

Thumb UCL Repair

Overview

- A controlled active motion therapy protocol after suture anchor repair of a ruptured UCL of the thumb is safe from a biomechanical point of view [1].
- Thumb UCL repair with suture tape augmentation demonstrates short-term outcomes comparable to what has been reported for other methods of repair [2].
- In patients with chronic UCL reconstructions, there was no significant change in pinch strength [3].
- In patients with chronic UCL reconstructions, significantly better results were achieved in grip strength, flexion, extension, ulnar and radial deviation [3].
- Acute surgical repair of the torn ulnar collateral ligament can achieve good subjective and objective functional results [4].
- Intraosseous suture anchor repair is a safe and effective method for repair of complete tears of the ulnar collateral ligament of the thumb MP joint [5].
- Late reconstruction of the ulnar collateral ligament of the thumb MP joint with free tendon graft provided good improvement in stability and strength of the thumb [6].
- Early mobilisation after robust tendon repairs is favoured to avoid tethering of the long tendons of the thumb during the early post-operative period [7].
- In a surgical cohort of active-duty soldiers with thumb MCP UCL injuries, rifle-related injury was the most commonly documented injury mechanism [8].
- Distal placement of the UCL phalangeal insertion restricted flexion motion from a mean of 57° to 47° [9].
- Avulsion of the ulnar collateral ligament of the thumb IP joint is a previously undescribed injury [10].
- At the last postoperative follow-up (range 6 weeks-6 months), 11 of 12 patients had good to excellent results subjectively and had regained 75% of the strength of the uninjured side [11].
- Arthroscopic reduction of a Stener lesion allows healing of the ulnar collateral ligament without the need for open repair [12].
- Functional and subjective outcomes were good or satisfactory in more than 90% of patients treated with functional bracing [13].

- Pure ligamentous injuries of the ulnar collateral ligament of the thumb in a child are much less common than epiphyseal fractures [14].
- Rodeo roping thumb injuries emphasize the importance of keeping the thumb upward and clear of the rope to avoid entrapment between the rope and saddle horn [15].
- After undergoing open reduction and internal fixation for thumb ulnar collateral ligament avulsion fractures, patients had relief of thumb pain and pinch strength improved from 36% of the contralateral side to 89% ($p < .01$) [17].
- The use of interference screws for fixation of tendon grafts to bone for hand ligament reconstructions is a promising new surgical technique [18].

Anatomy & Pathophysiology

OSSEOUS ANATOMY & KINEMATICS

- The skeleton of the hand consists of 27 bones, of which 19 are long bones [32].
- The thumb ray (first ray) is the shortest and consists of only three bones: a metacarpal and two phalanges [32].
- The thumb metacarpal makes an angle of about 45 degrees with the second metacarpal in the sagittal plane [32].
- The trapezium is angled out in front of the carpal plane, allowing the thumb metacarpal to oppose the other four digital rays [32].
- The epiphyseal plates are located at the proximal ends of the phalanges and the first metacarpal [32].
- The thumb metacarpal is independent and articulates with the trapezium [43].
- The metacarpophalangeal joints are the keystones of the longitudinal arches of the hand [43].
- The stability of the metacarpophalangeal joints is essential to the support of the longitudinal arch as well as the transverse metacarpal arch [43].
- The thumb ray is more mobile, shorter, and more proximal than the other rays, allowing it to project in front of the plane of the palm [32].

LIGAMENTOUS & SOFT TISSUE ANATOMY

- The metacarpophalangeal joint is stabilized by collateral ligaments and by the thick volar articular capsule, known as the volar plate [43].
- The lateral accessory ligaments, sagittal bands of the extensor apparatus, and the first annular segment of the flexor tendon pulley insert on the volar plate [43].
- The sagittal band fibers insert onto the volar proximal phalanx and onto the lateral borders of the volar plate [31].

- The sagittal bands form a sling that allows proximal extrinsic extensor tension to be transmitted to the proximal phalanx, permitting metacarpophalangeal joint extension without a tendinous insertion onto the proximal phalanx [31].
- Rupture or attenuation of the sagittal band fibers allows the extrinsic extensor tendon to sublux to the ulnar side of the metacarpal head, causing ulnar deviation of the finger [31].
- The flexor pollicis longus inserts into the proximal base of the thumb distal phalanx and is innervated by the anterior interosseous branch of the median nerve [47].
- The flexor pollicis longus flexes both the interphalangeal and metacarpophalangeal joints of the thumb [47].
- The tenosynovial sheath of the flexor pollicis longus is continuous with the radial bursa [47].
- The princeps pollicis artery, a terminal branch of the radial artery, runs along the ulnar side of the first metacarpal bone and along the volar surface of the adductor muscle [44].
- The princeps pollicis artery emerges onto the subcutaneous palmar tissue at the level of the cutaneous flexion crease of the metacarpophalangeal joint [44].
- At the metacarpophalangeal joint level, the princeps pollicis artery divides into two terminal rami, the collateral palmar arteries of the thumb [44].
- An arcade located deep in the flexor tendon joins together the two collateral palmar arteries at the level of the distal metaphysis of the first phalanx [44].
- The dorsal arteries of the thumb originate from palmar arteries (princeps, commissural, or anastomoses of the superficial arcade) at the level of the first metacarpal [44].
- The ulnar dorso-collateral artery generally stems from the princeps pollicis onto the medial border of the neck of the first metacarpal [44].

PATHOPHYSIOLOGY & INJURY MECHANISMS

- Acute injuries to the thumb ulnar collateral ligament (UCL) of the metacarpophalangeal joint are the result of a sudden, significant radial force causing abduction of the thumb [20].
- Fractures can occur at the base of the proximal phalanx in association with ruptures of the UCL of the metacarpophalangeal joint [19].
- Proximal phalanx base fractures associated with UCL rupture are caused either by avulsion of the UCL from its insertion or by shearing of the base by the palmar portion of the radial condyle [19].
- In sheared fractures, the fragment does not contain the UCL insertion, and its position is unrelated to the location of the insertion of the UCL [19].
- In avulsion fractures, the position of the bone fragment indicates the location of the end of the ligament [19].
- A displaced ligament (Stener lesion) can occur in the presence of a nondisplaced fracture [19].
- The mechanism of fracture (avulsion vs. shear) cannot be determined by radiographic appearance and is revealed only at surgery by inspecting the bone and its relationship to the end of the ligament [19].

- Supination and flexion of the thumb provided less stability when both components of the UCL were sectioned [20].
- Pronation and supination play a role in the stability of the thumb metacarpophalangeal joint [20].
- Performing a physical examination to assess instability did not create a Stener lesion if the exam was performed in a controlled, gentle manner with the thumb held without rotation [20].
- A Stener lesion was possible to create during examination only when the thumb was tested in a flexed and supinated position and there was sectioning of the proximal UCL, accessory UCL, and the origin of the ulnar sagittal band at the adductor aponeurosis [20].
- Pure ligamentous injuries of the UCL of the thumb in a child are much less common than epiphyseal fractures [14].
- Traumatic avulsion of the ulnar collateral ligament of the interphalangeal joint of the thumb is a previously undescribed injury [10].
- In a surgical cohort of active-duty soldiers with thumb metacarpophalangeal UCL injuries, rifle-related injury was the most commonly documented injury mechanism [8].

Classification

- Acute injuries of the thumb ulnar collateral ligament (UCL) of the metacarpophalangeal (MCP) joint are the result of a sudden, significant radial force causing abduction of the thumb [20].
- Fractures can occur at the base of the proximal phalanx in association with ruptures of the UCL of the MCP joint of the thumb [19].
- Proximal phalanx base fractures associated with UCL rupture are either caused by an avulsion of the UCL from its insertion on the proximal phalanx or by the shearing of the base of the proximal phalanx by the palmar portion of the radial condyle with continued displacement after UCL rupture [19].
- A sheared fragment of the proximal phalanx base does not contain the UCL insertion [19].
- If a fragment of bone has been avulsed by the UCL, its position indicates the location of the end of the ligament [19].
- A radiograph can reveal whether the insertion of the ligament is displaced, indicating a Stener lesion [19].
- A displaced ligament can occur in the presence of a nondisplaced fracture [19].
- The mechanism of fracture cannot be determined by radiographic appearance alone [19].
- The mechanism of fracture is revealed only at surgery by inspecting the bone and its relationship to the end of the ligament [19].
- Pure ligamentous injuries of the ulnar collateral ligament of the thumb in a child do occur, but they are much less common than epiphyseal fractures [14].
- Traumatic avulsion of the ulnar collateral ligament of the interphalangeal (IP) joint of the thumb is a previously undescribed injury [10].

Clinical Presentation

INJURY MECHANISMS AND EPIDEMIOLOGY

- Acute thumb UCL injuries are the result of a sudden, significant radial force causing abduction of the thumb [20].

PHYSICAL EXAMINATION AND DIAGNOSTIC FINDINGS

- Performing a physical examination to assess the amount of instability of an ulnar collateral ligament injury did not create a Stener lesion if the exam was performed in a controlled, gentle manner with the thumb held without rotation [20].
- It was possible to create a Stener lesion during physical examination when the thumb was tested in a flexed and supinated position, but only if there was sectioning of the pUCL, the aUCL, and the origin of the ulnar sagittal band at the adductor aponeurosis [20].
- Thumbs with a stress angle difference of 15° should always be explored for a probable Stener lesion [34].
- Diagnostic ultrasound is a useful, noninvasive tool for assessing the extent of rupture of the ulnar collateral ligament [25].

RADIOGRAPHIC AND ANATOMICAL CONSIDERATIONS

- These fractures are either caused by an avulsion of the UCL from its insertion on the proximal phalanx or by the shearing of the base of the proximal phalanx by the palmar portion of the radial condyle with continued displacement after UCL rupture [19].
- A radiograph can reveal whether the insertion of the ligament is displaced (Stener lesion) if a fragment of bone has been avulsed by the UCL [19].
- If a fragment has been sheared, its position is unrelated to the location of the insertion of the UCL [19].
- The mechanism of fracture cannot be determined by radiographic appearance and is revealed only at surgery by inspecting the bone and its relationship to the end of the ligament [19].

Investigations

- Fluoroscopy, MRI and ultrasound are increasingly being used and evaluated as diagnostic tools for thumb UCL injuries [20].
- If a fragment of bone has been sheared rather than avulsed, its position is unrelated to the location of the insertion of the UCL [19].
- It was possible to create a Stener lesion when the thumb was tested in a flexed and supinated position, but only if there was sectioning of the pUCL, the aUCL, and the origin of the ulnar sagittal band at the adductor aponeurosis [20].

Treatment

OPERATIVE REPAIR TECHNIQUES

- Suture anchor and suture tape augmentation techniques preserve native ligament proprioception while providing additional stability during early healing phases [28].
- At the last postoperative follow-up (range 6 weeks-6 months), 11 of 12 patients treated with an alternative collateral ligament repair method had good to excellent results subjectively and had regained 75% of the strength of the uninjured side [11].
- Both steel wire and simple suture techniques for UCL repair were equally effective, with the steel wire offering no clinical advantage over simple suture [33].
- A novel technique of thumb collateral ligament reconstruction in acute injuries resulted in negative instability tests and satisfying results in terms of motion (ROM loss less than 20%) and grip strength (loss less than 17%) at 3-month follow-up [36].
- In a comparison of acute and chronic UCL injuries, there were no statistically significant differences between operated and contralateral healthy thumb MCP joints in flexion, extension, ulnar deviation, radial deviation, grip strength, or tip pinch strength at final follow-up [27].
- In the avulsion fracture group of a comparative study, reduction was successful and union was observed with no complications such as reduction loss, MCP osteoarthritis, bone necrosis, or non-union [27].
- Ulnar deviation and radial deviation were significantly better in the avulsion group than in the rupture group [27].
- Grip and tip pinch strengths were significantly better in the avulsion group than in the rupture group [27].

RECONSTRUCTION TECHNIQUES

- Late reconstruction of the ulnar collateral ligament of the thumb MP joint with a free tendon graft provided good improvement in stability and strength of the thumb [6].

POST-OPERATIVE MANAGEMENT AND REHABILITATION

- Early mobilization after robust tendon repairs is favored to avoid tethering of the long tendons of the thumb during the early post-operative period [7].
- Immobilization of the MCP joint with a K-wire after surgical repair of the UCL allows return to work within 7 days for 62% of patients who are not manual workers [21].
- In patients with chronic UCL reconstructions, there was no significant change in pinch strength, but significantly better results were achieved in grip strength, flexion, extension, ulnar and radial deviation [3].

NON-OPERATIVE MANAGEMENT

SURGICAL CONSIDERATIONS AND COMPLICATIONS

- Immediate repair of ruptured structures at both joints in a case of traumatic avulsion of the UCL of the IP joint and MCP joint produced a satisfactory result [16].
- Fractures at the base of the proximal phalanx associated with UCL ruptures can be caused by avulsion of the UCL or by shearing of the base by the palmar portion of the radial condyle [19].
- A displaced ligament (Stener lesion) can occur in the presence of a nondisplaced fracture if the fragment was sheared rather than avulsed [19].
- The mechanism of fracture (avulsion vs. shearing) cannot be determined by radiographic appearance and is revealed only at surgery by inspecting the bone and its relationship to the end of the ligament [19].

Complications

- In a cohort of 12 patients treated with an alternative repair method, 11 had good to excellent subjective results and regained 75% of the strength of the uninjured side at follow-up ranging from 6 weeks to 6 months [11].
- After open reduction and internal fixation for thumb ulnar collateral ligament avulsion fractures, pinch strength improved from 36% of the contralateral side to 89% ($p < .01$) [17].
- In a comparison of acute and chronic UCL injuries, no complications such as reduction loss, MCP osteoarthritis, bone necrosis, and non-union were observed in the avulsion fracture group [27].
- In a comparison of acute and chronic UCL injuries, four patients in the avulsion group and four patients in the rupture group experienced mild intermittent pain caused by light activity [27].

Recovery

- Early active mobilization following UCL repair with a Mitek bone anchor leads to an earlier return to full hand function at 6 weeks compared to 8 weeks [29].
- Early active mobilization following UCL repair with a Mitek bone anchor leads to an earlier return to work at 7 weeks compared to 11 weeks [29].
- A policy of early mobilisation after robust tendon repairs is favoured to avoid tethering of the long tendons of the thumb during the early post-operative period [7].

Key Evidence

- [L5] A controlled active motion therapy protocol after suture anchor repair of a ruptured UCL of the thumb is safe from a biomechanical point of view. [1] ([10.1016/j.jhsa.2004.04.017](https://doi.org/10.1016/j.jhsa.2004.04.017))

- [L4] Thumb UCL repair with suture tape augmentation demonstrates short-term outcomes comparable to what has been reported for other methods of repair. [2] ([10.1142/s2424835520500046](#))
- [L3] There was no significant change in pinch strength in patients with chronic UCL reconstructions, but significantly better results were achieved in grip strength, flexion, extension, ulnar and radial deviation. [3] ([10.1016/j.hansur.2020.03.002](#))
- [L4] Acute surgical repair of the torn ulnar collateral ligament can achieve good subjective and objective functional results. [4] ([10.1016/0020-1383\(94\)90179-1](#))
- [L3] The authors concluded that this is a safe and effective method for repair of complete tears of the ulnar collateral ligament of the thumb MP joint. [5] ([10.1016/s0363-5023\(97\)80113-x](#))
- [L1] This new technique provided good improvement in stability and strength of the thumb. [6] ([10.1016/s0363-5023\(03\)80385-4](#))
- [L4] In this field of tendon surgery, we favour a policy of early mobilisation after robust tendon repairs to avoid tethering of the long tendons of the thumb during the early post-operative period. [7] ([10.1197/j.jht.2005.01.008](#))
- [L4] In this surgical cohort of active-duty soldiers with thumb MCP UCL injuries, rifle-related injury was the most commonly documented injury mechanisms. [8] ([10.1016/j.injury.2026.113711](#))
- [L5] Distal placement of the UCL phalangeal insertion restricted flexion motion (from a mean of 57° to 47°). [9] ([10.1053/jhsu.1999.0283](#))
- [L5] We present a previously undescribed injury of avulsion of the ulnar collateral ligament of the thumb IP joint. [10] ([10.1016/s0266-7681\(05\)80061-0](#))
- [L4] At the last postoperative follow-up (range 6 weeks-6 months) 11 of 12 patients had good to excellent results subjectively and had regained 75% of the strength of the uninjured side. [11] ([10.1016/s0266-7681\(97\)80436-6](#))
- [L4] Results indicate that arthroscopic reduction of a Stener lesion allows healing of the ulnar collateral ligament without the need for open repair. [12] ([10.1016/s0363-5023\(05\)80156-x](#))
- [L2] Functional and subjective outcomes were good or satisfactory in more than 90% of patients. [13] ([10.1016/s0363-5023\(89\)80026-7](#))
- [L5] Pure ligamentous injuries of the ulnar collateral ligament of the thumb in a child do occur, but they are much less common than epiphyseal fractures. [14] ([10.1016/s0363-5023\(86\)80009-0](#))
- [L4] These injuries emphasize the importance of keeping the thumb upward and clear of the rope to avoid entrapment between the rope and saddle horn. [15] ([10.1016/s0363-5023\(84\)80136-7](#))
- [L5] Immediate repair of the ruptured structures at both joints produced a satisfactory result. [16] ([10.1016/s0363-5023\(87\)80224-1](#))
- [L4] After undergoing open reduction and internal fixation, the patients had relief of thumb pain and pinch strength improved from 36% of the contralateral side to 89% (p < .01). [17] ([10.1016/s0363-5023\(97\)80049-4](#))
- [L5] The use of interference screws for fixation of tendon grafts to bone for hand ligament reconstructions is a promising new surgical technique. [18] ([10.1016/j.jhsa.2004.12.013](#))

- [L5] [19] ([10.1016/s0363-5023\(98\)80158-5](https://doi.org/10.1016/s0363-5023(98)80158-5))
- [L5] [20] ([10.1142/s0218810417500411](https://doi.org/10.1142/s0218810417500411))
- [L4] Immobilization of the MCP joint with a K-wire after surgical repair of the UCL is an option that allows return to work within 7 days for 62% of patients who are not manual workers. [21] ([10.1016/j.hansur.2015.12.007](https://doi.org/10.1016/j.hansur.2015.12.007))
- [L5] Diagnostic ultrasound is a useful, noninvasive tool for assessing the extent of rupture of the ulnar collateral ligament. [25] ([10.1016/0363-5023\(94\)90025-6](https://doi.org/10.1016/0363-5023(94)90025-6))
- [L4] [27] ([10.1016/j.main.2014.10.003](https://doi.org/10.1016/j.main.2014.10.003))
- [L5] The technique preserves native ligament proprioception while providing additional stability during early healing phases. [28] ([10.1016/j.eats.2025.103957](https://doi.org/10.1016/j.eats.2025.103957))
- [L1] Our results show that on average early active mobilization leads to an earlier return to full hand function (6 vs. 8 wk) and an earlier return to work (7 vs. 11 wk). [29] ([10.1097/bth.0b013e318284dbd7](https://doi.org/10.1097/bth.0b013e318284dbd7))
- [L4] Both techniques were equally effective, and the use of the more expensive steel wire, while technically satisfying and easy to perform, offers no clinical advantage over simple suture. [33] ([10.1016/0266-7681\(92\)90079-h](https://doi.org/10.1016/0266-7681(92)90079-h))
- [L4] Our study shows that thumbs with a stress angle difference of 15° should always be explored for a probable Stener lesion. [34] ([10.1177/1753193412455789](https://doi.org/10.1177/1753193412455789))
- [L5] At 3 month follow up, tests for instability were negative and satisfying results in terms of motion (ROM loss less than 20%), grip strength (loss less than 17%) were observed. [36] ([10.1016/j.jhse.2007.04.010](https://doi.org/10.1016/j.jhse.2007.04.010))

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