

Hand Injuries

Contributors

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Overview

Injuries to the hand are common sports-related injuries, with hand and wrist injuries responsible for between 3-25% of all sport related injuries.¹ Some musculoskeletal conditions of the hand are even named after the sport they are seen commonly associated with. They can affect ligaments; such as Skier's thumb, bones; such as Boxer's fracture, or tendons; such as Trigger finger. They can be hugely debilitating, not only for sports performance, but activities of daily living. Knowledge of anatomy can facilitate the swift identification and appropriate management of musculoskeletal injuries, preventing long term sequelae. Management options are often divided into conservative, with a combination of immobilisation and physiotherapy, or surgical.

Case Studies

- 1) Miss X was riding her bike when she misjudged a curb and fell off. Since the accident she reports pain between her thumb and forefinger where she landed on the handlebar. She is now struggling to write as her grip on the pen is weak. MRI revealed a partial tear of her UCL and diagnosed with Skier's thumb. She underwent 4 weeks immobilisation with a splint, followed by a course of physiotherapy to improve mobility.
- 2) Mr Y was involved in a fight last night and has presented to A&E with a swollen hand, most painful over dorsal surface of hand across the 5th metatarsal. X-ray revealed a transverse fracture in his 5th metatarsal. He was diagnosed with Boxer's fracture and underwent surgery and it was fixed with an intramedullary nail.
- 3) Mr Z is a diabetic builder who uses a lot of power tools. He presented with a sore, stiff 2nd index finger that would give him a "clicking" sensation when he forced it to bend or straighten. He was diagnosed with Trigger finger. On medical advice, he trialed a splint for 6 weeks with minimal success before finally getting resolution of symptoms with a corticosteroid injection.

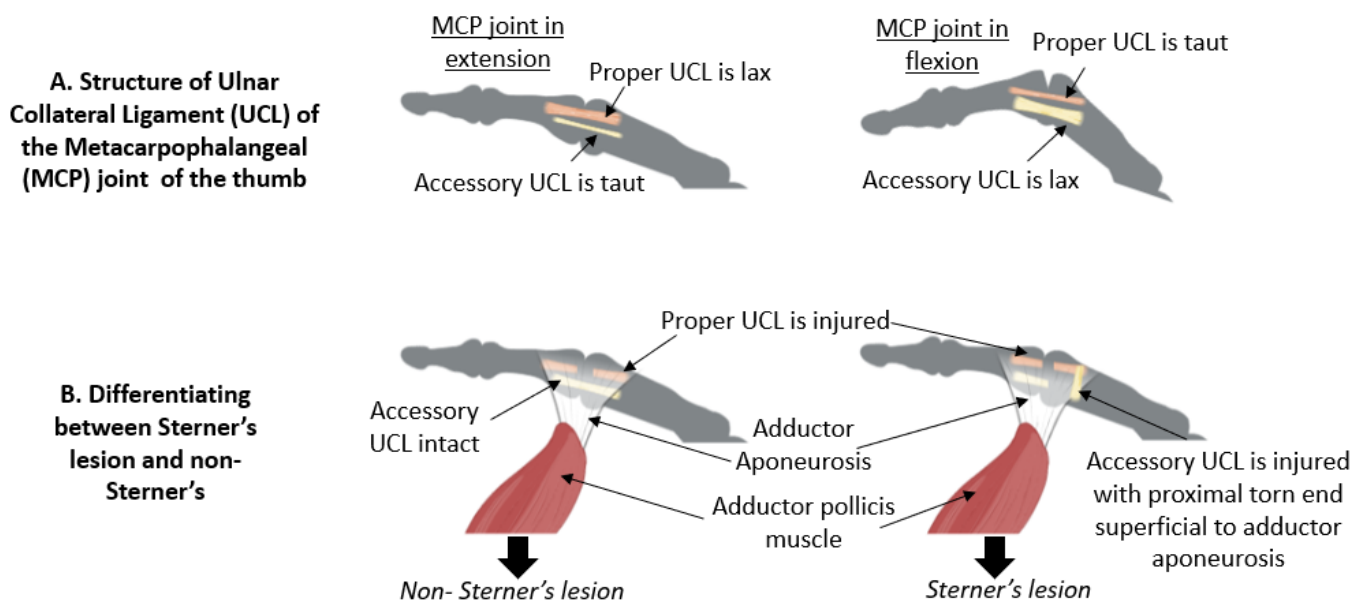
Aetiology, Anatomy and Epidemiology

Skier's thumb involves an acute injury to the ulnar collateral ligament (UCL).²

Anatomy: The thumb is a highly mobile joint, stabilised by a capsule alongside a series of dynamic muscles and passive ligaments. A key ligament that keeps the thumb pointing in a similar direction to other digits is the UCL. As illustrated in figure 1a, the UCL is made up of the proper collateral ligament, (attaches the medial condyle of the first metacarpal and inserts into the medial aspect of the first phalanx) and the accessory collateral ligament (which runs parallel but inserts more volar). The UCL sits under a structure called the adductor aponeurosis, which is attached to the adductor pollicis muscle. When there is slippage of one end of a torn UCL superficially to sit above the adductor aponeurosis, surgical intervention is required. This occurs in around 64-87% of UCL tears and is termed a Sterner's lesion,³ pictured in figure 1b.

Epidemiology: Skier's thumb occurs most commonly in bike or motorbike accidents (40%), when the thumb gets stuck behind handlebar, and in sports with a stick or ball (30%). Only 10% of skier's thumbs are reported to be from skiing accidents.⁴

ANATOMY OF SKIER'S THUMB



Both figures created with Biorender.com

Boxer's fracture is a fracture of the neck of the 5th metacarpal bone.⁵

Anatomy: The metacarpal bones connect the phalanges to carpals within the hand as seen in figure 2.

Epidemiology: The majority of Boxer's fractures are found in young males.⁵ Boxer's fractures are commonly caused by direct force to a clenched fist, frequently punching a hard surface. Ironically, most experienced boxer's do not suffer with this injury since they have been trained to load via their 2nd and 3rd metacarpals.⁶

Trigger finger is a condition where pain/stiffness/locking is experienced on flexion of a finger.⁷

Anatomy: The flexor tendons attach the muscles of the forearm allowing the finger to bend on contraction, gliding through a set of pulleys that the tendons sit within, called the tendon sheath, which hold the tendon close to the finger. When one of the pulley's become inflamed and thickened, friction is created and a nodule can develop on the flexor tendon, causing the joint to be stiff and locked.

Epidemiology: Trigger fingers are most common after forceful hand activities, such as rock climbing, using a drill for extended periods of time or carrying heavy shopping bags, or in certain medical conditions, such as rheumatoid arthritis and diabetes.⁷

ANATOMY OF BOXER'S FRACTURE



Figure 2. Schematic illustrating the anatomy of a boxer's fracture with the red line representing the common location of fracture on the neck of the 5th metacarpal bone.

Figure created with Biorender.com

ANATOMY OF TRIGGER FINGER

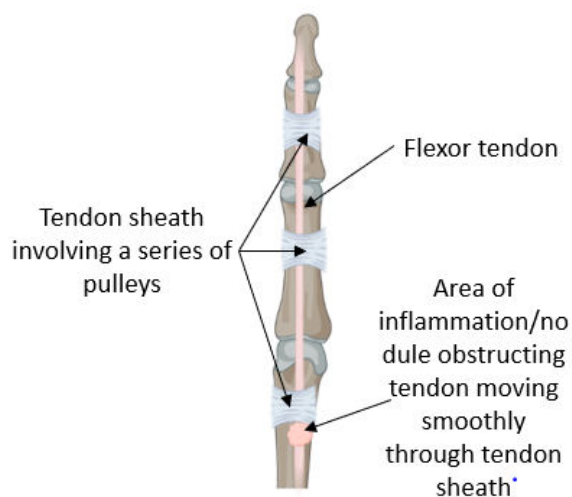


Figure 3. Schematic illustrating the anatomy of a trigger finger injury involving the flexor tendons.

Figure created with Biorender.com

Clinical Features and Differential Diagnoses

	Skier's thumb	Boxer's fracture	Trigger finger
Pain	Pain at the base of the thumb in the web space between the thumb and index finger. Pain can be referred to the wrist. Pain is replicated on palpation of the ulnar aspect of thumb	Pain in the dorsal surface of hand across the 5 th metatarsal	Pain on palpation at the base of finger on volar side or when bending or straightening finger
Inspection	Swelling and/or black/blue discolouration of thumb	Swelling and/or black/blue discolouration of the 4 th index finger which may appear misaligned and crosses other index fingers	Affected finger is often held in a flexed position at interphalangeal joints with thickening/swelling of the flexor sheath
Movement	Weakness/instability of grasp between thumb and first index finger and pincer grip	ROM of 3 rd and 4 th index fingers limited	Catching/popping/locking sensation on movement of finger
Clinical tests	Valgus stress to UCL reveals laxity of 30°, 15° greater than contralateral or lack of endpoint. If laxity present with thumb in flexion as well as extension, accessory UCL is also torn and Sterner's lesion more likely (which may be present as palpable mass may be present proximal to adductor aponeurosis)	-	-

Differential diagnoses	Avulsion fracture 1 st Metacarpophalangeal joint dislocation Bennett or Rolando fracture (partial or complete respectively intra-articular fracture at the base of the thumb) ⁸ Fracture or sprain at wrist	Injuries to neighbouring bones and soft tissues (tendons, ligaments)	Metacarpophalangeal joint osteoarthritis Dupuytren's contracture Flexor tendon/sheath tumours Sesamoid bone abnormalities
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Investigations and Management Options

	Skier's thumb	Boxer's fracture	Trigger finger
Investigations	XR – useful to rule out avulsion fractures (present in 21%) ⁹ Ultrasound – useful within first week with sensitivity 95.4% and specificity 80% for detection of Stener lesions ⁹ MRI – gold standard, sensitivity 96%-100% and specificity of 95-100% ⁴	XR – can identify features of fracture including location, comminution, displacement, rotation and involvement of MCP joint surface ⁵	Clinical diagnosis – no imaging required
Management options	Sprains and partial tears can be treated conservatively with a period of 4 weeks immobilisation with splint or short-arm thumb spica cast followed by physiotherapy. ¹⁰ Complete tears can be managed conservatively or surgically but presence of Stener lesion necessitates the latter. Surgical techniques vary using different tendon grafts but none deemed superior ⁴	Uncomplicated fractures can be managed with immobilisation with ulnar gutter splint or “buddy-strapping”. Angulated closed fractures can be reduced as treated as uncomplicated fractures. Fractures that are open, compound, intra-articular, malunion, non-union, irreducible or have a distal fragment with volar angulation and displacement require surgery. Again, there is no evidence for superior surgical technique from K wires, intramedullary nails and plates and screws. ⁵	Non-surgical treatment is first line. An observational study revealed resolution of symptoms on an average of 8 months without intervention. ¹¹ A recent study revealed night splinting with daytime mobilisation for 6 weeks led to symptom resolution in 55%. ¹² Corticosteroid injections are successful with 90% cure rates after 2-3 injections. ¹³ Surgical treatment, after a failed trial of non-surgical, involves US-guided longitudinal laceration of A1 pulley. ⁷

References

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