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Diagnosis and Treatment of Meralgia Paresthetica (Literature Review)

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Abstract

Meralgia paresthetica (MP) is a condition characterized by damage to the lateral femoral cutaneous nerve (LFCN), leading to sensory disturbances and pain in the anterolateral thigh. Currently, studies on MP interventions are scarce, with most available data being limited to case reports and small-scale studies. This article reviews the available diagnostic and therapeutic approaches for MP, highlighting the need for further research into more effective treatments. The primary aim of this article is to raise awareness of meralgia paresthetica and assist clinicians in its diagnosis and management.

Keywords

Meralgia paresthetica; Bernhardt-Roth Syndrome; Lateral femoral cutaneous nerve.

Introduction

Meralgia paresthetica (Bernhardt-Roth Syndrome, Lateral femoral cutaneous nerve neuropathy) is a pathological condition characterized by burning pain, tingling, and other sensory disturbances in the anterolateral region of the thigh, resulting from compression and injury to the lateral femoral cutaneous nerve [1]. The lateral femoral cutaneous nerve (LFCN) is purely an afferent sensory nerve, with its terminal receptors located in the area of the anterolateral part of the skin of the thigh. The nerve typically courses anterior to the anterior superior iliac spine (ASIS), where it lies beneath or passes through the inguinal ligament. The nerve continues through the pelvis and then passes through the psoas major muscle, reaching the L2-L3 spinal roots and the posterior spinal roots [2].

Despite its rarity, meralgia paresthetica (MP) is one of the most common compression-ischemic neuropathies of the lower limbs. The prevalence of the condition is 32-43 cases per 100,000 people per year [1,3,4]. In patients with diabetes mellitus, the incidence increases fivefold compared to the general population, reaching 247 cases per 100,000 individuals [5]. Interestingly, the incidence among military personnel is nearly twice that of the average incidence in the general population, amounting to 62 cases per 100,000 service members [6].

The causes of lateral femoral cutaneous nerve injury are diverse, including metabolic factors (such as diabetes mellitus, hypothyroidism, alcohol intoxication), internal nerve compression (caused by increased intra-abdominal pressure due to obesity, pregnancy, or the development of a tumor) and external nerve compression (resulting from tight straps or seat belts, restrictive clothing) [1, 3]. As well as iatrogenic causes due to surgical interventions or direct nerve damage during hip replacement surgery, spinal surgeries, or laparoscopic procedures in the groin area [2,7]. Additionally, meralgia paresthetica may occur as a complication of postoperative positioning [8], or after prone positioning ventilation [9-10]. The condition can occur at any age, but the incidence is highest among those aged 40 to 60 years [5].

Diagnosis

For diagnosis, it is important to take a thorough medical history and perform an appropriate physical examination. Although the diagnosis of meralgia paresthetica is essentially clinical, auxiliary diagnostic methods such as nerve conduction studies and ultrasound examination are useful complementary tools.

Clinical characteristics of MP:

1. Causalgia or burning pain, paresthesias, and hypesthesia over the upper lateral thigh
2. Symptoms are typically unilateral.
3. The development of the pathology is usually subacute, occurring over several days or weeks
4. Symptoms may be associated with prolonged hip extension, such as during walking, rising from a seated position, or prolonged standing.

A diagnostic maneuver that can be used for diagnosis:

1. The Pelvic Compression Test: the patient should be positioned on the unaffected side, and the examiner applies a downward compressive force on the patient's pelvis for 45 seconds. If the patient reports relief of symptoms, the test is considered positive. The sensitivity of the test is 95%, and the specificity is 93.3% [11].

When alarming, non-specific signs for MP (red flags) are detected, it is necessary to thoroughly examine the patient to conduct a differential diagnosis [12-13]. These (red flags) include: Motor deficits and reflex changes (which are characteristic of lumbar stenosis, intervertebral disc herniation with nerve root radiculopathy or damage to a peripheral motor nerve, in this case, the femoral nerve), history of cancer (if bone metastasis is suspected).

2. Nerve conduction study [14-17]: Sensory nerve conduction studies are useful for confirming the diagnosis and determining the severity of LFCN damage. Such an examination is especially useful in cases of unilateral damage, as it allows for the comparison of SNAP changes on both sides. Electrophysiological examination can also be used to assess the functional capacity of the nerve during the course of treatment. The normal amplitude (μV) is ≥ 4 [17].

The examination is useful but has several drawbacks:

In some normal individuals without symptoms, especially those older than age 40, these responses may be very small, requiring electronic averaging, or may be absent. Thus, a low-amplitude or absent potential should not necessarily be interpreted as abnormal. Side-to-side comparisons often are very useful in this regard if one side is symptomatic and the other is not [17].

- Electrophysiological examination of the LFCN is technically challenging, especially in patients with obesity. Thus, a low-amplitude or absent potential should not necessarily be interpreted as abnormal unless side-to-side comparisons are done in patients with symptoms limited to one side [18].

Ultrasonography

The advantages of ultrasonography are its general availability and quickness. This method is useful both for diagnosis (localizing the site of damage, ruling out neoplasms) and for treatment (localizing the nerve during injection). For compressive neuropathy, an increase in the cross-sectional area ($> 5 \text{ mm}^2$ is considered pathological) of the LFCN and hypoechogenicity of the nerve bundles are typical [18-19]. Ultrasound is more sensitive for abnormalities than MRI [20].

MRI

MRI is used to perform differential diagnosis to rule out tumor formations in the pelvic area, as well as to exclude urogenital or gynecological diseases, and lumbar disc herniations. MRI can also detect signal changes and neuroma formation of the LFCN associated with compression or trauma [21].

Treatment

Treatment of MP includes treatment of the underlying cause (if any) and conservative treatment. Surgical intervention is recommended only when all non-surgical methods of treatment have failed to provide effective treatment.

MP is a benign condition with possible spontaneous remission. According to the study by Ecker et al [22] spontaneous improvement occurred in 69% (in 20 out of 29 patients) without medical interventions. Chhuttani et al [23] reported improvement in 70% (in 42 out of 60 patients).

1. Preventive measures: Since the main causes of the pathology are now known, it is advisable to counsel each patient on preventive methods, such as avoiding and preventing further nerve compression. This includes weight reduction, regular exercise, avoiding tight clothing, and managing concomitant metabolic disorders.

2. Injection: Injection therapy with anesthetic and/or glucocorticosteroid under ultrasound guidance is particularly beneficial for patients with neuropathic pain syndrome [24-26]. Performing the injection under ultrasound guidance allows for the demonstration of morphological changes and the identification of anatomical variations in the course of the lateral femoral cutaneous nerve [27-28]. A total of five major nerve course variations have been described [29]. Ultrasound guidance also helps visualize the spread of the medication in real-time, reducing the likelihood of complications during the blockade and decreasing the need for repeat injections.

The main mechanism of analgesic action of corticosteroids is associated with their antiinflammatory and membrane-stabilizing properties through inhibition of myelinated C fiber transmission and inhibition of ectopic release [24].

Local injection of anesthetic drugs blocks A-delta and C fibers, inhibits sodium channels of sympathetic nerves, leading to the release of nitric oxide, which increases vascular microcirculation and reduces inflammation [30-31].

3. Medications for neuropathic pain relief that can be used include [32]:

- Tricyclic antidepressants
- Anticonvulsants: gabapentin, pregabalin
- Topical therapy with capsaicin [33]
- Topical application of lidocaine [34]

4. Therapeutic exercise and manual techniques [35-38]: Some clinical case reports indicate the benefits of manual techniques and therapeutic exercises. Treatment may include the following techniques: Active Release Techniques (ART), mobilization for the pelvis, myofascial therapy for the rectus femoris and iliopsoas, transverse friction massage of the inguinal ligament, exercises to improve flexibility of the hip and pelvic muscles, along with stabilization exercises for the pelvis and strengthening of the abdominal core. These interventions are safe and effective for alleviating symptoms in MP.

5. Transcutaneous electrical nerve stimulation (TENS): 10 sessions, 5 days per week for 2 weeks, with 20 minutes per daily session [24].

6. Kinesiotaping: It may be an additional method in the treatment of MP. Although the exact physiological mechanism of action is unknown, there is a single study involving a group of 10 patients with a clinical and electromyographic diagnosis of MP, where kinesiotaping was used, and improvement in patients' condition was reported over the 4-week study period [39].

7. Acupuncture [40-41]: There are several studies reporting successful treatment of MP with acupuncture; however, the exact physiological mechanisms are still under investigation. Further research is needed to gain a broader understanding of the effectiveness of acupuncture in treating MP.

8. Surgical [42-44]: neurolysis (decompression and transposition) or neurectomy. Surgical intervention for MP is generally reserved for patients who are resistant to conservative treatment.

Discussion /Conclusion

Current studies on interventions for MP are scarce. Available data are mostly limited to single case reports and studies with small sample sizes. Further multicenter randomized clinical trials are needed to develop a comprehensive approach to treatment and diagnosis, as well as to unify all previous data. Given the aging population and the rising prevalence of obesity, metabolic syndrome, and diabetes mellitus, an increase in the incidence of meralgia paresthetica can be anticipated, making this issue relevant for further research.

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