

# Nerve root syndrome

Nerve root syndromes refers to the pain that arise due to compression of the root of the nerve in the intervertebral space. The nerve root can be damaged unilaterally or bilaterally, mostly asymmetrically. Polyradicular involvement occurs more often in older patients due to long-term degenerative changes. In younger individuals, the symptoms arise rather spontaneously as a result of a known mechanism, it is mostly an isolated involvement of one root due to herniated disc. We divide them into cervical and lumbar.

## types of pain in nerve root syndromes

### Local pain

The pain is at the point of origin, it does not spread to the surroundings. We label it according to the location, e.g. lumbago

### Radicular pain

It is a pain that propagates along a given dermatome which is innervated by the damaged root. It is often an indicator of a herniated intervertebral disc and other degenerative changes of the spine, but it can also indicate Lyme disease.

### Pseudoradicular pain

It is most often located in the area of the sacroiliac joint or around the trochanters. It spreads through the groin or buttocks to the side of the thigh and does not exceed the border of the knee joint. It accompanies functional disorders of the joints or the spine.

## General clinical features

Patients often report pain radiating to one limb, rarely to both, and often complain of limited mobility. Objectively, we often find limited mobility, muscle weakness and impaired sensation in the given sensitive area.

## Cervical root syndromes

It is usual to find frequent restrictions on the mobility of the cervical spine, some passive movements of the head can cause pain. Muscle weakness in cervical root syndromes is not as large and noticeable because one muscle is often supplied by multiple roots. Clinical manifestations in elderly patients with chronic degenerative diseases of cp often lack the classic clinical picture. Sensitive disorders of varying degrees prevail, which may not have a clear root distribution to the upper limb. Classic cutting pain occurs in only about half of patients due to passive extension and rotation of the head to the affected side. Motor disorders are mostly compensated, although studies show that up to 3/4 of patients have motor deficits and reduced reflexes. It is therefore very difficult to make a correct diagnosis.

### Root syndrome C2

It rarely occurs. It is accompanied by unilateral pain in the area of mastoid process. The pain is most likely caused by irritation of the posterior branch of the greater occipital nerve at the point of penetration of the muscle and fascia towards the occiput.

### Root syndrome of C3 and C4

The clinical symptoms of these two root syndromes are almost identical, the only distinction is due to the sensitive innervation area, which is often very difficult. The pain occurs on the lateral side of the neck, around the trapezius and acromioclavicular joint, sometimes affecting the upper chest as well. The pain is typically sharp, provoked by a change in position or Valsalva maneuver.

### Root syndrome C5

The pain radiates from the neck to the lateral side of the arm. There is a motor disorder of the deltoid muscle and thus a weakening of abduction in the shoulder. The muscles of the rotator cuff supraspinatus and infraspinatus, muscles are also slightly affected, and the ability of the bicipital reflex may be affected. Sensory denervation corresponds to dermatome C5.

### Root syndrome C6

The pain spreads along the radial side of the forearm up to I. and II. finger. Motorly, there is a weakening of flexion in the elbow and extension in the wrist. The brachioradialis reflex is impaired. Sensory denervation corresponds to dermatome C6.

### Root syndrome C7

The pain is spread along the dorsal side of the arm up to III. finger. The motor function of triceps brachii is weakened. The triceps reflex is affected. Sensory denervation corresponds to dermatome C7.

### Root syndrome C8

The pain spreads through the back of the shoulder, the ulnar side of the arm up to IV. and V. fingers. The motor function of interossei muscles, flexor carpi radialis and flexor digitorum profundus are affected and thus, we find a weakened flexion of the fingers. Sensory deficit corresponds to dermatome C8.

## Lumbar nerve root syndromes

In the lumbar nerve syndrome there are many more causes than in neck syndromes. Most often, trunk compression occurs due to a herniated intervertebral disc, in up to half of the cases it is the L5/S1 segment. Prolapses in the L4/L5 segment are also common, less so in L3/L4. Other root syndromes hardly occur in the lumbar region. Another significant cause of root syndrome in this area is spondylitic changes in the spinal canal.

## Clinical features

Subjectively, the pain shoots into the relevant limb, worsens with coughing, sneezing and defecation. Objectively, we find positive stretching maneuvers (Lasègue, reverse Lasègue, Thomayer's sign), sensitive denervation in the relevant segments, weakening of muscle strength and even manifestations of peripheral paresis.

### Root syndrome L1, L2 a L3

Their occurrence is very rare, together about 1-2% of all cases of lumbar root syndrome. The pain radiates down the front of the thigh. The sensory disturbance corresponds to the relevant dermatome L1, L2 or L3. The motor disorder is partly in iliopsoas and quadriceps femoris. The cremaster reflex is affected.

### Root syndrome L4

About 5% of all diagnosed lumbar syndromes are caused by L3/L4 disc disorders. The pain spreads along the front of the thigh, to the inner side of the lower leg and to the inner side of the sole of the foot. It is difficult for the patient to walk up the stairs, he does not walk "on the switch", but moves the affected limb up the stairs to the healthy one. Sensory denervation corresponds to the L4 segment. Motorly, the dorsiflexion of the leg and the extension of the knee are weakened, mainly tibialis anterior and partially quadriceps femoris. The knee is less stable during fast movements and often "buckles". The equipment of the patellar reflex is violated. The appropriate stretching maneuver is the reverse Lasègue.

### Root syndrome L5

Roughly 45% of disabilities are caused by a disorder of the L4/L5 intervertebral disc. The pain is projected on the outer side of the thigh and calf to the dorsum of the leg after the II-IV, sometimes even the I. toe. The sensory disturbance corresponds to the L5 dermatome. The main motor deficit is the inability to perform dorsiflexion of the big toe, weakening of dorsiflexion of the fingers and ankle. The patient is unable to stand on the heel, in case of a mild disability, he manages this position with the tip of the foot dropped. Clinically, the syndrome resembles common fibular nerve palsy, which is why it is often referred to as **pseudoperoneal paresis**. The classic Lasègue stretching maneuver is the same as for S1 root syndrome.

### Root syndrome S1

55 % 55% of cases show clinical signs of damage to the L5/S1 intervertebral disc. The pain spreads along the back of the thigh and can end up to the fifth finger. The S1 dermatome is sensitively affected. Plantar flexion of the foot and pronation are motorically limited. The patient is unable to stand on tiptoe well, attacks the limb when walking and cannot manage to spring the leg on tiptoe. We often find a hypotonic gluteus maximus muscle. The flexibility of the Achilles tendon reflex is impaired.



LATERÁLNÍ VÝHŘEZ



DORZÁLNÍ VÝHŘEZ

scheme of herniated disc

## LINKS

## References

- MUMENTHALER, Marco – BASSETTI, Claudio L. *Neurologická diferenciální diagnostika*. 5. edition. Grada, 2008. 369 pp. ISBN 978-80-247-2298-6.
- PFEIFFER, Jan. *Neurologie v rehabilitaci : pro studium a praxi*. 1. edition. Grada, 2007. 327 pp. ISBN 978-80-247-1135-5.
- 
-