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Wrist and hand injuries in sport

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Outline

- o This chapter will review the functional anatomy of the hand and wrist and explain the causative factors of acute soft tissue injuries of the hand and wrist
- o Discuss the differences between acute and chronic injuries of the hand and wrist.
- o The chapter will further provide an overview of common soft tissue injuries of the hand and wrist by detailing the assessment, management, and rehabilitation strategies and protocols

Incidence of wrist and hand injuries

- Wrist and hand injuries are common in all types of sports.
- These injuries ranging from acute traumatic fractures, which can be seen in contact sports, such as football, rugby, hockey and basketball
- Chronic stress and overuse injuries, such as those seen in golf, gymnastics and various types of racquet sports
- Offensive and defensive linemen were most likely to sustain hand injuries, due to the higher incidence of contact with opponents,

- o Tennis players are also prone to overuse injuries (Jacobson et al. 2005), with studies showing that the extensor carpi ulnaris (ECU) in particular, may become dysfunctional as a result of prolonged or faulty technique
- o Wrist is the second most injured site in gymnastics after the shoulder
- o Sporting injuries of the wrist and hand are altogether not that uncommon, accounting for around a fifth of all emergencies presented to medical units within the UK

Anatomy of the wrist and hand

- o Assessment relies on a good applied knowledge of anatomy; a systematic and applied approach to the assessment process.
- o It is important, when assessing a client, to understand the functionality of the joint so that comparisons of dysfunction can be made

- o Motor tasks often include hand and wrist actions such as blocking, gripping, catching and throwing, which can be seen being performed by most of today's athletes in almost every sport.
- o The structure and function of the wrist and hand are unique, in that the muscles, joints, tendons and ligaments all work together to provide stability, whilst enabling the thumb and four fingers to perform intricate and often delicate movements

- The wrist and hand are comprised of 27 bones and more than 20 joints, of which there are 8 carpal bones, 5 metacarpal bones and 14 phalanges
- The scaphoid is the most commonly fractured bone of the carpals
- Dislocations of the capitate with the lunate may also occur as a result of scaphoid fractures, termed a 'perilunate dislocation

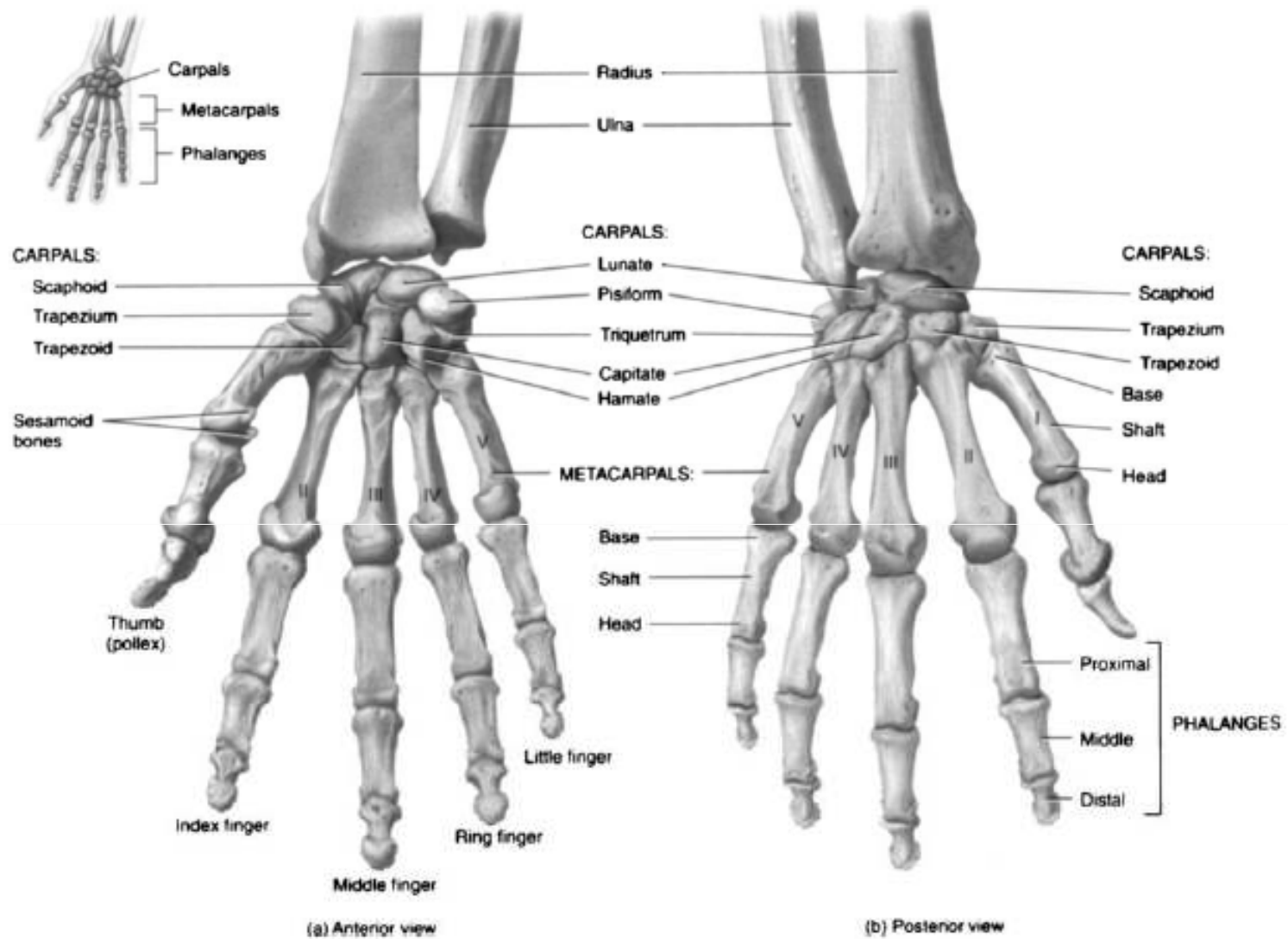


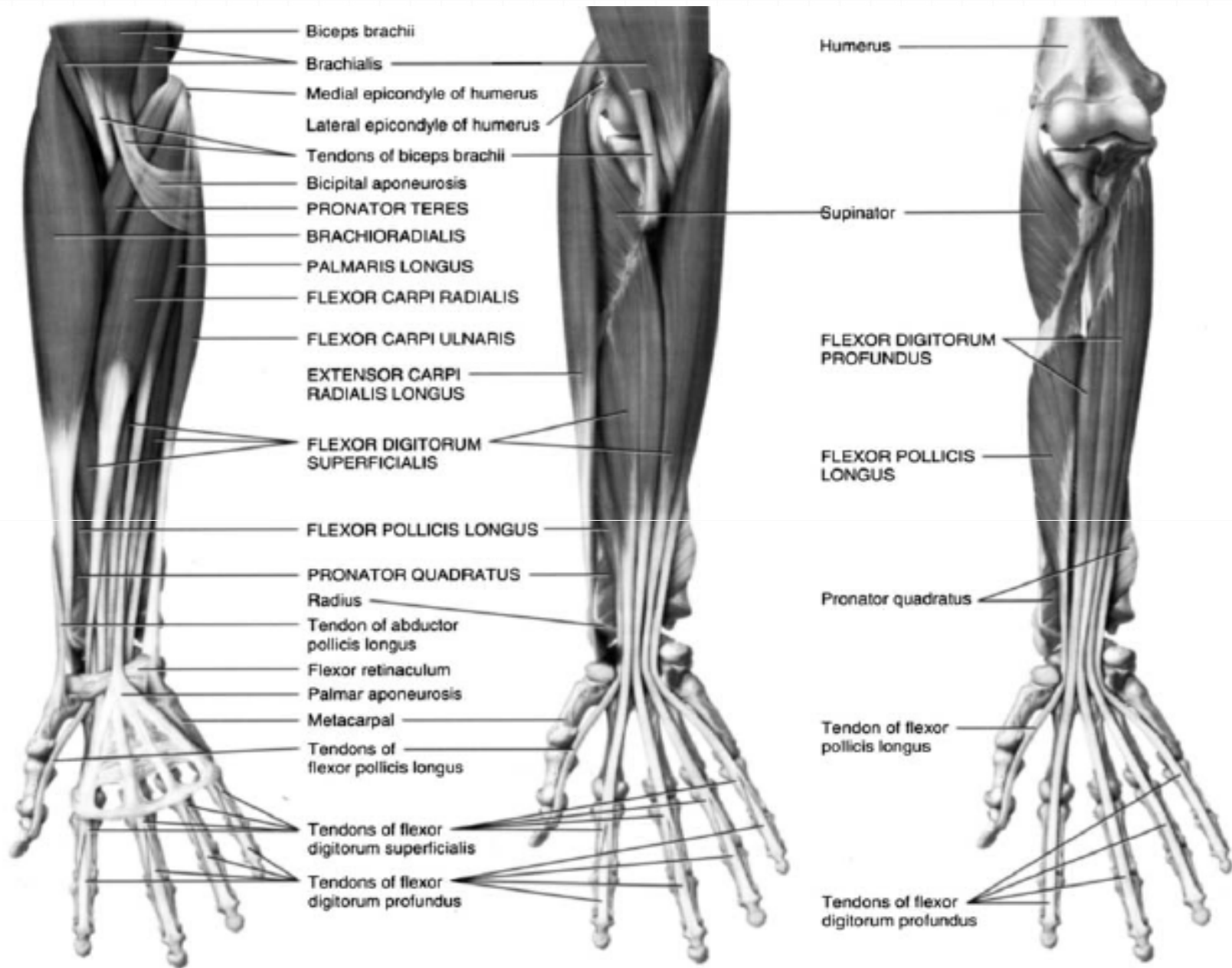
Figure 19.1 Bones of the wrist and hand (example). Reproduced, with permission, from Principles of Anatomy and Physiology, (11th ed). Tortora, G.J., & Derrickson, B., (2006)

o Joints:

- o* The joints of the wrist and hand can be classified by their anatomical location and articulation with one another, to make up the:
 - o* Radiocarpal joint (RC)
 - o* Mid carpal joint (MC)
 - o* Carpometacarpal joint (CMC)
 - o* Metacarpophalangeal joint (MP)
 - o* Interphalangeal joint (IP)

Muscles

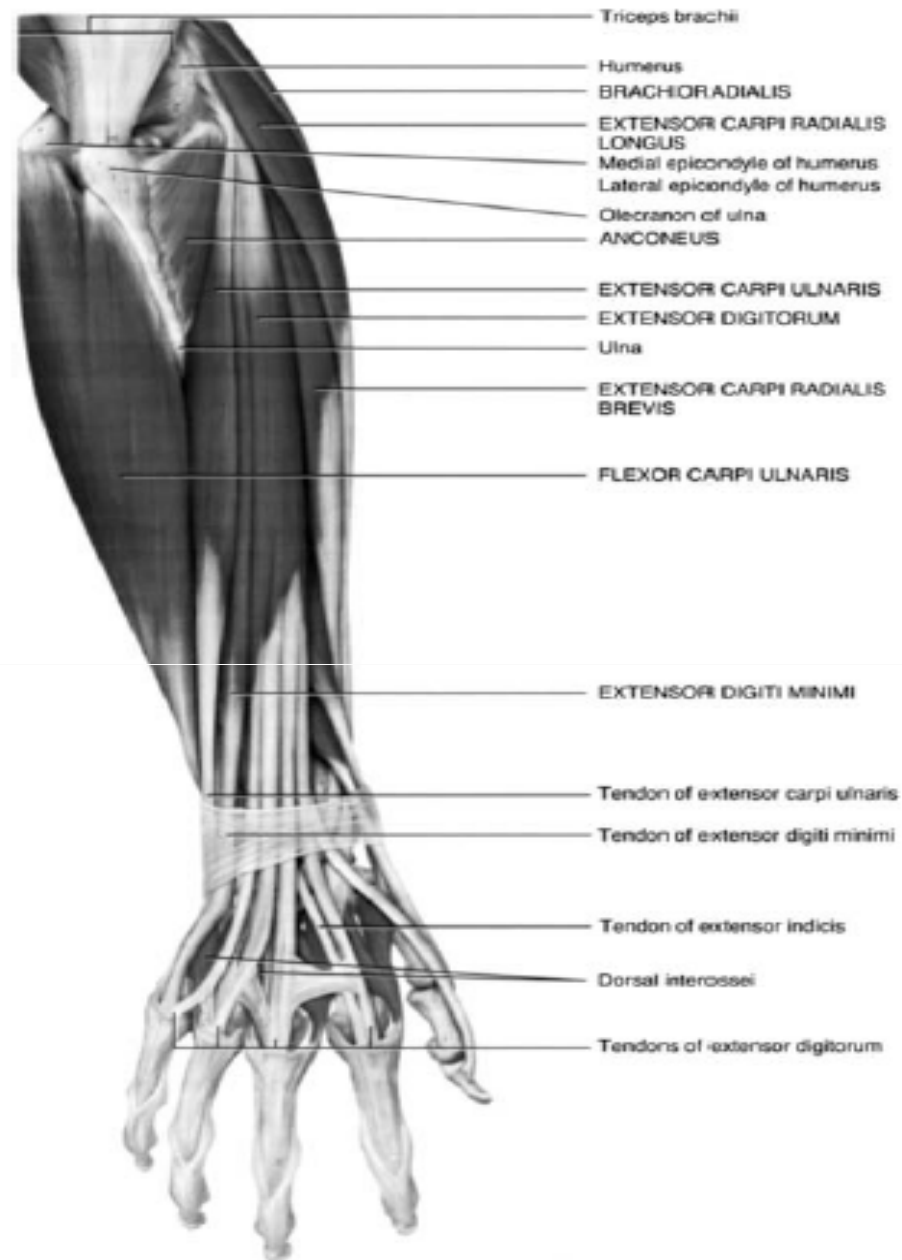
- o There are five muscles that act on the wrist joint.
- o These are the flexor group:
 - o Flexor carpi radialis, palmaris longus and flexor carpi ulnaris
 - o Extensor group; extensor carpi radialis longus and extensor carpi ulnaris
- o It is worth noting that a small percentage of individuals do not possess the palmaris longus, which aids to tighten the palmar fascia (Saied and Karamoozian 2009)
- o Intrinsic and extrinsic muscles of the hand, which co-exist to produce movement for the thumb and fingers.



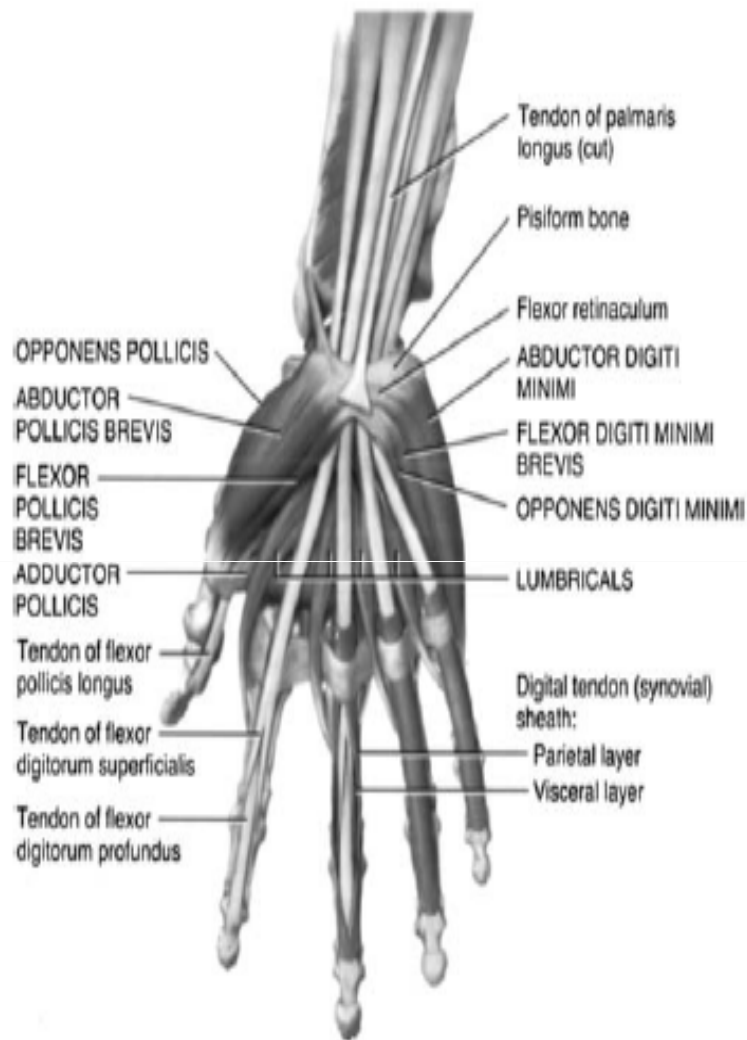
(a) Anterior superficial view

(b) Anterior intermediate view

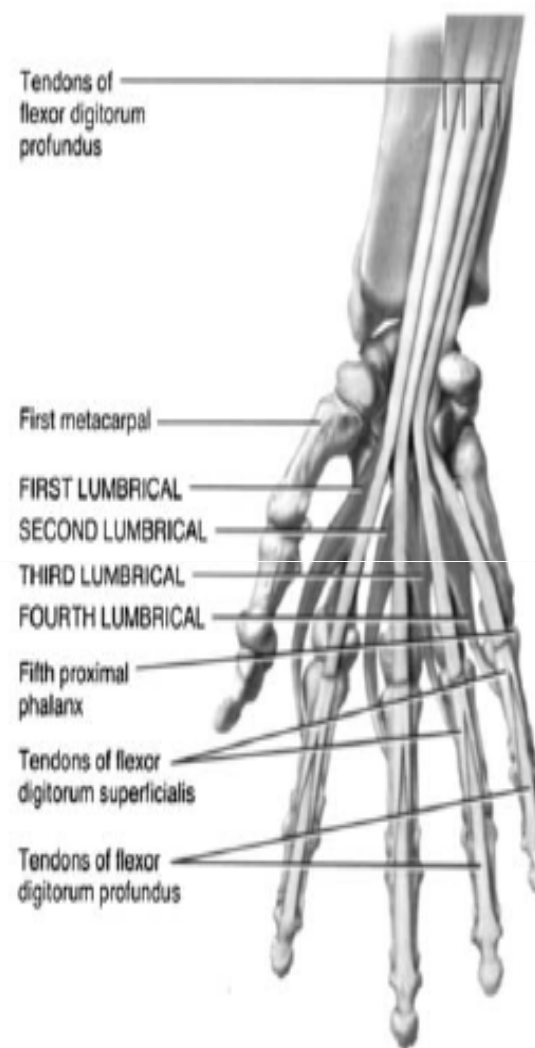
(c) Anterior deep view



(d) Posterior superficial view



(a) Anterior superficial view



(b) Anterior intermediate view showing lumbricals

Assessment and management of wrist and hand injuries

- Subjective Assessment
- Objective Assessment:
 - Palpation
 - Range of motion
 - Special testing
 - Functional assessment

Common sporting wrist and hand injuries

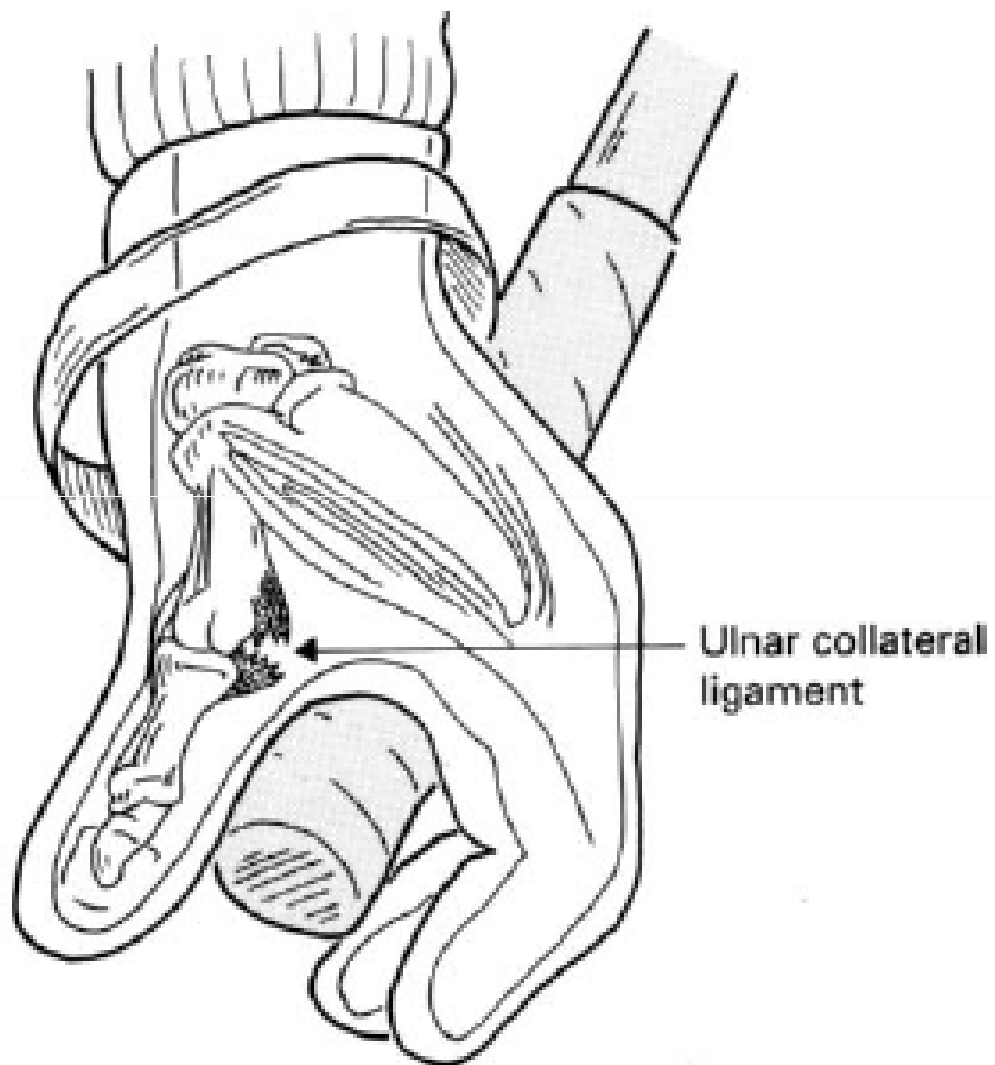
- **Acute soft tissue injuries:**

- *Gamekeeper's thumb*

- A common injury sustained by players in football and hockey, the gamekeeper's thumb is a sprain of the ulnar collateral ligament, also termed the 'skier's thumb', for the mechanism in which the injury is sustained

- **Management**

- **Injury prevention**



Mallet finger

- o Another common injury sustained in field and contact sports is mallet finger.
- o Mallet finger is sustained from forceful flexion of an extended distal DIP joint, such as when a player has mistimed a shot or catching the ball.

Jersey finger

- o A disruption of the flexor digitorum profundus tendon, also known as jersey finger, commonly occurs when an athlete's finger catches on another player's clothing
- o Usually while playing a team sport such as football or rugby.
- o As the athlete pulls away, the finger is forcibly straightened while the profundus flexor tendon continues to contract.
- o The ring finger is the weakest digit of the four fingers, accounting for 75% of all reported cases

Boutonniere deformity

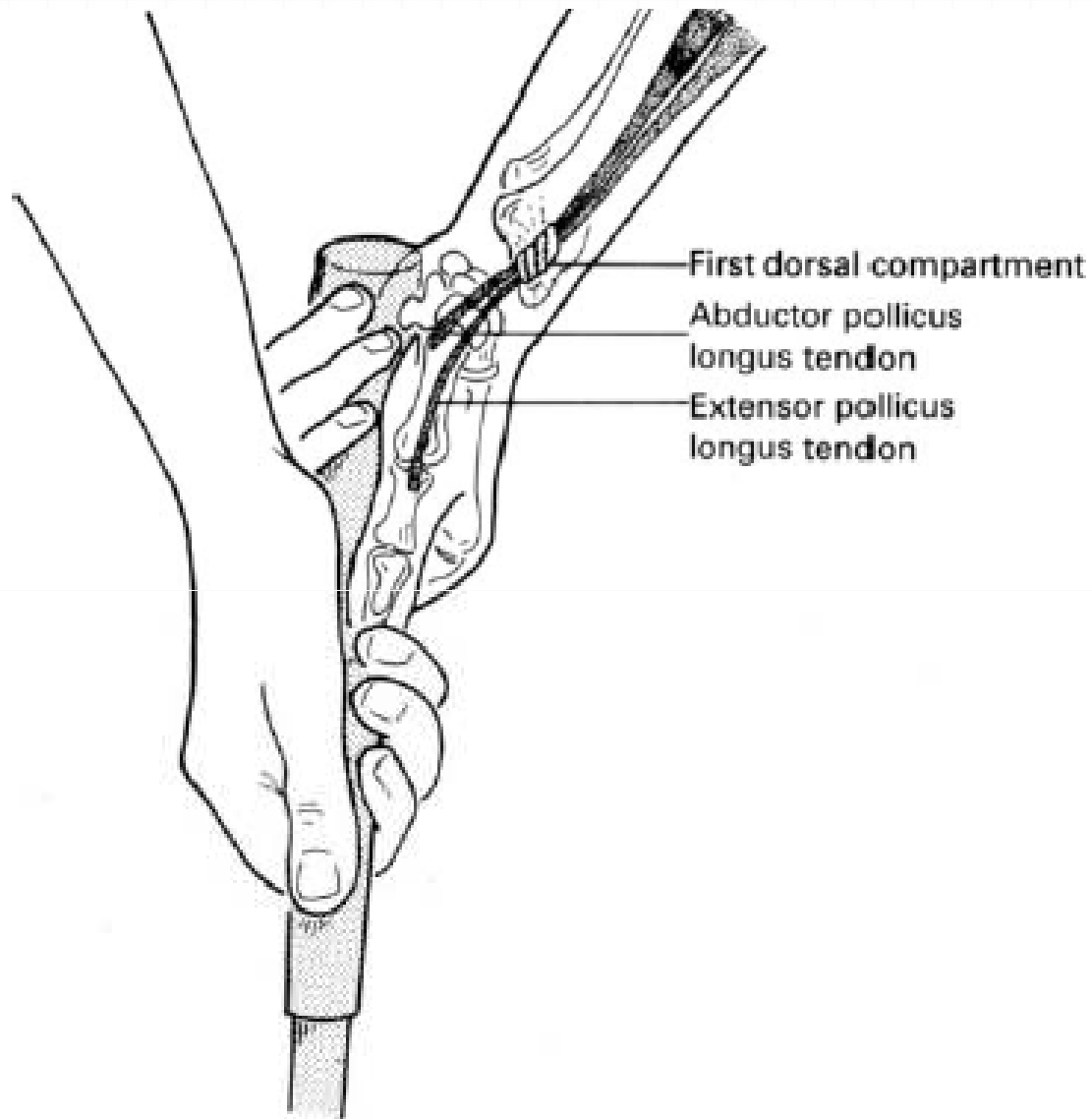
- o A common injury to the central slip extensor tendon (boutonniere deformity) occurs when the PIP joint is forcibly flexed while actively extended.
- o It is a common injury among basketball players.
- o Volar dislocation of the PIP joint can also cause central slip tendon ruptures

- o Extensor pollicis longus rupture*
- o Triangular fibrocartilage complex tears*
- o Collateral ligament sprains*
- o Wrist sprains*
- o Contusions*

Chronic and overuse injuries

De Quervain's disease:

- De Quervain's disease (also known as Hoffmann's disease) is an inflammation and thickening of the synovial lining of the common sheath of the abductor pollicis longus and extensor pollicis brevis tendons



- o Carpal tunnel syndrome*
- o Ulnar nerve compression*
- o Impingement syndrome*
- o Trigger finger*

Bone Pathology

- *Scaphoid fracture*

- *Metacarpal fractures*

- *Finger fractures*

- *Bennett's fracture*

 - A Bennett's fracture of the thumb (first metacarpal bone) is similar in mechanism to an MCP fracture. Except in this case impact is specifically targeted on thumb

- *PIP joint dislocations*

Table 19.1 UK sports and associated injuries (Rettig 2003, 2004)

Sport	Associated injuries	Occurrence
Rugby Union and Rugby League	Mallet finger DeQuervain's tenosynovitis Metacarpal fractures Scaphoid fractures Trigger finger/thumb Jersey finger	Direct trauma from player contact
American Football	Hyper extension wrist injury Flexor digitorum profundus ruptures Perilunate dislocation CMC and PIP joint injuries: collateral ligament tears, dislocations, fractures and volar plate injuries Intra-articular tears	Direct trauma and deviation forces
Boxing	Extensor tendon injury: Boxer's knuckle	Repetitive trauma
Tennis (other racquet sports such as squash and badminton)	Triangular fibrocartilage complex (TFCC) tears Extensor carpi ulnaris (ECU) dysfunction Carpal tunnel syndrome Ulnar wrist pain Hook of hamate fracture Kienbock's disease	Repetitive and overuse injury
Golf	Wrist flexor tendonitis	Overuse injury
Basketball	Sprained wrist Boutonniere deformity Finger fractures Gamekeeper's thumb	Direct trauma and falling
Gymnastics	Distal radius fractures Avascular necrosis of the capitate Ulnocarpal abutment syndrome Dorsal impingement	Repetitive loading and axial compression

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Rock climbing	Pulley disruption	Falling
Hockey	Gamekeeper's thumb Hand/finger fractures Finger tendon and ligament sprains	Direct trauma and player contact
Cricket	Bennett's fracture Carpal tunnel Mallet finger Wrist arthritis	Repetitive trauma and overuse injury
Cycling	Guyon's canal syndrome	Repetitive loading and compression
Weightlifting	Subluxation of the ECU Intersection syndrome	Overuse syndrome

Thanks