

The Wrist Joint

The **wrist joint** (also known as the radiocarpal joint) is an articulation between the radius and the carpal bones of the hand.

It is **condyloid-type** synovial joint which marks the area of transition between the forearm and the hand.

In this article, we shall look at the **anatomy of the wrist joint** – its structure, neurovasculature and clinical correlations.

Anatomical Structure

Articulating Surfaces

The **wrist joint** is formed by an articulation between:

- Distal end of the radius and the articular disk.
- Proximal row of the carpal bones (except the pisiform).

Together, the carpal bones form a **convex** surface, which fits into the concave shape of the radius and articular disk.

The ulna is prevented from articulating with the carpal bones by the presence of a fibrocartilaginous ligament, the **articular disk**. Instead, the ulna articulates with the radius just proximal to the wrist – at the distal radioulnar joint.

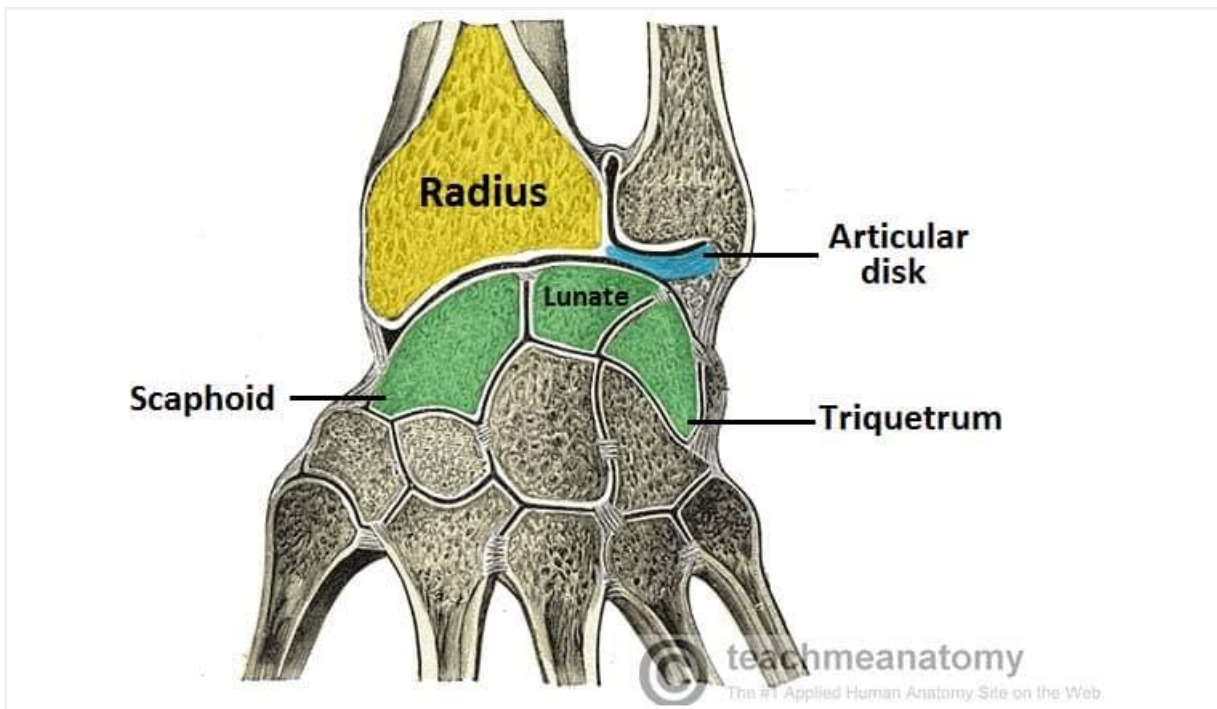


Fig 1
Articular surfaces of the wrist joint.

Joint Capsule

The **joint capsule** of the wrist joint attaches to the radius, ulna and the proximal row of the carpal bones.

It is lined internally by a **synovial membrane**, which produces synovial fluid to reduce friction between the articulating structures.

Ligaments

There are four main ligaments located at the wrist joint:

- **Palmar radiocarpal** – located on the palmar (anterior) side of the joint. It passes from the radius to both rows of carpal bones. Its function, apart from increasing stability, is to ensure that the hand follows the forearm during supination.
- **Dorsal radiocarpal** – Found on the dorsum (posterior) side of the hand. It passes from the radius to both rows of carpal bones. It contributes to the stability of the wrist, but also ensures that the hand follows the forearm during pronation.
- **Ulnar collateral** – Runs from the ulnar styloid process to the triquetrum and pisiform. It acts to prevent excessive radial (lateral) deviation of the hand.
- **Radial collateral** – Runs from the radial styloid process to the scaphoid and trapezium. It acts to prevent excessive ulnar (medial) deviation of the hand.

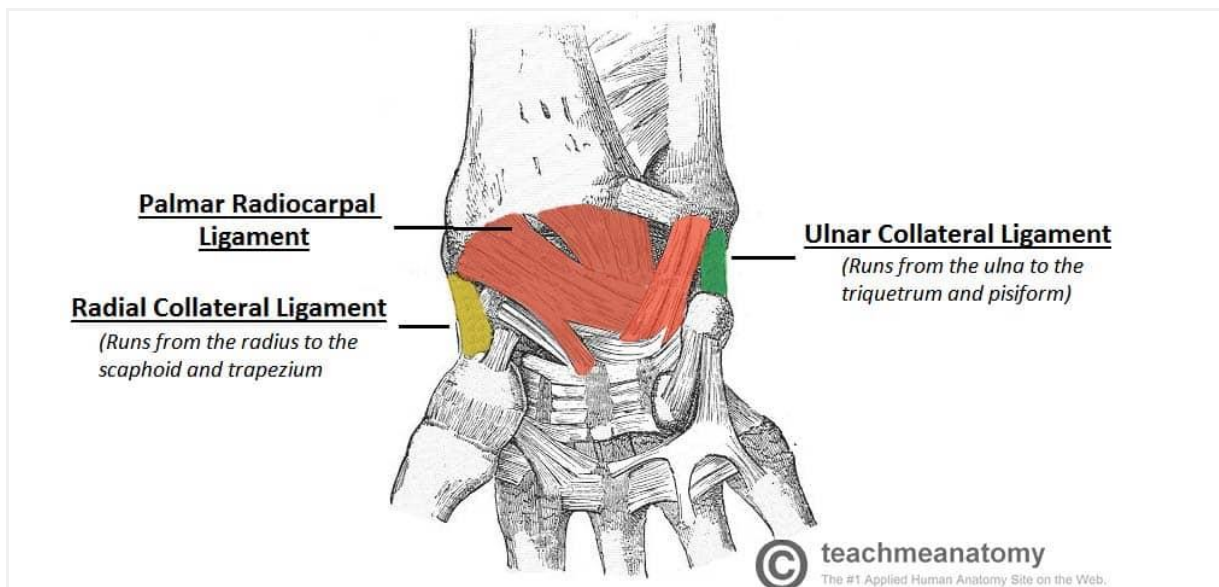


Fig 2

Palmar view of the ligaments of the wrist joint.

Pro Feature - Dissection Atlas

Movements

The wrist is an **ellipsoidal** (condyloid) type synovial joint, allowing for movement along two axes. This means that flexion, extension, adduction and abduction can all occur at the wrist joint.

All the movements of the wrist are performed by the muscles of the forearm.

- **Flexion** – Produced mainly by the flexor carpi ulnaris, flexor carpi radialis, with assistance from the flexor digitorum superficialis.
- **Extension** – Produced mainly by the extensor carpi radialis longus and brevis, and extensor carpi ulnaris, with assistance from the extensor digitorum.
- **Adduction** – Produced by the extensor carpi ulnaris and flexor carpi ulnaris
- **Abduction** – Produced by the abductor pollicis longus, flexor carpi radialis, extensor carpi radialis longus and brevis.

Mobility and Stability

The wrist joint is a highly mobile joint to allow the hand to move in several directions. Because of this, the wrist joint is prone to injury.

The wrist joint does maintain some stability due to intrinsic and extrinsic ligaments. Intrinsic carpal ligaments, the tiny ligaments between the carpal bones, are short ligaments that provide stability but are easily damaged with excessive force or twisting due to their small size.

The extrinsic ligaments, which include the palmar/dorsal radiocarpal ligaments and the radial and ulnar collateral ligaments are stronger and stabilise from the radius and ulna to the carpal bones of the wrist. They are discussed above in further detail.

Blood Supply

The wrist joint receives blood from branches of the dorsal and palmar carpal arches, which are derived from the **ulnar** and **radial** arteries (for more information, see Blood Supply to the Upper Limb)

Innervation

Innervation to the wrist is delivered by branches of three nerves:

- **Median nerve** – Anterior interosseous branch.
- **Radial nerve** – Posterior interosseous branch.
- **Ulnar nerve** – deep and dorsal branches.

Injuries to the Wrist Joint

Scaphoid Fracture

The scaphoid bone of the hand is the most commonly fractured **carpal bone** – typically by falling on an outstretched hand (FOOSH).

In a fracture of the scaphoid, the characteristic clinical feature is pain and tenderness in the anatomical snuffbox.

The scaphoid is at particular risk of **avascular necrosis** after fracture because of its so-called ‘retrograde blood supply’ which enters at its distal end. This means that a fracture to the

middle (or 'waist') of the scaphoid may interrupt the blood supply to the proximal part of the scaphoid bone rendering it avascular.

Patients with a missed scaphoid fracture are likely to develop **osteoarthritis** of the wrist in later life.



Fig 3

Radiograph of a scaphoid fracture.

Adapted from work by Iibalesiii [CC BY-SA 4.0]

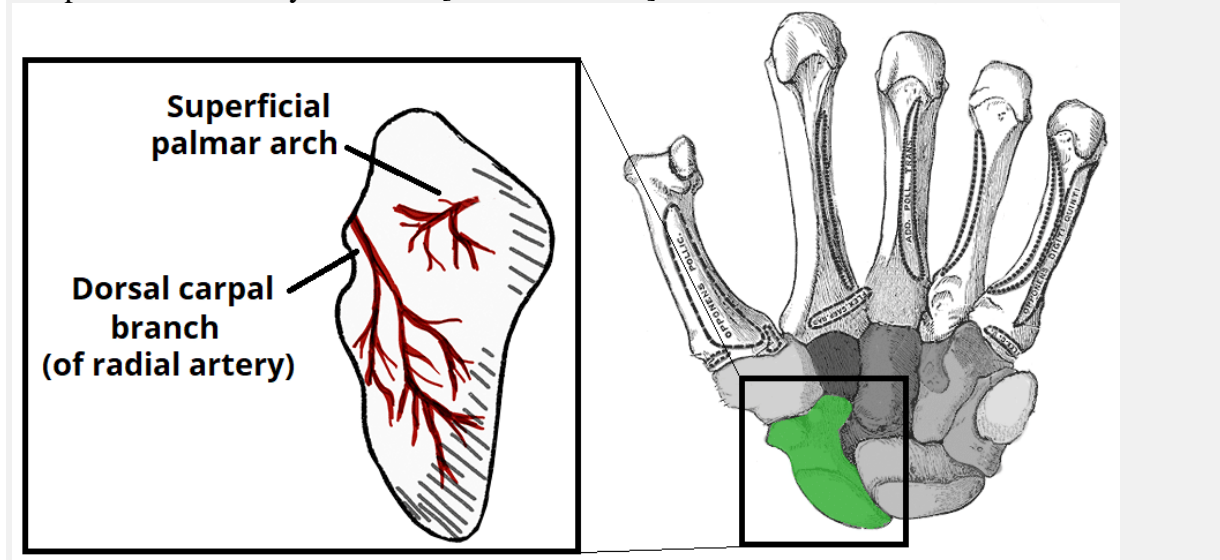


Fig 4

The blood supply to the scaphoid bone runs from distal to proximal.

Anterior Dislocation of the Lunate

This can occur by falling on a **dorsiflexed** wrist. The lunate is forced anteriorly, and compresses the carpal tunnel, causing the symptoms of carpal tunnel syndrome.

This manifests clinically as paraesthesia in the sensory distribution of the median nerve and weakness of thenar muscles. The lunate can also undergo avascular necrosis, so immediate clinical attention to the fracture is needed.

Colles' Fracture

The Colles' fracture is the **most common** fracture involving the wrist, caused by falling onto an outstretched hand.

The radius fractures, with the distal fragment being displaced **posteriorly**. The ulnar styloid process can also be damaged, and is avulsed in the majority of cases.

This clinical condition produces what is known as the 'dinner fork deformity'.

