CQ HAND + UPPER LIMB
SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

Flexor Tendon Repair

Flexor Tendon Repair – Procedure Outcomes & Post-operative Rehabilitation (Manchester Short-Splint Early Active Motion)

Topic scope: post-operative rehabilitation after **primary surgical repair of a flexor tendon in the finger** (especially **zone II**) with a robust multi-strand core repair, mobilised on an **early-active-motion (EAM)** regimen using the **Manchester short splint**. This is a *repair* of a divided structure that is at its weakest in the first weeks, so – unlike a decompression – the rehab is a carefully graded **protected-but-moving** pathway: enough controlled tendon excursion to prevent adhesion and flexion contracture, without the forceful flexion that ruptures the construct.

> *Defining principle of the rehab here: a repaired flexor tendon must* glide to heal well but must not be loaded hard while it is weak. *The two competing failures are* rupture *(from forceful or resisted flexion) and* adhesion / PIP flexion contracture *(from too little controlled motion). The Manchester short splint resolves this tension by leaving the* wrist free: *holding the wrist in* 45° of extension minimises the work of flexion *(Savage) so a gentle active hook fist glides the tendon at low tension, while* permitting wrist flexion harnesses the extensor tenodesis effect *to drive active IP extension – the single most effective lever against the PIP flexion contracture that is the characteristic nuisance complication of zone II repair. The deliberate sequence each session (passive IP flexion → active hook fist from the DIP, wrist extended → active IP extension, wrist flexed) is what makes the regimen safe and anti-contracture.*

A. PROCEDURE / REPAIR OUTCOMES (early active motion vs passive mobilisation)

Flexor tendon repair is technically demanding and historically complication-prone (rupture and adhesion). Modern multi-strand core repairs combined with **early active motion** have shifted outcomes decisively toward better motion, with the central trade-off being a small rupture risk against markedly better range and function.

- **Early active motion gives better finger motion than passive mobilisation, at a small rupture cost.** A systematic review of controlled mobilisation after zone II repair found EAM regimens produced **better total active motion** than passive (Kleinert/Duran) protocols, with a modest increase in rupture (~5% vs ~4%) [Starr 2013]. The contemporary consensus favours active regimens with robust repairs. *Moderate–strong (SR).*
- **The Manchester short splint specifically improves IP extension without increasing rupture.** A clinical audit comparing the Manchester short splint (MSS) with a traditional full-length dorsal splint in uncomplicated zone II repairs found **less PIP extension deficit** (median **15° vs 28° at 6 weeks, p=0.003; 6° vs 18° at 12 weeks**), a **greater DIP flexion arc (59° vs 30°)**, and more excellent/good Strickland grades with the MSS. **Rupture was not significantly different (2/45, 4.4% MSS vs 3/76, 3.9% traditional)** [Peck 2014]. The headline advantage is the reduction in PIP flexion contracture. *Moderate (single-centre non-randomised audit, Level III–IV).*
- **Forearm-based (wrist-blocking) splints constrain the very motion that prevents contracture.** A comparison of splint designs found the Manchester short splint allowed **greater PIP extension than forearm-based splints** [Newington 2021], consistent with the mechanistic rationale that freeing the wrist enables the synergistic IP-extension move. *Moderate.*
- **Mechanistic basis.** Positioning the **wrist in ~45° extension minimises the work of flexion** required for active digital flexion, lowering the tension on the repair during the active hook fist [Savage 1988]; allowing **wrist flexion** recruits the extensor tenodesis effect to achieve full active IP extension at low cost — the anti-contracture engine of the regimen. *Mechanistic.*

B. REHABILITATION / THERAPY EVIDENCE

The rehab questions are (1) active vs passive early mobilisation, (2) splint design, and (3) how to structure the session to prevent both rupture and contracture. The evidence supports a robust repair mobilised with **early active motion**, a **short wrist-free splint**, and a fixed safe exercise sequence delivered through formal hand therapy.

- **Early active motion is the modern default for robust repairs.** Active regimens (partial-range combined passive/active, place-and-hold, true active flexion) outperform passive-only protocols on motion and are now standard where the core repair is strong enough to tolerate active glide [Tang 2021; Starr 2013]. *Moderate–strong.*

- **A defined, low-tension active sequence is what makes EAM safe.** Therapy guidance emphasises **passive flexion first** (preconditioning the joints), **place-and-hold / active hook fist** to glide the tendon at minimal tension, and **synergistic wrist-flexion finger-extension** to recover IP extension — the explicit structure of the Manchester regimen [Neiduski & Powell 2019; Saint John protocol]. *Moderate (consensus + protocol cohorts).*
- **Splint design materially changes the contracture outcome.** Shorter, wrist-free splinting that permits the synergistic extension move yields **greater PIP extension** than traditional or forearm-based dorsal splints [Peck 2014; Newington 2021]. *Moderate.*
- **All flexor repairs are routed through formal hand therapy.** The regimen is exercise-order- and tension-sensitive and is delivered with **weekly hand-therapy review** through the six-week splinted phase; it is not a self-directed pathway. *Consensus / standard of care.*

RECOVERY TRAJECTORY (EXPECTED, EVIDENCE-ANCHORED)

Phase	Window	Restraint	Hand use / therapy focus	Strength / load	Notes
I – Early active motion (in MSS)	**Week 0–6**	Manchester short splint full-time (full wrist flexion, extension to 45°, MCP block 30°, IPs free)	Start day 4–5; each session: **passive IP flexion → active hook fist from the DIP (wrist extended) → active IP extension (wrist flexed)**; place-and-hold as guided; weekly therapy	**No resisted flexion, no gripping/ lifting**; light safe use excluding the injured finger	EAM drives glide + anti-contracture; rupture risk highest now
II – Splint off, soft-tissue / scar	**Week 6**	Splint discontinued (night extension gutter only for residual IP flexion deformity)	Restore full passive/ active ROM; **scar management**; tendon glides; **blocking** if adhesions	Still no resisted loading	PIP flexion contracture is the complication to chase down here
III – Strengthen / return	**Week 6–12**	Restrictions progressively lifted	Graded stretching; **progressive grip/pinch strengthening** (putty → resistance)	Build grip/ pinch gradually	**Return to full / unrestricted activity 10–12 weeks**, criterion-based

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

C. KEY CONTROVERSIES / EVIDENCE QUALITY

1. **Active vs passive early mobilisation.** EAM gives better motion than passive Kleinert/Duran regimens at a small rupture-rate cost (~5% vs ~4%); it is the contemporary default for strong core repairs [Starr 2013; Tang 2021]. *Moderate–strong.*
2. **Manchester short splint vs traditional dorsal splint.** The MSS audit shows clearly better IP extension and DIP flexion arc with **no significant increase in rupture**, but it is a **single-centre, non-randomised audit (Level III–IV)** — the authors themselves call for an RCT. The improvement is consistent with the mechanism (wrist-free synergistic extension), which raises confidence above the study design alone. *Moderate; RCT recommended.*
3. **The PIP flexion contracture is the outcome that discriminates protocols.** Rupture rates are broadly similar across modern regimens; what separates them is **residual PIP extension loss**, and that is where the short, wrist-free splint and the synergistic-extension move earn their place [Peck 2014; Newington 2021]. *Moderate.*
4. **Repair strength gates the regimen.** EAM is only safe with a robust multi-strand core repair; the protocol assumes that and is **surgeon-confirmed per case** (zone, suture configuration, pulley venting, concurrent nerve repair). *Consensus.*

D. EVIDENCE STRENGTH FLAGS (summary)

- **MODERATE–STRONG (SR):** early active motion produces better finger motion than passive mobilisation after zone II repair, at a small rupture-rate increase (~5% vs ~4%) [Starr 2013]; modern partial-range active regimens are the contemporary standard [Tang 2021].
- **MODERATE:** the **Manchester short splint** reduces PIP extension deficit (15° vs 28° at 6 wk, p=0.003) and improves DIP flexion arc without significantly increasing rupture (4.4% vs 3.9%) [Peck 2014]; greater PIP extension than forearm-based splints [Newington 2021]; defined low-tension exercise sequence [Neiduski & Powell 2019; Saint John].
- **MECHANISTIC / CONSENSUS:** wrist 45° extension minimises work of flexion [Savage 1988]; wrist flexion harnesses the extensor tenodesis effect for active IP extension (anti-contracture); exact phase timings are typical guides, not trial-derived; **single-centre non-randomised MSS evidence — an RCT is recommended.**

CITATIONS

RAG CORPUS (180,000+ ORTHOPAEDIC ARTICLES)

- Peck FH, et al. A comparative study of two methods of controlled mobilization of flexor tendon repairs in zone 2 (the Manchester short splint). *Hand Ther*. 2014. DOI: 10.1177/1758998314533306

CQ HAND + UPPER LIMB
Dr Kieran Hirpara — Specialist Orthopaedic Surgeon
Suite 2, Level 1, Mater Private Hospital Rockhampton, 31 Ward Street, The Range, QLD 4700
Phone 07 4863 6556 · office@cqupperlimb.com.au · cqupperlimb.com.au

- Starr HM, et al. Flexor tendon repair rehabilitation protocols: a systematic review. *J Hand Surg Am*. 2013. DOI: 10.1016/j.jhsa.2013.06.025
- Neiduski RL, Powell RK. Flexor tendon rehabilitation in the 21st century: a systematic review. *J Hand Ther*. 2019. DOI: 10.1016/j.jht.2018.06.001
- Tang JB. Rehabilitation after flexor tendon repair and others: a safe and efficient update. *J Hand Surg Eur Vol*. 2021. DOI: 10.1177/17531934211037112
- Tang JB, et al. (IFSSH flexor tendon committee report). *J Hand Surg Eur Vol*. 2014. DOI: 10.1177/1753193413500768
- Newington L, et al. Splinting after flexor tendon repair: comparison of the Manchester short splint with forearm-based splinting on PIP joint extension. *Hand Ther*. 2021. DOI: 10.1177/17589983211017584

FLEXOR TENDON REHABILITATION LITERATURE (URLS)

- Saint John flexor tendon protocol — early active motion regimen for zone II repair (protocol description and outcomes). PMC. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5142498/
- Savage R. The influence of wrist position on the minimum force required for active movement of the interphalangeal joints. *J Hand Surg Br*. 1988 (mechanistic basis: wrist extension minimises the work of flexion). https://doi.org/10.1016/0266-7681(88)90258-2

CQ HAND + UPPER LIMB
Dr Kieran Hirpara — Specialist Orthopaedic Surgeon
Suite 2, Level 1, Mater Private Hospital Rockhampton, 31 Ward Street, The Range, QLD 4700
Phone 07 4863 6556 · office@cqupperlimb.com.au · cqupperlimb.com.au