# Arterial examination

**Arterial examination** is part of the examination of the cardiovascular system. Together with the examination of the veins, it provides us with comprehensive information about the condition of the patient's blood vessels. In the outpatient clinic, we can use the anamnesis and the basic principles of physical examination (i.e. look, feel, listen) especially for a quick assessment, we can also subject the patient to so-called *functional tests*. For more detailed information, an examination using various **imaging methods** is subsequently indicated.

## Anamnesis

As part of the anamnesis, we focus on factors related to atherosclerosis both in the patient and within the family.

We are particularly interested in:

- disorders of lipid metabolism (hypercholesterolemia);
- diabetes mellitus;
- hypertension;
- damage to the vascular system (Cerebrovascular accident, heart attack, thrombosis, embolization, ect.);
- clotting disorders;
- **smoking.**

### Symptoms

#### Acute disability

In the case of acute occlusion of an artery by embolism (more common) or Trombus, the progression of symptoms usually occurs within hours, especially in patients with poor-quality collateral flow. 50% of those affected develop **acute ischemic syndrome**, which is characterized by:

- sharp, severe pain;
- cold;
- pallor, followed by marbling and cyanosis;
- impaired movement, reflexes and sensitivity;
- absence of pulsations.

We register similar symptoms in patients with closed limb bypasses. Because these patients often have peripheral nerve damage in addition to vascular damage, ischemic syndrome **may not** may not be associated with severe pain.

**Template:Untreated ischemic syndrome progresses to gangrene.**

#### Chronic Disability

The symptoms of long-term arterial damage are diverse and are based on the **narrowing or closure of the lumen**. Ischemic areas subsequently arise behind the obstacle.

**Claudication pain** (*claudicatio intermittens*) is a typical symptom of involvement of the arteries of the lower limbs. The patient feels pinching or spasms while walking, this forces him to slow down or stop, which leads to pain relief within a few minutes. Manifestations are **most often in the calf**, což odpovídá problému ve femoropopliteální oblasti.which corresponds to a problem in the femoropopliteal area. In the case of changes in the arteries of the lower leg and leg, the location of the problem moves to the flat of the leg, symptoms in the thigh or buttocks are related to the pelvic arteries or the Aorta. An important piece of information is the ***claudication interval*** the section between individual stops), which **corresponds to the distance the patient can walk without pain**. An interval is used as one of the ischemic injury of the lower limbs (ICHDK). Shortening the interval, i.e. the distance the patient walks, is related to the worsening of the disease. The basis of this symptom is ischemia. Other problems can be subjective, e.g. the feeling of coldness of the limb and increased sensitivity to cold, but also objective, such as **attacks of white fingers** (*digiti morturii*), changes in the quality of the skin (e.g. hyperpigmentation, scaling, ulceration, etc.) or [[swelling].

Upper extremity involvement is less common and is more typically characterized by **whiteness of the fingers** rather than pain. The pain is more often associated with strait syndromes (carpal tunnel syndrome). Manifestations in the hand region correspond to damage to the arteries on the forearm. A very serious situation can be the narrowing or closure of the subclavian artery in front of the vertebral artery gap. During the work of the upper limb, the so-called **thief syndrome** (*subclavian steal syndrom*), arises, when blood for the limb is supplied by reversing the flow of blood in the vertebral artery. Part of the blood intended for the brain is lost in this way, which leads to neurological symptoms such as vertigo fatique, syncope. The set of these neurological symptoms can be summed up by the term**manifestations of vertebrobasilar insufficiency**. Due to the specific anatomical placement of the structures in the region of the clavicle, first rib and neck muscles, the entire nerve-vascular bundle for the

upper limb may be oppressed here. Patients tend to have variable manifestations of vascular and nerve damage, which often **worsen in connection with certain movements** e.g. during hyperabduction. {{For more detailed information, see|Upper Thoracic Aperture Syndrome}

# Physical examination

## By looking

During the visual examination, we evaluate:

- **skin quality**;
- **adnexa** (hair, glands and nails);
- **color**;
- **skin surface**.

When the arteries are affected, the skin gradually **atrophies**, the subcutaneous fat decreases and the typical relief (smoothing of the grooves above the interphalangeal joints) disappears. Hair is thinning, nails are deformed and grow slowly. Atrophy of the glands is manifested by dryness of the skin. If the patient is lying down, **the limb tends to be paler**, the moment it is hung from the bed, it turns red due to reactive hyperemia. Chronic stagnation of blood in the capillaries can be manifested by a red, cyanotic color. If we press the place with our finger, it turns pale. Manifestations on the surface are related to impaired patency of the posterior tibial artery, on the dorsum of the leg cyanosis indicates involvement of the anterior tibial artery. The surface of the skin can be damaged by abrasions, cracks or ulcerations. [Interdigital mycosis]] is often found in patients . Typical ischemic gangrene nejčastější most often begins at the tips of the fingers, it can be observed in patients with diabetes.

## By touch

During the examination, we assess **the temperature** and **pulse** by palpation.

By placing the dorsal side of the fingers symmetrically on both limbs, we mainly evaluate the temperature **difference** within the limbs. At the point of narrowing, there is a**palpable vortex** above the larger arteries, possibly above the arteriovenous shunt . We evaluate the pulsations in the places of the course of the relevant arteries, it is good to orientate yourself according to easily palpable anatomical structures. **A non-palpable or weakened pulse** can be associated with the occlusion of the artery, but also with the variability of its course (a. dorsalis pedis is absent in 8-14% of individuals).

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### Places of touch on upper limb

| Arteries | Place of touch | Note |
|---|---|---|
| common carotid artery | three fingers medial to the sternocleidomastoid muscle | CAVE: rritation of the carotid sinus can lead to bradykardia up to syncope. We never compress both carotid arteries at the same time! |
| a. subclavian | medioclavicular above the clavicle | |
| a. axilaris | mid axillary line | best when hands are up |
| a. brachialis | medial distal third of the arm between the biceps brachii and brachialis muscles | palpable up to the elbow pit |
| a. radialis | medial to the processus styloideus radii on the volar surface of the forearm | |
| a. ulnaris | compression in the wrist against the flexor carpi ulnaris tendon | |
| a. digitales | on the sides of the fingers against the individual joints | |

### Places of touch on lower limb

| Arterie | Místo pohmatu | Poznámka |
|---|---|---|
| a. femoralis | medially from the center of the inguinal ligament | |
| a. poplitea | wrap both hands around the knee, thumbs joined above the kneecap, the other fingers around the kneecap | with a free limb or in semiflexion |
| a. tibialis posterior | behind the medial ankle | |
| a. dorsalis pedis | instep of the foot between II. and III. metatarsal | frequent course variability |
| a. fibularis | in front of the lateral ankle | |

### By listening

By listening, we evaluate the presence of murmurs, which arise due to the change in blood flow from laminar to turbulent. At a narrowing of 60% of the clearance, a swirl is audible, but at 80% of the clearance, the murmur disappears. Auscultation assesses the carotid artery, superficial femoral artery, popliteal artery and the abdominal course of theaorta from the lower abdomen to the xiphoideus process.

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## Functional tests

### Allen's test (modified)

Using this test, we can determine **the condition of the arteries distal to the wrist**. The test procedure is as follows:

1. We feel and mark the places for palpation of the a. radialis a a.ulnaris.
2. Pacient následně rytmicky několikrát sevře ruku v pěst a na závěr ji nechá pevně sevřenou.
3. The patient then rhythmically clenches his hand into a fist several times and at the end keeps it tightly clenched.

In the places we have marked, we squeeze both vessels to prevent blood flow.

1. Let the patient relax the fist, the fingers and palm should be pale. (If they aren't, we probably didn't hit the supply arteries hard enough.)
2. With constant compression, the patient hangs his arm and we then release the pressure on **one** of the arteries. The patency of the artery and the corresponding arch will be manifested by reddening of the hand within a few seconds.
3. We repeat the test for the second artery.

### Ratschow test

This is a positional test associated with effort for the examination of the lower limbs. We can divide it into three phases.

**In the first phase:**

1. The patient lying on his back raises his outstretched legs to an angle of 45-60° relative to the mat.
2. He stays in the position for 30 seconds.
3. We evaluate the change in the color of the area, in the case of limb ischemia, the area becomes pale.

**In the second phase:**

1. Still in the position from the first phase, the patient performs plantar and dorsiflexion as quickly as possible.
2. We measure the time that passes before pain appears in the calf and at the same time observe the color of the limb.

**In the third phase:**

1. The patient sits on the bed and hangs the limbs over the edge.
2. Physiologically, the color on the insteps returns within 5 seconds, the veins on the insteps fill up within 10 seconds, and the legs are uniformly red within 15 seconds.

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## Differential diagnosis

In terms of differential diagnosis, we focus on the neurological history and diseases of the locomotor system.

## Links

### External links

- Allen's test: https://www.youtube.com/watch?v=gdgomN6TsuE
- Ratschow test: https://www.youtube.com/watch?v=1mVFTV3ZM0Y

### References

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