CQ HAND + UPPER LIMB
SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

Mallet Finger

Mallet Finger — Injury Outcomes & Splint-Led Rehabilitation (Terminal Extensor Tendon, DIP)

Topic scope: non-operative (and, where indicated, post-fixation) management of a **mallet finger** — disruption of the **terminal extensor tendon at the distal interphalangeal (DIP) joint**, either purely tendinous or with an avulsion bony fragment (**bony mallet**). This is a **healing** injury, not a reconstruction: the entire treatment is **uninterrupted DIP extension splinting** that holds the tendon (or fragment) in apposition while it unites, with the PIP and MCP left free.

> *Defining principle of the rehab here: the terminal extensor tendon heals only if the DIP is held in continuous extension and is never allowed to flex during the splinting period. Any single lapse into DIP flexion separates the healing ends and restarts the healing clock, which is why patient compliance is the dominant outcome driver. The PIP is deliberately kept mobile because proximal-joint motion does not disturb terminal-tendon healing. Splint type (Stack, thermoplastic, volar/dorsal alumifoam) does not materially change the outcome — fit, skin tolerance and compliance matter more than the device. The single branch point is the bony mallet with a large articular fragment or DIP volar subluxation, where surgical fixation is considered; even there, splinting is non-inferior to pinning for the final extensor lag, so operation is reserved rather than routine.*

A. INJURY OUTCOMES (tendinous vs bony mallet; splinting vs fixation)

Mallet finger is one of the most reliably treated closed tendon injuries in the hand: the great majority heal well with splinting alone, and the principal debate is over the **bony mallet** — when, if ever, to fix it.

- **Continuous extension splinting is the standard of care and works well for both tendinous and bony mallets**, including chronic and delayed presentations, which still respond to splinting weeks after injury [Valdes systematic review LoE 1a; Salazar Botero review; Medscape; StatPearls]. *Strong (SR + reviews).*

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- **Splint type makes no meaningful outcome difference.** A randomised comparison of splint designs found no superiority of one orthosis over another; the determinant is uninterrupted DIP extension and compliance, not the device [Pike RCT]. *Strong (RCT).*
- **Splinting is non-inferior to extension-block pinning for the final extensor lag.** A randomised trial comparing conservative extension splinting with operative extension-block K-wiring for bony mallet found no advantage to pinning in the residual lag, supporting non-operative management as the default even for many bony mallets [Thillemann RCT]. *Strong (RCT).*
- **Surgery is reserved for the large bony fragment or subluxating DIP.** Operative fixation is considered when the fracture involves a large part of the articular surface (often cited as

> *~30%) or there is volar subluxation of the distal phalanx; common techniques are extension-block (Ishiguro) K-wiring with or without a trans-articular DIP pin. Single-K-wire constructs perform less well in non-compliant settings [Aksan; Salazar Botero; Medscape]. Moderate.*

- **Stack splints can subluxate a bony mallet.** Volar-based Stack-type orthoses holding the DIP in hyperextension can displace a bony-mallet fragment / promote subluxation, which is why a **straight/neutral DIP is preferred for bony mallets** rather than hyperextension [Kaplan]. *Moderate (mechanistic/clinical).*
- **The underlying mechanism is a terminal tendon avulsion at the distal phalanx.** Anatomical and injury studies characterise the lesion as avulsion of the terminal extensor at its distal-phalanx insertion, and a very small amount of tendon lengthening translates into a large extensor lag – roughly **1 mm of lengthening ≈ 25° of lag** – which is the biomechanical reason apposition must be maintained so strictly [Tuttle; Yeh; PMC current concepts]. *Mechanistic.*

B. REHABILITATION / THERAPY EVIDENCE

The central rehab questions are (1) how long and how strictly to splint, (2) whether the PIP should be included, and (3) whether night-time and post-splinting splinting are needed. The evidence supports **uninterrupted full-time DIP extension splinting (~6–8 weeks)** with the **PIP free**, followed by a weaning phase, and downgrades routine night-splinting to optional.

- **Uninterrupted DIP extension is the active ingredient; the PIP must stay free.** Splinting holds the DIP in full extension (or slight hyperextension) continuously; the PIP and MCP are mobilised from the outset because proximal-joint motion does not load the terminal tendon. Full-time wear is about **8 weeks for tendinous** and **6 weeks for bony** mallets [Valdes SR 1a; Salazar Botero; StatPearls; Physiopedia]. *Strong (SR + guideline-level reviews).*
- **Compliance is the dominant outcome driver.** Because any DIP flexion restarts healing, outcome tracks adherence to continuous extension more than any device choice; patient education and a safe flat-surface

splint-change technique are central [Valdes SR; Cook BAHT survey of therapist practice]. *Strong (mechanism + practice consensus).*

- **Avoid excessive hyperextension.** Holding the DIP in marked hyperextension risks dorsal-skin blanching and pressure ulceration over the joint; slight hyperextension or neutral is sufficient, and **bony mallets should be held straight/neutral** to avoid fragment subluxation [Azad dorsal splinting outcomes; Kaplan]. *Moderate.*
- **Night-time splinting after the full-time phase is non-essential (optional).** A Level-I study found that continued night-splinting after the primary full-time period was not essential to the result, so the ~2–6 week post-splinting night/risky-activity phase is framed as optional and pragmatic rather than mandatory [Valdes SR 1a evidence base]. *Moderate (Level I within SR).*
- **Recurrent lag responds to re-splinting.** If an extensor lag (>~20°) recurs after the splinting period, a further ~4–6 weeks of full-time extension splinting is appropriate; chronic/delayed mallets likewise still respond [Salazar Botero; Medscape; StatPearls]. *Moderate.*
- **A small residual extensor lag is the expected, satisfactory result.** Most patients are left with a slight permanent lag (mean ~8°, typically 5–10°) that does not impair function or satisfaction; this should be counselled as normal rather than as failure [Salazar Botero; PMC current concepts; Physiopedia]. *Moderate–strong (natural history).*

RECOVERY TRAJECTORY (EXPECTED, EVIDENCE-ANCHORED)

Phase	Window	Restraint	Hand use / therapy focus	Strength / load	Notes
I – Continuous DIP extension splinting	**Week 0–6/8** (bony ~6, tendinous ~8)	DIP held continuously extended; **never flex the DIP**	Full-time extension orthosis (Stack/ thermoplastic/ alumifoam); flat-surface splint changes only; **PIP + MCP moved freely** from day 1; daily dorsal-skin checks	No DIP loading; light splinted hand use	Any DIP flexion **resets the clock**; bony mallet held straight/neutral + **radiographic surveillance**
II – Weaning & controlled DIP motion	**+2–6 weeks** after full-time phase	Night / high-risk-activity splinting (night wear **optional**)	Begin **gentle graded active DIP flexion** + **blocked active DIP extension**; reduce day wear once lag ≤ 10–20°	Light functional load	**Lag >20° recurring → re-splint full-time ~4–6 wk**; chronic mallets still respond
III – Strengthening & return	**From ~week 8–12**	None (protective splint for contact sport)	Splint-free use; graded grip/pinch strengthening; full ROM; sport-/work-specific progression	Grip/ strength built up; driving once able to grip	**Expect ~5–10° permanent lag (mean ~8°)** – normal,

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Phase	Window	Restraint	Hand use / therapy focus	Strength / load	Notes
				the wheel safely	satisfaction preserved

(Phase windows mirror the precautions in the patient protocol; they are typical guides, not trial-derived deadlines.)

C. KEY CONTROVERSIES / EVIDENCE QUALITY

1. **Splint type.** Stack vs thermoplastic vs volar/dorsal alumifoam — randomised data show no meaningful outcome difference; the determinant is uninterrupted extension and compliance, not the device [Pike RCT]. *Strong evidence of equivalence.*
2. **Splinting vs operative fixation for bony mallet.** Randomised data show extension splinting is non-inferior to extension-block pinning for the residual lag; surgery is reserved for the large articular fragment (>~30%) or volar DIP subluxation, not used routinely [Thillemann RCT; Aksan; Salazar Botero]. *Strong (RCT) for non-inferiority; moderate for the fixation indications.*
3. **Hyperextension vs neutral.** Slight hyperextension aids tendinous apposition but excessive hyperextension risks dorsal-skin ischaemia/ulcer, and in bony mallets can subluxate the fragment — hence straight/neutral for bony mallets [Azad; Kaplan]. *Moderate.*
4. **Is night-splinting necessary?** A Level-I study found continued night-splinting after the full-time phase non-essential; the post-splinting phase is therefore optional/pragmatic rather than mandatory [Valdes SR 1a]. *Moderate.*
5. **Residual lag as expected outcome, not failure.** A small permanent lag (mean ~8°) is the norm and is compatible with full function and satisfaction; mislabelling it as failure drives unnecessary intervention [Salazar Botero; PMC current concepts]. *Strong natural-history data.*

D. EVIDENCE STRENGTH FLAGS (summary)

- **STRONG (RCT / SR):** uninterrupted DIP extension splinting as standard of care (6–8 wk full-time, tendinous ~8 / bony ~6); splint-type equivalence; PIP-free mobilisation; compliance as the key outcome driver; expected ~5–10° residual lag; splinting **non-inferior to pinning** for bony mallet (with radiographic surveillance during splinting).
- **MODERATE:** exact length of the weaning/night-splinting phase (night wear non-essential per a Level-I study); strengthening and return-to-sport/work timing (~8–12 weeks, criterion-based); hyperextension-vs-neutral splint positioning and the bony-mallet subluxation caveat; surgical indications (>~30% articular fragment / volar subluxation) and fixation technique.
- **WEAK / CONFIRM: driving** — a fingertip splint is not usually a contraindication once the wheel can be gripped safely, but this is confirmed clinically rather than evidence-defined.

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CITATIONS

RAG CORPUS (180,000+ ORTHOPAEDIC ARTICLES)

- A randomized controlled trial comparing splint designs for mallet finger. *J Hand Surg Am*. 2010. DOI: 10.1016/j.jhsa.2010.01.005
- Conservative management of mallet finger: a systematic review (Level of Evidence 1a). *J Hand Ther*. 2015. DOI: 10.1016/j.jht.2015.03.001
- Mallet finger: a survey of British Association of Hand Therapists practice. *Hand Therapy*. 2016. DOI: 10.1177/1758998316664822
- The mallet finger injury: a review (current concepts in diagnosis and management). *Arch Plast Surg*. 2016. DOI: 10.5999/aps.2016.43.2.134
- Outcomes of dorsal splinting for mallet finger. *Hand (N Y)*. 2022. DOI: 10.1177/15589447221093674
- Conservative splinting versus extension-block K-wiring for bony mallet finger: a randomized controlled trial. *J Hand Surg (Eur Vol)*. 2020. DOI: 10.1177/1753193420917567
- Tendon avulsion fractures of the distal phalanx (terminal extensor avulsion). *Clin Orthop Relat Res*. 2006. DOI: 10.1097/01.blo.0000205903.51727.62
- Tendon ruptures in the hand. *Hand Clin*. 2012. DOI: 10.1016/j.hcl.2012.05.040
- Single K-wire fixation of bony mallet finger in non-compliant patients. *Arch Orthop Trauma Surg*. 2021. DOI: 10.1007/s00402-021-03793-4
- Subluxation of bony mallet fractures with Stack splint immobilisation. *J Hand Surg Am*. 2013. DOI: 10.1016/j.jhsa.2013.08.111

MALLET-FINGER MANAGEMENT LITERATURE (URLS)

- Medscape — Mallet Finger Treatment & Management. https://emedicine.medscape.com/article/1242305-treatment
- StatPearls — Mallet Finger (NCBI Bookshelf). https://www.ncbi.nlm.nih.gov/books/NBK459373/
- Current concepts in the management of mallet finger (PMC; ~1 mm terminal-tendon lengthening ≈ 25° extensor lag). https://pmc.ncbi.nlm.nih.gov/articles/PMC4022957/
- Physiopedia — Mallet Finger. https://www.physio-pedia.com/Mallet_Finger

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