

The wrist consists of eight bones in two rows: the proximal and distal. The proximal row includes (starting from the radial bone): the scaphoid bone, the lunate bone, the triangular bone and the posttalar bone. The distal row includes: the larger four-sided trapezium, the trapezoid bone, the capitate bone and the ulnar bone.

80% of the axis burdening is sustained by the radioulnar articulation, which connects the distal radius with the scaphoid and lunate bones. The remaining 20% is sustained by the ulnar part of the wrist with the help of the TFCC.

The wrist doesn't move like a uniform complex. There're movements not only between the two rows of bones, but also between single bones. The articular activity of the proximal row is greater. The distal row is a more or less still structure that is connected to the bones of the metacarpal bones in the carpometacarpal joints. The scaphoid bone connects the two rows of wrist bones and works as a brace, thus increasing the wrist stability.

The wrist stability is ensured by a complex of tendons that belong to the internal and external system. The internal tendons tie the wrist bones together. The most important, clinically speaking, is the scapholunate tendon. The external tendons connect the wrist bones proximally with the radial and ulnar bones, distally - with the metacarpal bones. The tendons of the palmar side are thicker and more numerous. The tendons of the dorsal side are thinner. The importance of the tendons is obvious when you know that all tendons in this site (apart from the ulnar flexor of the wrist) have their distal attachments outside the wrist, thus the joints have no stabilization.

The TFCC mentioned above which enlarges the articular surface of the radial bone for the wrist, consists of the following structures: the triangular cartilage, the carpoulnar complex (the external tendons: the ulnarolunate and the ulnarotriangular) and the tendon sheath of the wrist ulnar flexor.

Wrist movements, apart from the distal radioulnar joint, take place in two planes:

1. flexion/extension in the sagittal plane,
2. radial abduction/ulnar adduction in the coronal plane.

The flexion of the wrist is usually located between 75 and 90 degrees, extension between 70 and 80 degrees, the radial abduction - 15 to 20 degrees and ulnar adduction between 35 to 40 degrees.

During the wrist extension movement, the first 2/3 of the movement is done in the radiocarpal joint, the remaining 1/3 - in the midcarpal joint. During flexion, the first half of the movement is done in the midcarpal joint, the second half - in the radiocarpal joint. The abduction and adduction movements are done mainly in the radiocarpal joint.

Apart from the medical interview and a clinical examination, the following additional tests are used in diagnosing a patient:

1. X-ray - the most common test, which significantly helps to differentiate wrist pathologies. Sometimes there's a necessity of taking pictures in additional projections.
2. Ultrasound - advisable when we deal with illnesses of soft tissues. It's done more rarely than X-rays, due to limited indications.
3. CT - may reveal the anatomy of the injury more thoroughly than ordinary X-rays. It's used for the examination of the skeletal system.
4. MRI - is used when there're problems with soft tissues and to examine vascularisation of the bone tissue.
5. Bone scintigraphy - is a sensitive yet non specific test. It's usually used when there's a possibility of fracture and a standard X-ray picture is unclear.
6. EMG - serves to examine the nerve conductivity, eg. in the carpal tunnel syndrome.
7. Arthroscopy - in the last years has become a more useful method of examination and treatment of many wrist illnesses, eg. tendon injuries, cartilage illnesses and intraarticular fractures.

The most frequent wrist illnesses are:

- [The carpal tunnel syndrome](#)
- [De Quervain's disease](#)
- [Triangular cartilage complex tear](#)
- [Saphenous bone fracture](#)
- [Wrist and area fracture](#)
- [Ulnar canal syndrome](#)

## The carpal tunnel syndrome

It's a frequent wrist disease. It's usually caused by a proffession or existing illnesses. Luckily, patients as frequently recover. With proper treatment, 90% of patients recover from weakly or medium intensified carpal tunnel syndrome.

### Who falls down with it?

Most people who use a typewriter or a computer is prone to this disease. The risk is greater when we type with arms in the air. This is when the same injuries and overburdening (of which we're not aware of) take place. Typing seems to be an easy task, a task that doesn't require any physical effort or involvement. Yet, if we do it frequently, the characteristic position of hands whilst typing causes compression of nerves that go through the wrist.

The carpal tunnel syndrome occurs and develops also due to kidney diseases, diabetes, joint illnesses, alcoholism, obesity, pregnancy and many more. Pain symptoms of various intensity develop in most people from the groups of risk.

## **What's the carpal tunnel syndrome?**

The illness is connected directly with the structure of the wrist. The wrist is built of small bones and surrounding tissues, which together make up a structure that looks like a tunnel – the so-called carpal tunnel. The tendons connect the muscles with the bones, and redirect the muscle movement onto the thumb and first three fingers. Also, a nerve transmitting stimulants between the hand and the spinal cord, runs through the carpal tunnel. Thus, as a result of overusing and overburdening, the tendons may swell, and the swelling may cause nerve compression, which, in turn, may lead to pain, numbness and prickling sensations.

## **Symptoms**

Symptoms are not characteristic, but they include:  
felt during work and intensifying at night: numbness, pain and prickling in the thumb, the index, middle and sometimes ring fingers,  
weakening of the muscles of the thumb,  
radiating pain from the arm, through the forearm to the shoulder,  
weakened sensation in fingers.

## **Prevention**

In order to reduce the risk of the carpal tunnel syndrome, it's worth to warm up the hand and fingers before work and during work it's necessary to relax and rest the hand and arm. When possible, we should avoid repetetive movements of the wrist. We also should create an ergonomic place of work. The table and chair should be regulated and we should have wrist pads.

[The carpal tunnel syndrome – treatment \(find out more\)](#)

## **De Quervain's disease**

It's a contracting inflammation of the tendinous sheaths in the site of the first row of extensors. This is a row that lies the furthest in the direction of the radial bone. It's in the site of the styloid process of the radial bone and contains the tendons of the long abductor of the thumb and the short extensor of the thumb, together with the sheaths. The first tendon may have two branches. The tendons may run through the common tunnel or, most frequently, through separate tunnels. It's suggested that these anomalies often influence the effects of the preventive treatment and bring about little positive effect after surgical treatment.

This disease may develop due to repeated activities that require frequent thumb abduction, together with the ulnar deviation of the wrist. Sometimes the disease is caused by bone changes in the distal epiphysis of the radial bone. In rare cases de Quervain's disease may become acute, due to a blunt trauma in the site of the styloid process of the radial bone.

Patients report pain and swelling in the site of the styloid process that intensify during thumb movements or a strong grip. Also, compression sensitivity is observed. If a superficial ramus of the radial nerve is involved in the disease process, extensive hyperaesthesia may occur. If, among characteristic symptoms, the Finkelstein's test is positive, the diagnosis has been completed.

[De Quervain's disease - treatment \(find out more\)](#)

## **Triangular cartilage complex tear**

Tears of the triangular cartilage complex may occur due to degeneration or injuries. The degenerative damages are connected with a positive variance of the ulnar bone and many co-occur with other disease changes, eg. ulnocarpal impingement syndrome.

Patients with the triangular cartilage complex tear often come in to report wrist pain on the ulnar side, often with a sound of a "click". There might have been an injury during a fall or wrist sprain. The pain intensifies during ulnar adduction and the rotation of the forearm. During an examination we try to assess the condition of the distal radioulnar joint by looking for instability and increased wrist supination. The result of the examination should be compared with the other hand. We do X-ray tests in order to look at the ulnar bone variance. The MRI test proves 90% accuracy in diagnosing this disease.

[Triangular cartilage complex tear \(find out more\)](#)

## **Saphenous bone fracture**

Fractures of the saphenous bone make up 80% of all wrist fractures. In the USA 345,000 fractures of the saphenous bone are noted yearly. The saphenous bone is the only bone that goes through both rows of the wrist bones. Thus it's exceptionally prone to injuries, especially in the area of its waist. The most frequent reason of the injury is a fall on a stretched arm with an extended wrist. It takes twice the strength to break the waist of the saphenous bone than to break the distal epiphys of the radial bone. The fracture may be accompanied by injuries of other wrist bones and ligaments leading to instability and increasing the risk of fracture nonunion. Due to atypical vascularisation of the saphenous bone, especially in the proximal pole area, fractures knit slower and healing may be endangered by the occurrence of the avascular necrosis of a bone fragment.

It's very important to examine the patient after the wrist injury he/she had. When we suspect the fracture of the saphenous bone, we should look for pain, especially in the area of the anatomical snuffbox and the dorsal surface of the wrist. The range of joint motion should be examined, too. We also should look for crackles, instability, swelling, hematoma and pain during axial compression of the thumb.

The fracture may not be visible on X-rays (in standard as well as additional

projections). In that case another X-ray test should be performed after 2 weeks. During the 14 days, due to bone resorption in the crack the X-ray may be able to show it. If an early diagnosis is necessary, bone scintigraphy, performed within 48 hours after the injury, shows secret fractures. CT is nowadays the best examination that allows to see the fractures in the wrist area. The MRI gives us an examination of soft tissues and of bone vascularisation.

[Saphenous bone – treatment \(find out more\)](#)

## **Wrist and area fracture**

This wrist injury occurs frequently and in a very simple way. It may be caused by a fall or a dorsal flexion of the wrist. Elderly people or those who suffer from osteoporosis are exceptionally prone to these fractures.

The wrist fracture is connected with the risk of deformities and complications (eg. stiffness, limited range of motion), that's why it's very important to introduce rehabilitation after treatment.

### **Kinds of wrist fractures**

There're three kinds of wrist fractures:

- Colles' fracture – most frequent type, it's a fracture of the distal epiphysis of the radial bone about 2.5cm from the wrist joint; occurs when a person falls down and leans against the floor with the erected hand,
- Smith's fracture – less frequent, occurs when a person falls down on the dorsum of the hand,
- fractures of wrist bones – least frequent and least dangerous.

### **Symptoms**

The most typical and clear symptom is wrist deformation, pain, swelling and a hematoma in the site of the injury. The wrist range motion may not be affected, although it's not a rule.

The symptoms are not intensified among women with osteoporosis, which makes it difficult to pose a correct diagnosis. In such a case it's necessary to have an X-ray done.

[Wrist and area fractures – treatment \(find out more\)](#)

## **Ulnar cannal syndrome (the Guyon's cannal)**

It's a compression of the ulnar nerve at the wrist level. The most frequent causes of the compression are: a ganglion, an adipoma or an aneurysm of the ulnar artery. The symptoms of the compression are always connected with numbness of the fingertips

of the little and ring fingers. Gradually the muscles weaken and we deal with atrophy of the muscles that are innervated with the ulnar nerve and with contraction in flexion of the little and ring fingers. In more severe injuries we observe claw positioning of the little and ring fingers and the abducted position of the little finger.

In order to diagnose the illness correctly, the doctor needs to examine the patient thoroughly and confirm the diagnosis with an EMG test, which shows the muscle activity and the conductivity in the peripheral muscles. The test consists of two stages: ENG (which checks the conductivity) and EMG (which checks the muscle with the help of a needle electrode).

[The ulnar canal syndrome – treatment \(find out more\)](#)

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