CQ HAND + UPPER LIMB
SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

Distal Biceps Tendon Repair

Distal Biceps Tendon Repair — Post-operative Rehabilitation (Evidence)

Topic scope: Post-operative rehabilitation after surgical repair of a ruptured **distal biceps tendon** reattached to the radial tuberosity with **cortical-button fixation**. The protocol here reflects Dr Hirpara's practice — a **sling-only, early-comfort-motion** approach with **deliberately delayed loading** — set against the published spectrum of distal-biceps rehabilitation protocols.

> *Defining principle: Cortical-button fixation is the strongest available construct, and biomechanical and clinical evidence show it tolerates **immediate motion** safely. Dr Hirpara's stance is to **spend that strength on early movement, not early loading**: a **simple sling for 6 weeks (no hinged brace, no extension block)** with **all motion to comfort from day 1 including extension**, but with **resisted strengthening and lifting held back until ~4 months** to protect tendon-to-bone healing and minimise re-rupture, and **unrestricted activity / return to sport at ~6 months** on criterion-based clearance. This sits at the protective end of loading while matching the most current thinking on early motion for stiffness prevention.*

Where this protocol sits in the evidence

Published distal-biceps protocols span a wide range, from rigid hinged-brace extension-block schemes to immediate unrestricted motion. Dr Hirpara's plan diverges from the "traditional" template in two deliberate ways:

1. **Immobilisation:** A simple sling for comfort, not a hinged ROM brace, and **no extension block**. Motion is unrestricted to comfort from day 1. The mainstream BWH/MGB protocols instead use a posterior splint at 90° for 5–7 days, then a hinged brace with a 45°→30° extension block opened ~10°/week to full extension by ~6 weeks (or ~3 weeks in the accelerated variant). Dr Hirpara's approach is at the **early-motion** end and is justified by the strength of the cortical-button construct.

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

2. **Loading:** Resisted strengthening and lifting are deferred to **~4 months**. This is *more conservative* than the published loading timelines (accelerated resisted work at week 6; standard/MGB at weeks 8–10–12; light weights weeks 12–14). Crucially, this conservatism is a choice made **despite** having the construct that would permit earlier loading.

The endpoint — **unrestricted activity / return to sport at ~6 months**, criterion-based — is the single most commonly cited endpoint across protocols and matches the mainstream consensus.

Key evidence and controversies

1. **Early/immediate motion is safe with modern fixation.** *(Moderate)* Biomechanical work supports immediate motion: Bisson et al (AJSM 2007) found aggressive rehabilitation safe after the modified 2-incision approach, and Rose et al (KSSTA 2010) showed single-incision EndoButton/FiberWire repairs survive 2,000 immediate-motion cycles. Several series report no increased re-rupture with immediate post-operative motion. This underpins the sling-only, motion-to-comfort approach.
2. **Cortical-button strength enables early motion.** *(Moderate)* Cortical-button (± interference screw) fixation has the highest load-to-failure of the available constructs (Olsen JSES 2014; Spang JSES 2006; Lang OTSR 2018 — comparable functional outcomes across constructs but higher load-to-failure for cortical button). Spencer/Edwin (HAND 2008) argued EndoButton fixation strength may allow earlier ROM. This fixation strength is the explicit rationale for permitting immediate movement.
3. **Mobilisation timing may not change outcome.** *(Moderate)* A retrospective comparison found no clinically significant difference in failure, complications, ROM or patient-reported outcomes for early versus delayed mobilisation after primary distal biceps repair. This undercuts the urgency of accelerating loading and supports a measured progression.
4. **Conservative rehab may lower re-rupture.** *(Consensus / survey)* Rosenthal/Ting/Sher (JSES 2023), a survey of fellowship-trained elbow surgeons, suggests **more conservative post-operative rehab may be associated with lower re-rupture risk** — a direct counterweight to the accelerated-loading trend and the rationale for deferring loading to ~4 months. Phelps et al (JSES Int 2025, Level IV systematic review) found **no consensus on the optimal return-to-sport protocol**, with protocols ranging from immobilisation to immediate motion.
5. **Tendon elongation in the mid window.** *(Moderate)* Marshall et al (OJSM 2016, radiostereometric) showed the repaired tendon elongates mostly at **4–8 weeks** post-op with minimal change at 8–16 weeks — a biomechanical argument for caution against aggressive loading in that mid window even when motion itself is safe.
6. **Incision and complications.** *(Moderate)* Grewal et al RCT (JHS 2010): no overall functional difference single vs double incision (flexion strength slightly greater with two-incision, more minor complications with single-incision). Amarasooriya systematic review (AJSM 2020): synostosis occurred only with double incision; fixation technique did not significantly affect re-rupture. Incision choice mainly drives complication-avoidance precautions, not the ROM timeline. Re-rupture rates overall are low (0–5.6%; Garon & Greenberg 2016).

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

Phased rehabilitation timeline (this protocol)

Phase	Window	Sling / brace	ROM / use	Strengthening / loading	Criteria to progress
I – Protected comfort motion	**Week 0 → 6**	**Simple sling 6 wk**, off for exercises/ hygiene. **No hinged brace, no extension block**	All motion to comfort from day 1 – active + passive flexion, extension and forearm rotation. No arc restriction	**None.** No resisted biceps/supination loading; hand/wrist/ grip and scapular/ shoulder ROM maintained	Wound healed; comfortable near-full ROM; out of sling at 6 wk
II – Full motion, unloaded	**Week 6 → ~4 mo**	Sling off	Full symmetric pain-free ROM; light everyday use	**None yet** – light functional use **without resisted loading or lifting**	Full painless ROM; wound/ repair settled → begin loading ~4 mo
III – Strengthening & graded loading	**~4 → 6 mo**	–	Full ROM maintained	**Start LIGHT resisted strengthening / lifting at ~4 mo**; progress gradually (isotonic curls + resisted supination → functional → job/sport-specific)	Pain-free resisted flexion/ supination; strength approaching the other side
Return to activity	**~6 mo**	–	Unrestricted	Unrestricted activity / return to sport, criterion-based	Full painless ROM; strength ≥ 90–100% of the other side; tolerance of job/ sport-specific demands

One-line summary: simple sling 6 weeks with all motion to comfort from day 1 (no brace, no extension block) → full unloaded motion to ~4 months → light resisted loading from ~4 months → unrestricted activity / sport at ~6 months, criterion-based.

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

Evidence strength flags

- **MODERATE (biomechanical + cohort):** safety of immediate/early motion with cortical-button fixation (Bisson 2007; Rose 2010; Olsen 2014; Spang 2006; Lang 2018); no clinically significant difference early vs delayed mobilisation; low overall re-rupture rates.
- **MODERATE (biomechanical):** tendon elongation concentrated 4–8 weeks (Marshall 2016) — supports caution on mid-window loading.
- **CONSENSUS / survey-level:** more conservative rehab may lower re-rupture (Rosenthal 2023); no consensus on optimal return-to-sport protocol (Phelps 2025, Level IV). The **specific phase timings of this protocol are expert/consensus-derived**, not trial-derived.

Overall evidence strength: Moderate. Phased timelines rest on consistent institutional protocol consensus reinforced by biomechanical studies and retrospective cohorts; few prospective RCTs of the rehabilitation progression itself, and no consensus on the optimal return-to-sport protocol.

CITATIONS

RAG CORPUS (180,000+ ORTHOPAEDIC ARTICLES)

- Grewal R, Athwal GS, MacDermid JC, et al. Single vs. double incision technique for the repair of distal biceps tendon ruptures: a randomized clinical trial. *J Hand Surg Am*. 2010.
- Amarasooriya M, Bain GI, Roper T, et al. Complications after distal biceps tendon repair: a systematic review. *Am J Sports Med*. 2020.
- Keener JD. Controversies in the surgical treatment of distal biceps tendon ruptures: single versus double-incision repairs. *J Shoulder Elbow Surg*. 2011;20(2):S113–S125.
- Dunphy TR, Hudson J, Batech M, et al. Surgical treatment of distal biceps tendon ruptures: an analysis of complications in 784 surgical repairs. *Am J Sports Med*. 2017;45(13):3020–3029.
- Bisson LJ, Gurske-de Perio J, Weber AE, et al. Is it safe to perform aggressive rehabilitation after distal biceps tendon repair using the modified 2-incision approach? A biomechanical study. *Am J Sports Med*. 2007.
- Rose DM, Archibald JD, Sutter EG, et al. Biomechanical analysis suggests early rehabilitation is possible after single-incision EndoButton distal biceps repair with FiberWire. *Knee Surg Sports Traumatol Arthrosc*. 2010;19(6).
- Marshall NE, Keller RA, Okoroha K, et al. Radiostereometric evaluation of tendon elongation after distal biceps repair. *Orthop J Sports Med*. 2016.
- Phelps BM, Birnbrich A, Singer W, et al. Postoperative rehabilitation and return to sport criteria following distal biceps tendon rupture surgery. *JSES Int*. 2025. (Level IV systematic review: no consensus on optimal RTS rehabilitation.)

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

- Rosenthal R, Ting RS, Sher D. Management of distal biceps tendon ruptures: a survey of fellowship-trained subspecialist elbow surgeons. *J Shoulder Elbow Surg*. 2023;32(10).
- Olsen JR, Shields E, Williams RB, et al. A comparison of cortical button with interference screw versus suture anchor techniques for distal biceps brachii tendon repairs. *J Shoulder Elbow Surg*. 2014;23(11):1607–1611.
- Spang JT, Weinhold PS, Karas SG. A biomechanical comparison of EndoButton versus suture anchor repair of distal biceps tendon injuries. *J Shoulder Elbow Surg*. 2006.
- Lang NW, Bukaty A, Sturz GD, et al. Treatment of primary total distal biceps tendon rupture using cortical button, transosseous fixation and suture anchor: a single center experience. *Orthop Traumatol Surg Res*. 2018.
- Edwin ES (Spencer EE Jr), Tisdale A, Kostka K, Ivy RE. Is therapy necessary after distal biceps tendon repair? *HAND*. 2008;3(4).
- Rubinger L, Solow M, Johal H, et al. Return to work following a distal biceps repair: a systematic review of the literature. *J Shoulder Elbow Surg*. 2020;29(5):1002–1009.
- Ford SE, Andersen JS, Macknet DM, et al. Major complications after distal biceps tendon repairs: retrospective cohort analysis of 970 cases. *J Shoulder Elbow Surg*. 2018;27(10):1898–1906.
- Cuzzolin M, Secco D, Guerra E, et al. Operative versus nonoperative management for distal biceps brachii tendon lesions: a systematic review and meta-analysis. *Orthop J Sports Med*. 2021.
- Garon MT, Greenberg JA. Complications of distal biceps repair. *Orthop Clin North Am*. 2016. (Re-rupture 0–5.6%.)

PUBLISHED REHABILITATION PROTOCOLS (WEB)

- Brigham & Women's Hospital — Distal Biceps Tendon Repair Rehabilitation Protocol (standard). https://www.brighamandwomens.org/assets/BWH/patients-and-families/pdfs/elbow—distal-biceps-repair-protocol.pdf
- Brigham & Women's Hospital — Distal Biceps Tendon Repair Accelerated Protocol. https://www.brighamandwomens.org/assets/BWH/patients-and-families/rehabilitation-services/pdfs/elbow-accelerated-distal-biceps-repair-protocol-bwh.pdf
- Mass General Brigham Sports Medicine — Rehabilitation Protocol for Distal Biceps Tendon Repair (rev. 10/2021). https://www.massgeneral.org/assets/mgh/pdf/orthopaedics/sports-medicine/physical-therapy/rehabilitation-protocol-for-distal-biceps-repair.pdf

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