



University of Dundee

The management of acute complete ruptures of the ulnar collateral ligament of the thumb a national cross-sectional study

Mikhail, Mark; Riley, Nicholas; Rodrigues, Jeremy; Carr, Elaine; Horton, Robin; Beale, Nicholas

Published in:
Bone and Joint Open

DOI:
[10.1302/2633-1462.58.BJO-2024-0062.R1](https://doi.org/10.1302/2633-1462.58.BJO-2024-0062.R1)

Publication date:
2024

Licence:
CC BY-NC-ND

Document Version
Publisher's PDF, also known as Version of record

[Link to publication in Discovery Research Portal](#)

Citation for published version (APA):

Mikhail, M., Riley, N., Rodrigues, J., Carr, E., Horton, R., Beale, N., Beard, D. J., Dean, B. J. F., & Johnson, S. (2024). The management of acute complete ruptures of the ulnar collateral ligament of the thumb a national cross-sectional study. *Bone and Joint Open*, 5(8), 708-714. <https://doi.org/10.1302/2633-1462.58.BJO-2024-0062.R1>

General rights

Copyright and moral rights for the publications made accessible in Discovery Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

The management of acute complete ruptures of the ulnar collateral ligament of the thumb

a national cross-sectional study

From University of Oxford,
Oxford, UK

Correspondence should be
sent to B. J. F. Dean benjamin.dean@ndorms.ox.ac.uk

Cite this article:
Bone Jt Open 2024;5(8):
708–714.

DOI: 10.1302/2633-1462.
58.BJO-2024-0062.R1

M. Mikhail,^{1,2} N. Riley,^{1,3} J. Rodrigues,^{4,5} E. Carr,⁶ R. Horton,⁷ N. Beale,⁸ D. J. Beard,⁸ B. J. F. Dean,^{1,8} The UCL TEAR Collaborative

¹Oxford University Hospitals NHS Trust, Oxford, UK

²Department of Plastic Surgery, Stoke Mandeville Hospital, Aylesbury, UK

³Oxford University Hospitals NHS Foundation Trust Nuffield Orthopaedic Centre, Oxford, UK

⁴University of Warwick Clinical Trials Unit, Coventry, UK

⁵Buckinghamshire Healthcare NHS Trust, Aylesbury, UK

⁶University Hospitals Coventry and Warwickshire NHS Trust, Coventry, UK

⁷British Society for Surgery of the Hand, London, UK

⁸NDORMS, University of Oxford, Oxford, UK

Aims

Complete ruptures of the ulnar collateral ligament (UCL) of the thumb are a common injury, yet little is known about their current management in the UK. The objective of this study was to assess the way complete UCL ruptures are managed in the UK.

Methods

We carried out a multicentre, survey-based cross-sectional study in 37 UK centres over a 16-month period from June 2022 to September 2023. The survey results were analyzed descriptively.

Results

A total of 37 centres participated, of which nine were tertiary referral hand centres and 28 were district general hospitals. There was a total of 112 respondents (69 surgeons and 43 hand therapists). The strongest influence on the decision to offer surgery was the lack of a firm 'endpoint' to stressing the metacarpophalangeal joint (MCPJ) in either full extension or with the MCPJ in 30° of flexion. There was variability in whether additional imaging was used in managing acute UCL injuries, with 46% routinely using additional imaging while 54% did not. The use of a bone anchor was by far the most common surgical option for reconstructing an acute ligament avulsion (97%, n = 67) with a transosseous suture used by 3% (n = 2). The most common duration of immobilization for those managed conservatively was six weeks (58%, n = 65) and four weeks (30%, n = 34). Most surgeons (87%, n = 60) and hand therapists (95%, n = 41) would consider randomizing patients with complete UCL ruptures in a future clinical trial.

Conclusion

The management of complete UCL ruptures in the UK is highly variable in certain areas, and there is a willingness for clinical trials on this subject.

Take home message

- The lack of a firm endpoint on metacarpophalangeal joint (MCPJ) stressing had

the strongest perceived influence on the decision to offer surgery.

- The use of further imaging was variable, with 54% of respondents not using

further imaging routinely, with ultrasound being the most commonly used method.

- The use of a bone anchor was by far the most common surgical option for reconstructing an acute ligament avulsion.
- Most respondents opted to immobilize the MCPJ for four to six weeks, both following surgical intervention and following non-surgical treatment.

Introduction

Acute complete ruptures of the ulnar collateral ligament (UCL) of the thumb metacarpophalangeal joint (MCPJ) are common and account for approximately 50 in 100,000 presentations to emergency departments (EDs).¹ These injuries frequently result in pain and dysfunction, which can be persistent in a minority of cases in which there may also be joint instability. Minor sprains without significant joint instability on clinical examination are best treated with early movement as pain allows, while there is more controversy regarding how best to manage complete UCL ruptures which typically manifest with joint instability on clinical examination.²

Understanding the anatomy of the region and the variation in severity of the injury is thought to be of clinical importance.³ Clinical examination requires an appreciation of the anatomy of the adductor muscle aponeurosis, proper UCL, accessory UCL, and palmar plate. The MCPJ is examined by applying a valgus force in extension and in a degree of MCPJ flexion to isolate the UCL proper and to de-tension the palmar plate.⁴ The clinical investigations for UCL injuries include radiographs, stress radiographs (images are acquired while applying a force to the MCPJ), ultrasound (USS), and MRI. The term 'Stener lesion' describes when the ligament is completely torn and retracted, allowing the adductor aponeurosis to become interposed between the torn ligament and its site of bony insertion.⁵ There is some controversy over the 'Stener lesion' relating to its true frequency, how to diagnose its presence, and how best to treat it.²

The British Society of Surgery of the Hand (BSSH) recently published a National Institute for Health and Care Excellence (NICE)-accredited guideline on the management of UCL injuries.² In this context, our objective was to assess the way complete UCL ruptures were managed in the UK. Specifically, our research questions included: which factors influence the decision to operate on a UCL injury?; what is the role of imaging?; what is the approximate number of operations per year, and how is surgery done?; how are patients immobilized and rehabilitated?; and is there potential for a future clinical trial?

Methods

We carried out a multicentre, survey-based cross-sectional study in 37 UK centres over a 16-month period from June 2022 to September 2023. Research Ethics Committee approval was not required as per Health Research Authority guidance. Study data were collected and managed using Research Electronic Data Capture (REDCap) electronic data capture tools hosted at the University of Oxford. REDCap is a secure, web-based software platform designed to support data capture for research studies, providing: 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated

export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources.⁶

Participating centres and clinicians

The UCL working group was assembled, involving collaborators from multiple stakeholder groups, including orthopaedic surgery, plastic surgery, and hand therapy. Participating centres were recruited using clinician contacts from previous collaborative projects and advertising on the social media. Any centre which regularly treated patients with acute thumb trauma was eligible to participate. The survey for all participants identified whether they were a surgeon or hand therapist (both physiotherapists and occupational therapists); this included surgical grade. The surgeon survey included sections on UCL injury assessment, imaging, surgery, and future research. Both surveys included a section on immobilization.

Outcomes

The survey included sections on respondent role, clinical examination, factors influencing surgery, the nature of surgery and non-surgical treatment, as well as the potential for a clinical trial in this area.

Statistical analysis

The study was done according to a previous template for survey-based studies. Statistical analysis was carried out using R v. 4.3.1 (R Foundation for Statistical Computing, Austria). Unless otherwise stated in the characteristics description, numbers and percentages are used for categorical variables and median (IQR) for continuous variables. The analysis plan was pre-determined and the analysis was purely descriptive in nature, meaning any form of power calculation would be inappropriate.

Results

Centres

A total of 37 centres participated, of which nine were tertiary referral hand centres and 28 were district general hospitals.

Respondents

There was a total of 112 respondents, 69 of whom were surgeons and 43 were hand therapists. A majority of the surgeons were consultants (n = 57, 83%), while the remainder were either fellows or ST3 to ST8 training grade registrars.

Patient factors influencing upon surgery to offer surgery

Figure 1 shows the way in which surgeons perceived various patient factors influenced their decision to offer surgery. The two factors which most strongly influenced this decision were "employment/hobbies" and being a "sportsperson", making surgeons "much more likely" to offer surgery (10% (n = 7) and 14% (n = 10), respectively), and "more likely" to offer surgery (39% (n = 27) and 46% (n = 32), respectively).

Clinical examination and influence upon decision to offer surgery

Most respondents used local anaesthetic to aid clinical examination either rarely (n = 26, 38%) or never (n = 21,

Table I. The extent that examination findings influence decisions to offer surgery, by surgeon grade.

Variable	Non-Consultant (n = 12)	Consultant (n = 57)	Overall (n = 69)
No firm 'endpoint' to stressing MCPJ in full extension, n (%)			
Do not routinely check	0 (0)	3 (5.3)	3 (4.3)
No influence	2 (16.7)	0 (0)	2 (2.9)
Some influence	9 (75.0)	14 (24.6)	23 (33.3)
Strong influence	1 (8.3)	40 (70.2)	41 (59.4)
No firm 'endpoint' to stressing MCPJ in 30° flexion, n (%)			
Do not routinely check	0 (0)	0 (0)	0 (0)
No influence	1 (8.3)	0 (0)	1 (1.4)
Some influence	4 (33.3)	14 (24.6)	18 (26.1)
Strong influence	7 (58.3)	43 (75.4)	50 (72.5)
> 30° laxity of MCPJ in 30° flexion, n (%)			
Do not routinely check	0 (0)	6 (10.5)	6 (8.7)
No influence	3 (25.0)	12 (21.1)	15 (21.7)
Some influence	8 (66.7)	30 (52.6)	38 (55.1)
Strong influence	1 (8.3)	9 (15.8)	10 (14.5)
10° to 20° increased laxity versus non-injured thumb in 30° flexion, n (%)			
Do not routinely check	0 (0)	8 (14.0)	8 (11.6)
No influence	4 (33.3)	26 (45.6)	30 (43.5)
Some influence	7 (58.3)	21 (36.8)	28 (40.6)
Strong influence	1 (8.3)	2 (3.5)	3 (4.3)
Palpable 'Stener' lesion, n (%)			
Do not routinely check	1 (8.3)	12 (21.1)	13 (18.8)
No influence	1 (8.3)	9 (15.8)	10 (14.5)
Some influence	5 (41.7)	9 (15.8)	14 (20.3)
Strong influence	5 (41.7)	27 (47.4)	32 (46.4)

MCPJ, metacarpophalangeal joint.

30%). Local anaesthetic was used sometimes by 20% (n = 14), regularly by 7% (n = 5), and always by 4% (n = 3).

Table I shows the influence of clinical examination upon the decision to offer surgery. The strongest influence upon the decision to offer surgery was the lack of firm 'endpoint' to stressing the MCPJ in full extension and stressing the MCPJ in 30° of flexion.

The role of imaging

There was a very even split in whether additional imaging was used in managing acute UCL injuries, with 46% routinely using additional imaging and 54% not. Ultrasound was the most common form of imaging used (41%, n = 28), while MRI was used less frequently (10%, n = 7).

The respondents commonly described the use of routine imaging to detect the presence of a Stener lesion to inform the decision of whether to offer surgery. For example, one respondent stated, "Evident Stener lesion will certainly

mandate surgery" and another, "If Stener always operate. If not offer cast or surgery."

Surgery

Figure 2 depicts the estimated proportion of UCL ruptures operated upon. There was a wide spread of the estimated percentage, with no obvious pattern to responses.

Transarticular Kirschner wires were used as part of surgery variably: never (67%, n = 46), sometimes (29%, n = 20), often (1%, n = 1), and always (3%, n = 2). The use of a bone anchor was by far the most common surgical option for reconstructing an acute ligament avulsion (97%, n = 67) with a transosseous suture used by 3% (n = 2).

Immobilization and rehabilitation

Table II shows the preference among hand therapists and surgeons for different forms of postoperative immobilization. The majority of respondents (69%, n = 77) used a cast for postoperative immobilization, with surgeons opting for a cast

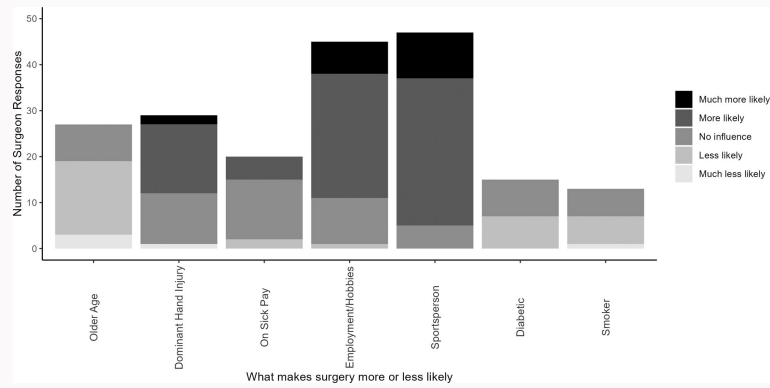


Fig. 1
Chart detailing, by count of surgeon responses, the influence of various factors on the decision to offer surgery.

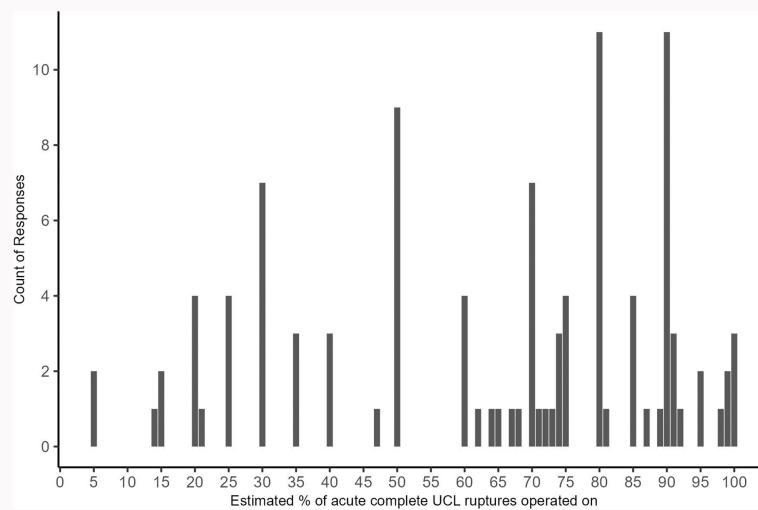


Fig. 2
Chart detailing, by count of responses, the estimated percentage of acute complete ulnar collateral ligament (UCL) ruptures operated on.

(75%, n = 52) more frequently than hand therapists (58%, n = 25).

In terms of hand therapists' postoperative mobilization regimes, only six respondents (14%) immobilized the thumb interphalangeal joint (IPJ) for any period of time with 37 respondents opting for no IPJ immobilization (86%). In terms of thumb MCPJ immobilization, one respondent (2%) opted for no period of immobilization, 24 respondents for four weeks' MCPJ immobilization (56%), and 13 respondents (30%) for six weeks' immobilization.

Table III shows the preferred period of immobilization for complete UCL ruptures managed non-surgically. The most common duration of immobilization for those managed conservatively was six weeks (58%, n = 65) and four weeks (30%, n = 34). Table IV shows the preferred mode of immobilization for complete UCL ruptures managed non-surgically. The most frequent option for surgeons was cast immobilization in those managed conservatively (51%, n = 35); the most popular options for hand therapists were thermoplastic splint (37%, n = 16), and the combination of a cast followed by a thermoplastic splint (30%, n = 13).

A future clinical trial

The majority of surgeons (87%, n = 60) and hand therapists (95%, n = 41) would consider randomizing patients with complete UCL ruptures in a future clinical trial.

Discussion

The key findings of this study included that the strongest influence on the decision to offer surgery was the lack of firm 'endpoint' to either stressing the MCPJ in full extension or stressing the MCPJ in 30° of flexion. There was clear variability in whether additional imaging was used in managing acute UCL injuries, with 46% routinely using additional imaging and 54% not. The use of a bone anchor was by far the most common surgical option for reconstructing an acute ligament avulsion. Most respondents immobilized the thumb MCPJ for between four and six weeks, both after surgery and in conservatively managed cases. Most surgeons and hand therapists would consider randomizing patients with complete UCL ruptures in a future clinical trial.

Broadly, current practice appears very much aligned with the recently published BEST UCL guidelines.² The guidelines state that "clinical examination is recommended to assess for significant laxity of the UCL", which is consistent with

Table II. Most frequently used postoperative method of immobilization.

Method, n (%)	Surgeon (n = 69)	Therapist (n = 43)	Overall (n = 112)
Cast	52 (75.4)	25 (58.1)	77 (68.8)
Thermoplastic splint	17 (24.6)	15 (34.9)	32 (28.6)
Off the shelf splint	0 (0)	0 (0)	0 (0)
Other*	0 (0)	3 (7.0)	3 (2.7)

*Other included "4 weeks cast and 4 weeks thermoplastic splint", "cast or thermoplastic splint", and "mixed depending on surgeon/case - either cast or thermoplastic splint".

Table IV. For patients managed conservatively, the most frequently used method of immobilization. All values are presented as numbers (%).

Method	Surgeon (n = 69)	Therapist (n = 43)	Overall (n = 112)
Cast	35 (50.7)	7 (16.3)	42 (37.5)
TP splint	13 (18.8)	16 (37.2)	29 (25.9)
Off-the-shelf splint	3 (4.3)	6 (14.0)	9 (8.0)
Cast then TP splint	15 (21.7)	13 (30.2)	28 (25.0)
Other*	2 (2.9)	1 (2.3)	3 (2.7)
Missing	1 (1.4)	0 (0)	1 (0.9)

*Other: "cast, cast then TP splint or TP - method varies significantly" TP, thermoplastic.

the strong influence of examination findings on the decision to offer surgery that we have observed. The variable use of further diagnostic imaging observed by this study makes sense in the context of the uncertainty of the evidence in this area, as stated in the guidelines: "There is insufficient evidence to mandate the routine use of USS or MRI." The guidelines also advise that patients without significant joint laxity should be treated non-surgically, while they also state that it is reasonable to offer early surgery or non-surgical immobilization of the MCPJ to patients with significant joint laxity on clinical examination.

There are two key relevant cohort studies in this area, which both demonstrate a high success rate in treating complete UCL ruptures non-surgically.^{7,8} Pichora et al⁷ followed up 32 patients who had been investigated with stress radiography, arthrography, and clinical examination. All patients were treated with a removable custom splint. Functional and subjective outcomes were good or satisfactory in more than 90% of patients; pinch strength recovered to 89% of the contralateral thumb at approximately one year following injury. The three treatment failures involved persistent symptoms, which did not respond favourably to subsequent surgery, and which were not related to joint

Table III. For patients managed conservatively, total number of weeks immobilized. All values are presented as numbers (%).

Number of weeks immobilized	Surgeon (n = 69)	Therapist (n = 43)	Overall (n = 112)
1	0 (0)	0 (0)	0 (0)
2	0 (0)	0 (0)	0 (0)
3	1 (1.4)	0 (0)	1 (0.9)
4	21 (30.4)	13 (30.2)	34 (30.4)
5	1 (1.4)	0 (0)	1 (0.9)
6	41 (59.4)	24 (55.8)	65 (58.0)
7	0 (0)	0 (0)	0 (0)
8	4 (5.8)	4 (9.3)	8 (7.1)
> 8	1 (1.4)	2 (4.7)	3 (2.7)

instability. Meanwhile, Landsman et al⁸ assessed the outcomes in 39 patients with 40 UCL ruptures. All patients were assessed clinically and deemed to have significant laxity of the UCL. All patients were treated with splint immobilization for a minimum of eight weeks, and six patients (15%) were treated with delayed surgery as a result of no firm endpoint on stressing the UCL. In the 34 patients who did not require delayed surgery, there was a recovery of pinch strength to 92% of the contralateral thumb at beyond one year. Additionally, 28 patients of 34 had no pain on daily activities, while the remaining six patients reported an occasional ache on strenuous activities.

The apparent willingness of both surgeons and hand therapists to consider randomizing patients in a future randomized controlled trial (RCT) is also unsurprising, given the lack of high-quality evidence in this area to guide practice. The guidelines also concluded that there was a need for better evidence, specifically high-quality RCTs to investigate the clinical and cost effectiveness of surgery versus non-surgical joint immobilization. Certainly, the observed variability in the estimated proportion of UCL ruptures operated upon opens up whether a trial could potentially randomize patients to surgery versus non-surgical treatment. This is consistent with the BEST guideline's recommendation of "High quality RCTs to investigate the clinical and cost effectiveness of surgery versus non-surgical joint immobilization."² Further work would certainly be needed to better define where surgical equipoise lies in this regard.

The strength of our study is that we have included responses from both surgeons and hand therapists. A limitation to our study is the sample size of 37 centres, which represents around 25% of acute NHS Trusts in the UK. There is a decent geographical spread as the participating centres include England, Scotland, and Wales, while there is also a reasonable spread in terms of the different regions in England. Undoubtedly, responder bias will have influenced the results, meaning that the results cannot be claimed to be fully representative of the entirety of the UK. However, it is reasonable to suppose that it is highly likely that responses

showing a significant degree of variability (for example, the proportion of UCL ruptures being operated on) are consistent with a degree of variability across the UK. A further limitation is that our study relies on the assumption that the results of surveys accurately represent true care, which may not always be the case. Certainly, more preparatory work is essential before designing a definitive clinical trial in this area. This survey does suggest that there are some areas of relative uniformity in practice, such as certain aspects of the decision-making, and the type of surgery undertaken. However, it does appear that there are areas of significant variability, such as the role of imaging and, crucially, whether or not surgery should be undertaken.

In conclusion, the management of complete UCL ruptures in the UK appears highly variable in certain areas and there is a willingness for clinical trials on this subject.

References

1. **Musharrafieh RS, Bassim YR, Atiyeh BS.** Ulnar collateral ligament rupture of the first metacarpophalangeal joint: a frequently missed injury in the emergency department. *J Emerg Med.* 1997;15(2):193–196.
2. **BEST Guideline group.** 2023. https://www.bssh.ac.uk/_userfiles/pages/files/professionals/BEST%20Guidelines/BEST%20UCL%20Final.pdf (date last accessed 13 August 2024).
3. **Papandrea RF, Fowler T.** Injury at the thumb UCL: is there a Stener lesion? *J Hand Surg Am.* 2008;33(10):1882–1884.
4. **Abrahamsson SO, Sollerman C, Lundborg G, Larsson J, Egund N.** Diagnosis of displaced ulnar collateral ligament of the metacarpophalangeal joint of the thumb. *J Hand Surg Am.* 1990;15(3):457–460.
5. **Moberg E, Stener B.** Injuries to the ligaments of the thumb and fingers; diagnosis, treatment and prognosis. *Acta Chir Scand.* 1953;106(2–3):166–186.
6. **Harris PA, Taylor R, Minor BL, et al.** The REDCap consortium: Building an international community of software platform partners. *J Biomed Inform.* 2019;95:103208.
7. **Pichora DR, McMurtry RY, Bell MJ.** Gamekeepers thumb: a prospective study of functional bracing. *J Hand Surg Am.* 1989;14(3):567–573.
8. **Landsman JC, Seitz WH, Froimson AI, Leb RB, Bacher EJ.** Splint immobilization of gamekeeper's thumb. *Orthopedics.* 1995;18(12):1161–1165.

Author information

M. Mikhail, MRCS, Specialist Trainee in Plastic Surgery, Oxford University Hospitals NHS Trust, Oxford, UK; Department of Plastic Surgery, Stoke Mandeville Hospital, Aylesbury, UK.

N. Riley, MBBS, FRCS (Tr&Orth), Dip Hand Surg, Consultant Hand Surgeon, Oxford University Hospitals NHS Trust, Oxford, UK; Oxford University Hospitals NHS Foundation Trust Nuffield Orthopaedic Centre, Oxford, UK.

J. Rodrigues, BSc, MSc, MBA, PhD, FRCS(Plast), Associate Professor, Consultant Plastic Surgeon, University of Warwick Clinical Trials Unit, Coventry, UK; Buckinghamshire Healthcare NHS Trust, Aylesbury, UK.

E. Carr, MSc, MCSP, Physiotherapist, University Hospitals Coventry and Warwickshire NHS Trust, Coventry, UK.

R. Horton, Patient Representative, British Society for Surgery of the Hand, London, UK.

N. Beale, MBBS, FRCS (Tr&Orth), Dip Hand Surg, Clinical Trials Manager

D. J. Beard, GDPhys, MCSP, MSc, MA, DPhil, Professor of Musculoskeletal and Surgical Science NDORMS, University of Oxford, Oxford, UK.

B. J. F. Dean, BM, BCh, BA, MA, DPhil, FRCS, Senior Research Fellow, Consultant Hand Surgeon, Oxford University Hospitals NHS Trust, Oxford, UK; NDORMS, University of Oxford, Oxford, UK.

Author contributions

M. Mikhail: Investigation, Methodology, Writing – original draft, Writing – review & editing.

N. Riley: Conceptualization, Methodology, Writing – original draft, Writing – review & editing.

J. Rodrigues: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing.

E. Carr: Conceptualization, Data curation, Methodology, Writing – original draft, Writing – review & editing.

R. Horton: Conceptualization, Methodology, Writing – original draft, Writing – review & editing.

N. Beale: Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing.

D. J. Beard: Methodology, Supervision, Writing – original draft, Writing – review & editing.

B. J. F. Dean: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Writing – original draft, Writing – review & editing.

Funding statement

The authors disclose receipt of the following financial or material support for the research, authorship, and/or publication of this article: British Society for Surgery of the Hand (BSSH) pump priming grant.

ICMJE COI statement

B. J. F. Dean and M. Mikhail report a British Society for Surgery of the Hand (BSSH) pump priming grant for this study. B. J. F. Dean also reports a British Medical Association Doris Hillier grant which was unrelated to this study. B. J. F. Dean is also a member of the BSSH research committee. D. J. Beard holds a Senior Investigator grant from the National Institute for Health and Care Research, unrelated to this study. M. Mikhail reports a BSSH grant to the ULCTEAR steering group for this study, allocated under his name. N. Riley reports consulting fees from Acumend, Arthrex, and Meshworks, unrelated to this study.

Data sharing

The data that support the findings for this study are available to other researchers from the corresponding author upon reasonable request.

Acknowledgements

The UCL Tear Collaborative:
Aberdeen Royal Infirmary, Woodend General Hospital: Lucy Clubb, Alan Johnstone, David Lawrie;
Ashford and St Peter's NHS Trust: Mohamed Imam, Sarah Joyce;
Calderdale and Huddersfield NHS Foundation Trust: Sudhi Ankarth;

Cardiff and Vale: Rachel Capp, Kathryn Dayananda, Nick Gape, Ryan Trickett;
Chelsea and Westminster Hospital: Alice Bremner-Smith, Carol Chan, Rupert Eckersley, Maxim Horwitz, Anita Jatan, William Lumsdaine, Gordon McArthur, Sarah Mee;
Glan Clwyd Hospital: Louisa Banks, Sally Dean, Sasan Dehbozorgi, Kate Green, Sonu Mehta;
Great Western Hospital: Francesca Fawkes, Jemma Rooker;
Guys & St Thomas' NHS Foundation Trust: Hannah Bell, Kalpesh Vaghela;
Imperial College Healthcare NHS Trust: Katia Fournier, Donna Kennedy, Lily Li;
Kettering General Hospital: Suresh Srinivasan;
King's College Hospital: David Gamble, Efstratios Gerakopoulos, Jordyn Groves, Thomas Jackson, Karthik Karuppaiah, Amy Maltby, Anjali Nair, Ines Reichert;
Leeds General Infirmary: Robert Bains, Chrishan Mariathas, Fiona Reilly;
Leicester Royal Infirmary: Laura Sharpe, Clare Wildin;
Lincoln County Hospital: Michael Feeney, Avadhut Kulkarni, Vikas Sharma;
Musgrove Park Hospital, Taunton: Sarah Flaherty, Anthony Gough, Katharine Hamlin, Lorraine King, Cherry Law;
Ninewells Hospital, Dundee: Simon Johnson, Cyndi Svee;
Northampton General Hospital: Yasmeen Khan;
Northern General Hospital, Sheffield: Sarah Rodgers, Phil Storey;
Oxford University Hospitals: Ben Dean, Lizelle Sander-Danby;
QEUH Glasgow: Karen Shields, Matthew Torkington;
Queen Elizabeth Hospital, Birmingham: Rachel Blackshaw, Tahseen Chaudhry, Lisa Jordan, Feiran Wu;
Royal Berkshire Hospital: David Clarke, Elena Robinson, Ruben Thumbadoo;
Royal Blackburn Hospital: Miriam Parkinson, Kevin Sharpe;
Royal Cornwall Hospitals NHS Trust: Matt Allen, Rob Poulter;

Royal Devon and Exeter Hospital: Jamie Currie, Oliver Stone;
Royal Infirmary of Edinburgh: Nicola Cliff, Andrew Duckworth;
Royal United Hospital Bath: Alex Cowey, James Crossfield, Grey Giddins, Robyn Heath, Ilana Langdon, Lydia Mgbemena, Rebecca Mills, Greg Pickering, Mark Sheriff;
Salford Royal / Northern Care Alliance: Andrew McDonough, Zaf Naqui;
South Tees NHS Foundation Trust: Nicole Lyons, Emma Reay;
South Warwickshire: Tracey Taylor;
Stepping Hill Hospital, Stockport: Michelle Bates, Gillian Eastwood, Iain McLoughlin-Symon, Ashwanth Ramesh;
Stoke Mandeville Hospital: James Chan, Prashant Govilkar, Rebecca Shirley, Claire Upson;
The Dudley Group NHS Foundation Trust: Soha Sajid (Single Input);
University Hospitals Coventry: Elaine Carr, Claire Langley;
University Hospitals Dorset: Joanna Higgins;
University Hospitals Plymouth: Alexander Armstrong, Sameer Gujral, Aimee Howe, Mina Ip, Janette Thornsby, Robert Slade;
Whiston Hospital: Laura Knowles, Stephen Lipscombe;
WWL NHS Trust: Theresa Goggins, Sumedh Talwalkar.

Open access funding

The open access fee for this article was funded by the British Society of Surgery of the Hand (BSSH) pump priming grant.

© 2024 Mikhail et al. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial No Derivatives (CC BY-NC-ND 4.0) licence, which permits the copying and redistribution of the work only, and provided the original author and source are credited. See <https://creativecommons.org/licenses/by-nc-nd/4.0/>