Peripheral nerve involvement syndromes

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Upper Extremity

File:Swan neck.png
Radial palsy

Lesions of the radial nerve

File:Obrna n.ulnaris.jpg
Obrna n. ulnaris

- **Anatomy**: N. radialis has fibers from roots C5–C7 and separates from n. axillaris. During its course on the lateral side of the arm, it sends out cutaneous and motor branches (*m. triceps brachii*). It mainly controls the extension of the elbow, wrist and metacarpophalangeal joints.
- **Clinical picture**: The hand collapses volarly, the dorsiflexion and extension of the fingers is weakened. Serious abduction and extension of the thumb. The patient is unable to make an intensive fist. Hearing impairment may not be significant, or it may affect area I. and II. metacarpus dorsally.
- **Causes**:

File:Obrna medianu.jpg
Obrna n. medianus

1. *lesion in axilla* – the motor fibers for the triceps brachii muscle are also affected, which leads to a weakening of extension in the elbow (eg: compression with high crutches);
2. *lesions in the area of the sulcus n. radialis* – innervation of the triceps is normal, hand and finger extensors are affected (eg: Saturday night palsy – pressure of the edge of a bench or chair in the axilla area in heavily drunk people);
3. *humeral fractures* – the need to examine the momentum of the hand; entrapment between fragments may occur, either during injury or during subsequent reduction or surgery;
4. *supinator tunnel syndrome* – oppression when passing through the supinator muscle;
5. *pressure in the area of the wrist where it presses closely on the radius* – impairment of sensitive innervation (e.g.: tight watch strap, metal handcuffs).

Lesions of the ulnar nerve

- **Anatomy**: N. ulnaris is formed by fibers from the roots of C8–Th1 and runs along the medial side of the arm. During its course, it is found in two places very superficially under the skin – in the *sulcus nervi ulnaris* and at the level of the wrist next to the os pisiforme. In the palm it runs from hypothenar to thenaru. It sends motor branches to the forearm and mainly to the hand itself (the entire hypothenar, mm. interossei and part of the thenaru).
- **Clinical picture**: Semiflexed posture of the 4th and 5th fingers, sunken first interosseous space, abducted little finger, atrophy of all interosseous muscles during a longer period of paresis. The image of a **claw-like hand** is created. The sufferer feels paresthesia in the area of the 4th and 5th finger.
- **Causes**:

1. *cubital tunnel syndrome* – chronic microtraumatization during exertion in the elbow;
2. *compression in Guyon channel* – mainly motor disability, the hypothenar is usually spared; atrophy of the 1st interosseus dominates;
3. *chronic compressive syndromes* – rheumatological diseases, arthritic disfigurement, external compression when leaning on a mat (e.g.: glass grinders);
4. *axillary lesion* – very rare (eg: compression with high crutches);
5. *trauma* – fractures in the elbow area (eg: dislocation and displaced fractures), cuts in the wrist area;
6. *soft tissue tumors* – lipoma, fibroma.

Median nerve lesion

- **Anatomy**: N. medianus arises from fibers of the roots of C5–Th1 and runs along the inside of the arm. It motorically innervates the flexors, *m. pronator teres* and most of the thenar and *mm. lumbricalis* I. and II.
- **Clinical picture**: It is mostly manifested by the involvement of sensitive innervation. Patients have problems with hypoesthesia, allodynia or causalgia. In severe lesions, there is atrophy of the thenar portion, which appears as a depression.
- **Causes**:

1. *carpal tunnel syndrome*;
2. *supracondylar fractures humerus*;
3. syndrome *pronator tunnel* – it is often preceded by an increased load on the muscle, manifested dominantly by pain, rarely by paresis;
4. *wrist trauma* – cuts.

Lower Extremity

Lesions of the sciatic nerve

- **Anatomy**: N. ischiadicus receives fibers from the roots of L4–S3 and is the largest nerve of the sacral plexus. It sends out motor fibers for the flexors of the back of the thigh and for the muscles of the lower leg and leg, sensitively innervates the lateral and dorsal parts of the calf and the leg itself. In its course, it is divided into 2 main branches – *n. peroneus* and *n. tibialis.*
- **Clinical picture:** When both main branches are completely damaged, the manifestation is a weakening of the dorsal and plantar flexion of the leg. However, isolated damage to the peroneus nerve is more common. The reason is its localization closer to the surface of the body, a disproportionately smaller vascular supply to its size and greater traction during its course. There is paresis of the knee flexors and hip extensors, which, however, can be quite subtle. It is often compensated by the gluteal and calf muscles.

- **Causes**:

1. *trauma* – dislocation and fractures of the pelvis, posterior dislocation of the hip joint;
2. *iatrogenic damage* – intraoperatively during hip joint alloplasty (mechanism of compression, traction or ischemia), incorrect application of i.m. injection into the buttock area (especially in cachectic patients and children);
3. *oppression* – unconscious patients, hematomas in the gluteal region, tumors;
4. *piriformis m. syndrome* – it manifests as pain in the buttock region with radiation to the hip and thigh.

Femoral nerve lesion

- **Anatomy**: N. femoralis is formed by fibers from the roots of L2–4. It motorically innervates *the iliopsoas, sartorius and quadriceps femoris muscles*, providing sensitive innervation on the inner side of the thigh and the inner side of the lower leg. Allows for hip flexion and knee extension.
- **Clinical picture:** The impairment of the motor function of the *quadriceps* dominates, due to which patients have problems walking up stairs, climbing a chair, their lower limb breaks when walking down stairs. If the damage lasts longer, the *quadriceps* atrophies.
- **Causes**:

1. *pelvic trauma* – fractures, dislocations;
2. *result of operation* – hip joint surgery, extirpation of inguinal nodes, etc.;
3. *iatrogenic* – incorrect application of i.m. injections, hematomas after angiography;
4. *pressure in the area of inguinal canal* – tumors, enlarged nodes, aneurysm *a. femoralis*.

Lesions of the tibial nerve

- **Anatomy**: N. tibialis is formed by fibers from the roots of L5–S2. It separates from n. ischiadicus, sends several motor branches (*m. triceps surae, m. tibialis post., m. flexor digitorum longus* and *flexor hallucis longus*) and sensitively innervates the back of the calf and the lateral part of the leg (creates a connection with the peroneus nerve and creates a sensitive *suralis nerve*). It passes behind the inner ankle and its final branches are the *n. plantaris medialis* et *lateralis* innervating the small muscles of the leg.
- **Clinical picture**: Weakening of plantar flexion of the foot and toes. Patients are unable to walk on tiptoes. The foot is numb and the Achilles tendon reflex often disappears.
- **Causes**: Individual disability is very rare. Compared to the *n. peroneus*, it is significantly less fragile.

1. *knee trauma* – dislocation and displaced fractures;
2. *trauma in the passage area behind the inner ankle* – cuts and lacerations, ankle fractures, pressure with a plaster cast, etc.;
3. *tarsal tunnel syndrome* – initially manifest as intermittent pain shooting into the planta, with a longer duration of constant paresthesia and pain.

Lesion of the peroneal nerve

- **Anatomy**: The *N. peroneus* receives fibers from the roots of L4–S1. From n. ischiadicus, I separate as a common trunk *n. peroneus communis* and in the area of penetration into the *m. peroneus* it is divided into a superficial and a deep branch. During its course, it encircles the head of the fibula, where it is placed very superficially and is often injured in this place. It sensibly innervates the outer side of the calf. It motorically controls the eversion of the leg, the extensors of the front of the lower leg and the small muscles of the dorsum of the leg.
- **Clinical picture**: Because the dorsiflexion of the leg is restricted, the patient is unable to walk on the heels and the toe drops.
- **Causes**:

1. *pressure in the area of the head fibula* – the nerve can be pressed against the bone and bruised (eg: plaster fixation, long-term immobilization, operative position on the side, long-term squatting position while working in the garden);
2. *traction injuries* – result of knee dislocation or ankle distortion;
3. *strait syndrome* – fibrous band compression in fibular tunnel, anterior tarsal tunnel syndrome;
4. *compartment syndrome*;
5. *systemic polyneuropathies* – vasculitides, amyotrophic lateral sclerosis.

Links

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- ws:Syndromy postižení periferních nervů

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- Ischiadicus
- Femoral nerve
- N. tibialis
- Peronaeus communis nerve
- Inguinal canal
- Amyotrophic lateral sclerosis
- Vasculitides

References

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