# Title Page

# Title: The management of thumb UCL injuries: a summary of the BSSH guideline

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## Abstract

The ulnar collateral ligament (UCL) guideline development was undertaken in accordance with the BEST Process Manual, which has been accredited by the National Institute for Health and Care Excellence (NICE). This review article serves as a summary of the systematic reviews and the final guideline. The group included two patients, a radiologist, a commissioner, an emergency medicine doctor, hand therapists and surgeons. The group's recommendations are that patients with acute UCL injuries should be assessed with a history, clinical examination, and x-rays. Patients without significant joint laxity can be treated non-surgically. Patients with significant joint laxity on clinical examination may be treated with non-surgical joint immobilisation or surgical repair and should reach a shared decision with their clinician about the definitive treatment within 2 weeks of presentation.

## Introduction

Acute injuries to the ulnar collateral ligament (UCL) of the thumb metacarpophalangeal joint (MCPJ) are common injuries, and are estimated to account for around 50 in 100,000 presentations to Emergency Departments (EDs) in the United Kingdom(Musharafieh et al., 1997). These injuries represent a spectrum from the more minor sprains to the more major higher energy multi-ligament ruptures. These injuries frequently present in pain and dysfunction, which can be persistent in a minority of cases. The more minor 'sprains' without joint instability on clinical examination are generally treated with early movement as pain allows. There is more controversy as to how best to manage complete UCL ruptures which typically present with an inability to load the MCPJ in pinch initially and with joint instability on clinical examination.

Understanding the anatomy of the thumb MCPJ and the variation in severity of the injury is clearly of clinical importance. Clinical examination requires the consideration of the pathophysiology of the adductor muscle aponeurosis, proper UCL, accessory UCL and palmar plate. The MCPJ is generally examined by applying a radial force in extension and in a degree of MCPJ flexion to relax the palmar plate, the latter thought to isolate the

UCL proper. The clinical investigations for UCL injuries include plain x-rays, x-rays while applying a force to the MCPJ (stress x-rays), Ultrasound (USS) and Magnetic Resonance Imaging (MRI). The term ‘Stener lesion’ is used to describe when the ligament is completely torn and is retracted, with the adductor aponeurosis becoming interposed between the torn ligament and its site of bony insertion. There is some controversy as regards the ‘Stener lesion’ relating to its true frequency, how best to diagnose its presence, its prognosis and how best to treat it.

## Target audience

The anticipated users were health care professionals who are involved in treating patients with acute UCL injuries, those commissioning care for patients, and possibly patients and carers of patients with acute UCL injuries. The target population was adults with acute UCL injuries of the thumb MCPJ.

## Objectives and Questions

The overall objective was to describe the management of adult patients with acute ulnar collateral ligament (UCL) injuries of the thumb metacarpophalangeal joint (MCPJ) in the United Kingdom. The specific questions to be discussed were:

- How should patients with suspected UCL injuries be initially assessed, investigated and managed?
- Which patients should be referred to specialist services and when should they be seen?
- How should patients be further assessed and investigated by specialist services?
- What treatments should be offered to which patients and when?
- Which treatments are superior to other treatments?
- Which treatments are more cost-effective than other treatments?
- What outcomes can be expected from specific treatments?
- What future quality improvement work and/or research might be beneficial in this area?

The guideline development was undertaken in accordance with the BEST Process Manual(BSSH, 2016), which has been accredited by the National Institute for Health and Care Excellence (NICE). The guideline development methodology included assembling a group of stakeholders (patient representatives and medical professionals from the relevant specialities), the development of the questions, systematic reviews, guideline development group meetings to discuss and agree upon the final guideline which was then approved by the relevant stakeholder organisations including the BSSH, BAHT and the RCEM. This article serves

as a summary of the systematic reviews and the final guideline which resulted from this body of work. The full systematic review methods and results are presented in the final guideline but have been concisely summarised for the purposes of this article.

# Methods

Both the diagnostic and the therapeutic systematic reviews are carried out according to PRISMA guidance with a pre-registered protocol, searches carried out by the research librarian, and two reviewers performing the screening and data output(BSSH UCL Guideline Group, 2023).

## Diagnostic:

The inclusion criterion was any diagnostic study relating to acute UCL injuries in adults (aged ≥18). A total of 24 studies were finally selected as being relevant to the research question. Six studies assessed clinical examination, 12 US, six MRI and two stress arthrography. One study assessed both ultrasound and MRI as index tests and another both clinical stress testing and ultrasound. The reference tests used were surgery, MRI and clinical follow-up. The study quality was assessed using the QUADAS-2 tool(Whiting et al., 2011). Levels of evidence were grade from 1 to 4 based on The Oxford Centre for Evidence-based Medicine - Levels of Evidence.

## Therapeutic:

The inclusion criterion was any study relating to acute UCL injuries in adults (aged ≥18). The intervention was patients undergoing any form of therapeutic (surgical or non-surgical) intervention and the comparator was any therapeutic intervention (including, but not be restricted to, e.g. active monitoring, usual care, non-surgical interventions such as early mobilisation or splinting or cast treatment, surgical interventions or similar). The study design had to include an intervention and a comparator. Six studies met the inclusion criteria. The shortlisted studies were assessed using SIGN50 methodology.

# Results

## Diagnostic

### *Clinical examination:*

Of the six studies which reviewed clinical examination techniques, two were of level 2 evidence and four of level 3 (Abrahamsson et al., 1990; Cooper et al., 2005; Heyman et al., 1993; Louis et al., 1986; Mahajan et al., 2016; Murphey et al., 1997). The level 2 studies tested cohorts of 23 and 30 patients respectively and both stated a positive clinical diagnosis

of a valgus deformity of > 35º on stress testing. Heyman et al. tested patients under local anaesthetic block with the MCPJ in 30º flexion and palpated for a mass, and Mahajan et al. clinically assessed with the MCPJ in 30º flexion and extension whilst noting a fixed end-point with no mention of local anaesthesia(Heyman et al., 1993; Mahajan et al., 2016). Heyman et al. used surgery as the reference standard and documented displaced ligaments alone, with the results giving a sensitivity of 0.94 (95% CI 0.70 to 1.00) and specificity of 0.57 (95% CI 0.18 to 0.90). In comparison, Mahajan et al. used MRI as the reference standard and assessed both displaced and ruptured undisplaced ligaments. Their results gave a sensitivity of 0.92 (95% CI 0.64 to 1.00) and specificity of 0.41 (95% CI 0.18 to 0.67) for the detection of displaced ligaments, and a sensitivity of 0.91 (95% CI 0.71 to 0.99) and specificity of and 0.75 (95% CI 0.35 to 0.97) for ruptured undisplaced ligaments.

### *Ultrasound:*

The search identified 12 studies which assessed the use of ultrasound in the diagnosis of UCL injuries. Of these, two were level 1 studies, four level 2 studies and six level 3 studies. Of the two level 1 studies, Shekarchi et al. compared the accuracy of diagnosing complete UCL rupture in 20 patients on ultrasound with the findings confirmed on MRI, giving a sensitivity of 0.71 (95% CI 0.29 to 0.96) and specificity of 0.85 (95% CI 0.55 to 0.98)(Shekarchi et al., 2018). Susic et al. used ultrasound to assess a completely torn and displaced UCL in 14 patients with clinical signs of injury and confirmed findings at surgical exploration(Susic et al., 1999). This study gave figures reporting a sensitivity of 0.40 (95% CI 0.05 to 0.85), specificity of 0.78 (95% CI 0.40 to 0.97) and accuracy of 0.64 (95% CI 0.35 to 0.87). Comparing the results of the four studies which assessed the effectiveness of ultrasound in diagnosing completely torn and displaced ligaments using surgery as the reference standard, gives a range of test sensitivity from 0.4 to 1.00, specificity from 0.78 to 1.00 and accuracy from 0.64 to 1.00 from a total of 96 participants.

### *MRI:*

Six trials were identified pertaining to the use of MRI. Of these, one had an evidence level of 2 and the rest were level 3. The level 2 trial additionally considered the use of ultrasound and adopted surgery as the reference standard (Hergan et al., 1995). All five of the level 3 trials compared both surgery and clinical follow-up as the reference standards. Only the level 2 trial provided sufficient data for a statistical test result, reporting a sensitivity of 1.00 (95% CI 0.54 to 1.00) and specificity of 1.00 (95% CI 0.72 to 1.00) for displaced and non-displaced tears in a sample of 17 patients.

## Therapeutic

Sollerman et al compared a functional splint to plaster cast treatment in patients with complete UCL ruptures(Sollerman et al., 1991); patients were managed both surgically and non-surgically. The authors reported no difference in MCPJ range of movement (ROM), grip strength and sick leave taken; however, the data provided were insufficient for any further analysis.  The RCT by Rocchi et al. compared the outcomes of operated patients treated with either a traditional standard thumb spica which immobilized the MCPJ or a new modified thumb spica which allowed early MCP motion(Rocchi et al., 2014). At 12 months the new spica group had increased MCPJ ROM (standardized mean difference (SMD), −3.69; 95% confidence interval (CI), −2.46–−4.92, P<0.0001), a better Dreiser index (SMD, 1.65; 95%CI, 0.81–2.50; P=0.0001) and reduced pain VAS (SMD, 1.53; 95% CI, 0.70–2.35; P=0.0003). The RCT by Crowley et al. compared outcomes between patients treated with early active mobilization or plaster immobilization after being treated surgically with Mitek anchor repair(Crowley et al., 2013). The outcome data was not provided, meaning that any further analysis was not possible. The retrospective comparative case series by Saetta et al. demonstrated a higher chance of an excellent functional result with suture repair versus steel wire, but this was not statistically significant (risk ratio, 1.19; 95% CI, 0.82–1.71); the other outcome data was incomplete and thus precluded further analysis(Saetta et al., 1992). The retrospective case series by Lane demonstrated no statistically significant difference in outcomes for a new method of suture repair  versus a traditional pull-out suture technique used in combination with K-wire stabilisation(Lane, 1991). The study by Katolik et al. did not provide adequate data with which to conduct any further analysis(Katolik et al., 2008).

None of these studies demonstrated any significant difference in complication rates of the interventions which they compared.  Overall, all studies were deemed to be at a high risk of bias, particularly in terms of blinding of outcome assessment and selecting reporting. There is a lack of high-quality prospective studies using reliable and valid patient reported outcome measures (PROMs).  Only the study by Rocchi used a validated PROM, and none of the other studies used validated PROMS

# Discussion

## Diagnostic

The six clinical assessment studies reported sensitivities between 0.91 and 0.94 and specificities between 0.41 and 0.75. Twelve ultrasound studies stated sensitivities between 0.4 and 1.0 and specificities between

0.78 and 1.0. From six MRI studies, one stated a sensitivity of 1.0 and specificity of 1.0. However, when the studies were assessed using the QUADAS-2 tool, most were determined to be of low to moderate quality with significant heterogeneity in design. Despite the term ‘Stener lesion’ being widely used, no study has demonstrated that it can be reliably diagnosed by any form of clinical examination or investigation. Overall, these results support the use of clinical examination given its high sensitivity for the detection of displaced ligaments; however, the role of ultrasound and MRI remains unclear.

## Therapeutic

There is some low-quality evidence which supports early mobilisation for surgically treated patients. The studies by Crowley et al and Rocchi et al have demonstrated some early functional benefits to early mobilisation after surgery. Therefore, there is sufficient evidence to support early mobilisation after surgery when it is felt to be safe to do so.

The natural history of complete ruptures is uncertain as the rate of failure of non-surgical treatment is highly variable. Pichora et al reported only 3 failures (7%) of non-surgical treatment in 42 patients, and the poor outcomes were not associated with joint instability(Pichora et al., 1989). Landsman et al reported 6 failures (15%) out of 40 patients which were all associated with joint instability(Landsman et al., 1995). While Milner et al reported a very low rate of failure for ruptures with less than 3mm displacement on MRI and a 90% failure rate for ruptures with >3mm displacement(Milner et al., 2015).

There is a lack of evidence comparing surgery to non-surgical treatment, and no prospective study has compared surgery to non-surgical treatment. Non-surgical immobilisation can be either with a cast or a customised splint, however there is no evidence to demonstrate the superiority of a specific type of immobilisation.

There is also a high level of uncertainty relating to the outcomes for both non-surgical and surgical treatments due to the lack of high-quality evidence. There is a lack of high-quality prospective studies using reliable and valid patient reported outcome measures (PROMS). Of note only one of all the included therapeutic studies used a validated PROM.

## Key clinical practice recommendations:

1. Clinical examination is recommended to assess for significant laxity of the UCL (**low evidence**)
2. X-rays in orthogonal planes should be obtained to check for fractures and joint subluxation.

3. There is insufficient evidence to mandate the routine use of ultrasound (USS) or magnetic resonance imaging (MRI)
4. Patients without significant joint laxity should be treated non-surgically
5. It is reasonable to offer early surgery or non-surgical immobilisation of the MCPJ to patients with significant joint laxity on clinical examination (**very low evidence**)

## Good practice points:

*It is considered good practice that:*

- Patients are assessed by history, clinical examination and x-rays in two orthogonal planes. This initial clinical examination should be performed by an appropriately trained healthcare professional
- There is a local pathway for the management of suspected UCL injuries which involves specialist musculoskeletal (MSK) services and access to definitive surgical care when deemed necessary
- Patients with pain but preserved function AND no clinical evidence of significant joint laxity AND normal x-rays may be discharged with safety net advice
- Patients who do not meet the above criteria for early discharge should be referred on to specialist MSK services
- A shared decision about definitive management should be reached within 2 weeks of a patient's referral to specialist MSK services (the specialist MSK services should be capable of providing surgery when needed)
- Non-surgical immobilisation for patients with significant joint laxity should be with a rigid orthosis such as a cast or thermoplastic splint

The patient flow diagram (Figure 1) summarises the pathway of care developed in the guideline.

## Clinical audit indicators:

It is considered that the following could be used as clinical audit indicators:

- Suitable validated patient reported outcome measures (PROMs)
- Pinch strength
- Persistent joint instability

## Resource Implications:

It is believed that the clinical practice recommendations and good practice points align with existing NHS practice. Therefore, the resource implication of implementing this guideline is considered minimal.

## Facilitators and barriers to implementation:

If clinical staff are not competent in assessing UCL injuries, then training may be required.  Such training is not believed to be complex, expensive or onerous to deliver. No other significant barriers to implementation have been identified.  It is suggested that using the quick reference as a standalone reference may be facilitator.  For example, users may wish to make the quick reference guide could be made available in clinical areas.

## Future research recommendations:

Areas for future research into the management of UCL injuries include:

- High quality prospective cohort studies to better understand the natural history of UCL injuries
- High quality diagnostic studies to assess the reliability and validity of modern imaging techniques, as well as how these relate to clinical prognosis
- High quality RCTs to investigate the clinical and cost effectiveness of surgery versus non-surgical joint immobilization
- High quality RCTs to assess the clinical and cost effectiveness of different rehabilitation regimes after surgery
- (It should be noted that PROMs should be an integral part of any future research studies and that a diagnostic study could potentially be embedded within a future RCT)

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Figure 1: Patient flow diagram depicting the recommended management from first presentation to definitive treatment