Abstract: Meralgia paresthetica (MP) is a neurological disorder of the nervus cutaneous femoris lateralis (lateral femoral cutaneous nerve) (LFCN) characterized by a localized area of paresthesia and numbness on the anterolateral aspect of the thigh. Medical history and neurological examination are essential in making the diagnosis. However, red flags such as tumor and lumbar disc herniations must be ruled out. While the diagnosis of MP is essentially a clinical diagnosis, sensory nerve conduction velocity studies are a useful additional diagnostic tool.

The first choice in management of MP is, besides treating the underlying cause, always a conservative approach. Simple measures such as losing weight and not wearing tight belts and/or trousers can be advised. Pharmacological therapy consists mainly of antineuropathic medication.

Anatomical variants of the LFCN occur in a quarter of patients and may be the reason for negative response to diagnostic blocks. For interventional treatment of MP, such as local injection with anesthetics and corticosteroids or pulsed radiofrequency treatment of the LFCN, the evidence is limited. In particular, pulsed radiofrequency treatment of the LFCN should only take place in a study context.

Key Words: evidence-based medicine, meralgia paresthetica, pulsed radiofrequency, algorithm

INTRODUCTION

This review on meralgia paresthetica (MP) is part of the series “Evidence-Based Interventional Pain Medicine according to clinical diagnoses.” Recommendations formulated in this chapter are based on “Grading strength of recommendations and quality of evidence in clinical guidelines” described by Guyatt et al., and adapted by van Kleef et al. in the editorial accompanying the first article in this series (Table 1). The latest literature update was performed in November 2010.

Meralgia paresthetica is a neurological disorder characterized by paresthesia and numbness in an anterolateral cutaneous area of the thigh due to a lesion (compression) and/or dysfunction of the nervus
cutaneous femoris lateralis (lateral femoral cutaneous nerve, LFCN).

Even though MP can develop spontaneously at any age, the disease usually presents in the 30- to 40-year age group. The incidence in children could be higher than originally assumed. MP appears in one-third of children who have undergone surgery for an osteoid osteoma. An incidence of 0.43 in 10,000 was found in a Dutch study of a population of first-line care of 173,375 patients. There is a higher incidence of MP in males. In addition, there is a correlation with obesity, diabetes, and pregnancy related to increased intra-abdominal pressure. However, MP is also seen in children of relatively slender build.

Meralgia paresthetica can have many etiologies and can be subdivided into two main groups: spontaneous onset and iatrogenic. Spontaneous MP occurs without previous surgical intervention and can be subdivided into an idiopathic, metabolic, or mechanical type. In the case of the mechanical type, increased intra-abdominal pressure plays a role that appears with obesity and pregnancy. External direct pressure on the LFCN from wearing belts, corsets, or tight pants can lead to MP. However, internal pressure, such as that caused by tumors of the uterus, can also present as MP. Other causes for the spontaneous onset of MP are radiological degenerative defects of the symphysis pubica and leg-length disparity. L1 radiculopathy can also mimic MP. Metabolic factors such as lead poisoning, alcoholism, hypothyroidism, and diabetes are considered in particular to correlate with MP.

Surgery on the spinal column and the pelvis (osteotomy), in which a direct lesion to the LFCN occurs, is the most important iatrogenic cause for the onset of MP, and is seen in about 20% of cases. Neurotmesis of the LFCN is frequently described in relation to autogenous bone graft harvesting from the crista iliaca in spondylodesis operations. This is due to the fact that the LFCN has different anatomical variations, including the variant in which it runs across the crista iliaca. Compression neuropraxia in patients who undergo spine surgery on a Hall–Relton frame and neuropraxia of the LFCN by traction on the musculus psoas major during retroperitoneal dissection are also described. Many other operations are associated with the onset of an iatrogenic MP due to positioning, compression by restraining belts or devices, or direct surgical injury, such as total hip replacement surgery, laparoscopic cholecystectomy and myectomy, transplantations for coronary bypass surgeries, stomach reductions, surgery for morbid obesity, and laparoscopic inguinal repair. When surgery is performed in the area of the spina iliaca anterior superior (antior superior iliac spine, ASIS), the patient has a 35% risk of sensory loss and a 5% risk of developing MP.

The variable gross anatomical topography of the LFCN with regard to the surrounding bone structures and soft tissues is important, on the one hand, because it
could possibly be a predictor of the onset of MP; and on the other, for the interpretation of the diagnostic blockade and for potential local treatment options. Anatomical variation of the LFCN appears in 25% of patients.\textsuperscript{17}

The progression of five different types of LFCN can be distinguished based on cadaver studies.\textsuperscript{17}

Type A: LFCN runs posterior to the ASIS over the crista iliaca (4%).

Type B: LFCN runs anterior to the ASIS above the tendinous origin of the musculus sartorius, but is embedded in the tissue of the ligamentum inguinale (27%).

Type C: LFCN runs medial to the ASIS, embedded in the tendinous origin of the musculus sartorius (23%).

Type D: LFCN runs medial to the tendinous origin of the musculus sartorius, localized between the tendon and the musculus sartorius and a thick fascia of the musculus iliopsoas under the ligamentum inguinale (26%).

Type E: LFCN runs further medially and is embedded in the connective tissue under the ligamentum inguinale and lies on the thin fascia of the musculus iliopsoas where it branches off toward the ramus femoralis of the nervus genitofemoralis (20%).\textsuperscript{9}

Types A, B, and C are the most sensitive to traumas.\textsuperscript{18} Outside the above-mentioned anatomical variants, various branching pattern of the LFCN has been described with one or two vertebral origins of the nerve.\textsuperscript{19,20} When the lesion is located around the ligamentum inguinale, the LFCN undergoes pathological changes, such as local demyelination and Wallerian degeneration, mainly of the large fibres.

I. DIAGNOSIS

I.A HISTORY

Symptoms involving MP usually consist of unpleasant paresthesia on the exterior side of the thigh. This occurs unilaterally in most cases, but in 20% of cases it appears bilaterally.\textsuperscript{16}

The patients complain of a typical burning, stabbing pain with a tingling sensation in the thigh. They usually localize the symptoms as occurring on the skin itself. Even though some MP patients report pain in the context of an allodynia in the area of the LFCN, most of them indicate that they have an unpleasant tingling sensation (dysesthesia) instead of pain. These MP symptoms can be provoked with postural change by extending the hip or by prolonged standing.\textsuperscript{8} The symptoms sometimes disappear when the patient sits down.

I.B PHYSICAL EXAMINATION

During physical examination, palpation is usually painful on the lateral part of the inguinal ligament at the point where the nerve crosses the inguinal ligament. Some patients also present with hair loss in the areas of the LFCN because they constantly rub this area.\textsuperscript{8}

I.C ADDITIONAL TESTS

Somatic: none.
Psychocognitive: none.

When indicated, pelvic radiography can be performed to rule out bone tumors. MRI or ultrasound examinations are indicated if pelvic tumor, including retroperitoneal tumor, is suspected. Blood tests and thyroid function tests are indicated if a metabolic cause is suspected.

When in doubt, neurophysiological evaluation using a somatosensory-evoked potential and a nerve conduction test of the LFCN can be carried out. As well as demonstrating MP, this test can simultaneously provide information and locate the lesion in the LFCN.\textsuperscript{21}

A positive diagnostic blockade with 8 mL local anesthetic, performed by locating the LFCN using a nerve stimulator, can usually confirm the diagnosis. However, it should always be borne in mind that an abnormal course of the LFCN can also cause a negative diagnostic block.

I.D DIFFERENTIAL DIAGNOSIS

In general, diagnosis can be established from the typical medical history, physical examination, and general neurological examination. This is of great importance because other neurological, urogenital, and gastrointestinal symptoms are not usually part of the clinical diagnosis associated with MP.\textsuperscript{8} It can provide the specialist with indications for the presence of other diseases that could account for the patient’s symptom pattern. All patients with motor loss and/or reflex variations, or patients with loss of sensation in areas that are not supplied by the LFCN, require further testing. Differential diagnoses should rule out red flags such as metastases in the crista iliaca, lumbar disc herniation with radicul-
opathy, and avulsion fractures. Even chronic appendicitis can present as a syndrome similar to MP.8

II. TREATMENT OPTIONS

II.A CONSERVATIVE MANAGEMENT

The great majority of cases of MP have a favorable course and 85% will recover with conservative treatment.22 The first choice of conservative treatment is always to tackle the underlying cause (when known), such as weight loss or the wearing of tight clothing and/or belts.23 When pain predominates, tricyclic antidepressants, antiarrhythmics, and anticonvulsants can be administered to treat the neuropathic pain.24 Capsaicin or lidocaine cream can be prescribed if there is dysesthesia of the epidermis.25

II.B INTERVENTIONAL MANAGEMENT

Local Infiltration of the LFCN

Traditionally, local infiltration of the LFCN with a local anesthetic, with or without corticosteroids, is administered in various dosages, but outcomes are rarely correctly reported in the literature.8 Treatment success (> 50% pain reduction and improvement in mobility) was reported after two injections under ultrasound guidance. Injections of bupivacaine 0.25%, 1:200 000 epinephrine and 40 mg methylprednisolone for the first injection and 20 mg methylprednisolone for the second injection were administered at a 3-week interval.26

Pulsed Radiofrequency Treatment of The LFCN

Pulsed radiofrequency (PRF) treatment of the LFCN was only reported in four case reports.27–29 The first case, a 68-year-old patient diagnosed with MP of 4-month duration was treated with PRF in the area of the LFCN. The paresthesia disappeared 24 hours after treatment and the patient was still symptom-free after 6 months.27 A positive effect was of PRF treatment of the LFCN in the other three case reports.28,29

Spinal Cord Stimulation

One case report mentions the use of spinal cord stimulation in a patient with 1-year history of MP confirmed by a positive diagnostic block of the LFCN. Conservative, pharmacological treatment yielded unsatisfactory pain relief and injection of local anesthetic with corticosteroid provided only 9-hour pain relief. A quadripolar lead was implanted at the mid-Th10 vertebral body level. Eight months after implantation the patient was almost completely pain free, no longer used pain medication, and was working full time.30

II.C COMPLICATIONS OF INTERVENTIONAL MANAGEMENT

Local Infiltration

The reports available do not mention complications or adverse effects; no conclusions can be drawn.

Pulsed Radiofrequency Treatment

No complications or adverse effects of PRF treatment were documented in the four case reports.27–29 In a review of the literature on PRF in more than 1,200 patients, no complications have been mentioned.31

Spinal Cord Stimulation

The patient discussed in the case report did not experience any side effect. The potential side effects and complications of spinal cord stimulation are described in the article on “Complex Regional Pain Syndrome” of this series.32

Surgical Treatment Options

Surgical intervention in painful MP should be reserved for very exceptionally serious cases that have been thoroughly examined and in which other psychocognitive factors have been ruled out.6

II.D EVIDENCE FOR INTERVENTIONAL MANAGEMENT

The summary of the evidence for the interventional management of MP is given in Table 2.

III. RECOMMENDATIONS

There is only limited documentation regarding the interventional treatment of MP. When conservative
treatment provides inadequate results, local infiltration of the LFCN with local anesthetics and corticosteroids can be considered. PRF treatment of the LFCN should only be performed in a study context. Spinal cord stimulation should be reserved for refractory cases, preferably in a study context.

III.A CLINICAL PRACTICE ALGORITHM

Figure 1 represents the treatment algorithm for the management of MP.

III.B TECHNIQUE(S)

LFCN Block

Lateral femoral cutaneous nerve block is carried out with the patient in the supine position. A pillow under the knees can increase the patient’s comfort, especially if extension of the legs is painful. The LFCN can sometimes be identified by palpation. A point 2 cm medial and 2 cm caudal to the ASIS is selected as the injection site. The needle (22 to 25 G) is inserted past the deep fascia of the thigh (fascia lata) where a “pop” is noted when perforating the fascia. Thereafter, paresthesia can usually be quickly generated in the area of the lateral side of the thigh. The point where the paresthesia is maximal is sought.

Lateral femoral cutaneous nerve block was recently described using ultrasound. The ASIS was identified with ultrasound. The tissue caudad to the ASIS is scanned with the ultrasound probe (6 to 13 Hz) in a transverse position to identify the musculus sartorius. The LFCN lies at this level above the musculus sartorius in the area under the fascia lata and above the fascia iliaca. Running caudally the LFCN enters a lenticular compartment between the musculus sartorius and the musculus tensor fasciae latae, formed by a double layer of the fascia lata and filled with fat. A 22-G needle is inserted in-line with the ultrasound probe. The location of the LFCN is confirmed when the patient experiences a reproducible paresthesia by stimulation (1 Hz; 1 mA). Subsequently, a test dose of 1 mL is injected; this should not exacerbate the pain. A total volume of 9 mL bupivacaine 0.25% with 20 or 40 mg of methylprednisolone is injected. Dispersion of the injection fluid is continuously monitored by means of ultrasound, so that dispersion around the nerve can be observed.

Pulsed Radiofrequency Treatment

After the LFCN has been identified as described above, a needle location is sought where stimulation with 50 Hz causes tingling in the area of the lateral side of the thigh with an output below 0.6 V, using a 23-G RF needle with an active 5-mm tip and a 60- or 100-mm-long needle. The length of this needle depends on the size of the patient (obesity requiring the longer needles). Subsequently, a PRF current of 45 V lasting for 120 seconds is administered without any preceding local anesthetic. The maximum temperature should not exceed 42°C, but if this occurs the output should be reduced. If necessary, a second treatment period of 120 seconds can be administered if the impedance is above 500 Ω, prior to injection of 1 mL NaCl 0.9% solution.

Spinal Cord Stimulation

We refer to the article in this series on “Complex Regional Pain Syndrome” for the technique.32
IV. SUMMARY

Meralgia paresthetica is a frequent complaint. An exact medical history and neurological examination are usually enough to establish its diagnosis. When using diagnostic blocks and local invasive treatment, it is important to realize that in 25% of patients anatomic variants of the nervus cutaneous femoris lateralis (LFCN) may be present. Conservative treatment is always the first choice of therapy. Infiltration with corticosteroids and local anesthetics can be considered. PRF treatment and spinal cord stimulation are also an option, but should be performed only in the context of a study.

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