to the diagnosis but many times it is a diagnosis of exclusion. In such instances MP should be considered once all the other causes of anterolateral thigh pain have been ruled out.

History should be directed to the possible causes of MP e.g. tight belts, corsets, or tight pants, surgeries around the inguinal region, hip or spine and any history of

diabetes, hypothyroidism and alcoholism. Neurological examinations should be focused on loss of hairs on anterolateral aspect of thigh (because of autonomic neuroischemia affecting the capillaries that supplies nutrition to the hair follicles) and localized sensory loss. There may be tenderness at ASIS of the affected side. The clinical tests used for the diagnosis of MP are 1. Tinel sign 2. Neurodynamic test and 3. Pelvic compression test. [12]

Tinel sign is elicited by tapping over the upper and lateral aspects of the inguinal ligament or extending the thigh posteriorly which stretches the nerve and may reproduce or worsen the paraesthesia.

For neurodynamic test the examiner stabilizes the pelvis with the cranial hand and grass the lower extremity at the knee with the caudal hand. The examiner then bends the knee and adducts the hip in order to tension the LFCN. A positive test would be the reproduction of the patient's neurologic symptoms.

Pelvic compression test is sensitive and specific test for diagnosis of MP. At the same time it also rules out lumbosacral radicular pain. To perform this test patient is asked to lie laterally with the affected limb upwards and he/she is asked to focus on the symptom. Then physician applies lateral compressive force on the pelvis and hold the pressure for 45 seconds. The patient will observe the alleviation of the symptom because by this maneuver the two attachments of inguinal ligaments are brought closer causing the ligament to become slacker.[31]

There are various other investigations needed to rule out other pathologies and establish the diagnosis. They are

1. Imaging and blood investigations
2. Electro-physiologic studies
3. Nerve block

5.1 Imaging and blood investigations:

Ultrasound imaging has been proposed as an alternative diagnostic method to diagnosed MP in the recent literature. It not only confirms the entrapment morphologically, but also uncovers a likely underlying cause and provides immediate interventional guidance. The pertinent sonographic findings will be hypoechoic and swollen lateral femoral cutaneous nerve. [32,33]

There has been growing interest in the value of magnetic resonance neurography in the diagnosis of MP. Three -Tesla MR neurography has been found to be an accurate and reliable tool in the diagnosis of MP. [34]

Plain X-ray of the lumbar spine and pelvis should be performed to rule out degenerative disc disorder and pelvic tumor. Magnetic resonance and ultrasound imaging can be employed to evaluate the prolapsed intervertebral disc and retroperitoneal mass.[14]

Test to diagnosed risk factors like diabetes and thyroid dysfunction should also be performed.

5.2 Electromyography and nerve conduction studies

The electro-physiologic tests that are routinely performed to confirm the diagnosis of MP includes sensory nerve conduction velocity (SNCV) and somatosensory evoked potential (SSEP). [35-38] These tests have also been used to determine the prognosis of the disease.[39]

5.3 Nerve block

Lateral femoral cutaneous nerve block with lignocaine and corticosteroid can be of diagnostic benefit and therapeutic value in patients suffering from MP. It is an objective test that helps to differentiate MP from other causes.

Ultrasound guided block have been successfully used in the diagnosis and treatment of MP. [40]

5.4 Differential diagnosis:

Many a times MP becomes a diagnosis of exclusion. The following pathologies must be ruled out before considering MP.

1. **Lumbar radiculopathy**

Patient generally has back pain associated with reflex, motor, and sensory changes whereas patient with MP will have no back pain and no motor or reflex changes. The sensory changes of MP will be limited to the distribution of the lateral femoral cutaneous nerve and should not extend below the knee. Sometimes both these pathologies may co-exist, increasing the diagnostic dilemma.

2. **Trochanteric bursitis [41]**

This is a painful condition of pelvic girdle characterized by diffuse pain around buttock and lateral thigh. There will be tenderness at greater trochanter and relieved by local infiltration of anesthetic agent. MP has similar tenderness at ASIS and the pain is relieved by LFCN block.

3. **Femoro-acetabular impingement(FAI): [42]**

FAI is one of the common causes of anterior hip pain and may be misdiagnosed for MP. There will be tenderness at anterior joint line and pain is aggravated by flexion, adduction and internal rotation or flexion, abduction and external rotation of hip. There is no sensory impairment.

4. Occasionally, diabetic femoral neuropathy may produce anterior thigh pain, which may confuse the diagnosis.

6. Treatment

MP is a self-limiting disease and spontaneous remission has been reported many times.[14] However, if the symptoms persist various modalities of treatments are available to treat MP. The main aim of the treatment is pain relief and return to normal function. Treatment can be broadly classified into two groups: 1. Non-operative and 2. Operative [43]

6.1 Non-operative treatment

1. Weight loss
2. Stop wearing tight fitting pants or belts

3. NSAIDs

NSAIDs are used for acute pain relief. They can be used for short period of time. Long term use of such drugs should be considered judiciously because of it side effects.

4. Local injection

Local steroid injection is commonly used treatment method with predictable outcome. Ultrasound guided perineural steroid injection has been preferred by many pain physician. [44-46]

5. Physiotherapy

Physiotherapists employ their own strategies to treat MP. It includes 1. Pain relief 2. Range of motion 3. Manual therapy 4. Functional training and 5. Patient education. [47]

Beside the short course oral NSAIDs, local lidocaine patch provides clinically meaningful pain relief in most of these refractory neuropathic pain patients without side effects. [48]

Methylcobalamin, antidepressant (amitriptylin, Fluoxetin), Anticovulsant (carbamazepine, gabapentine, pregabaline) have been used with variable outcome.

Pulsed radiotherapy, kinesio-taping and acupuncture have been used by experts to show proven benefit in the management of MP. [49-51]

6.2 Operative Treatment:

Patient not improving with non-operative treatment are the candidate for surgical treatment. Surgical techniques include neurolysis, neurectomy or transposition of LFCN. These procedures have long term pain relieve with very little recurrence. Patients who have neurectomy may have permanent numbness on thigh. [52-55]

7. Conclusion

Anterolateral thigh pain is a common presentation of MP but many times it may be present as gluteal pain, hip pain or thigh pain extending to knee and leg. These unusual presentations are because of anatomical variations in branching pattern and course of the LFCN. Thorough clinical work up, strong clinical suspicion and appropriate investigations can lead us to appropriate diagnosis. None the less, it is often self-limiting disease and if symptoms persist there are various modalities of treatment for MP.

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