CQ HAND + UPPER LIMB
SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

Rotator Cuff Repair

Rotator Cuff Repair — Best-Evidence Rehabilitation Protocol

Scope: arthroscopic (and mini-open) rotator cuff repair (RCR). Two evidence sources combined: (1) local RAG corpus of 180,000+ Orthopaedic articles (citations below carry the journal/year), and (2) authoritative published institutional rehabilitation protocols (URLs below).

Each claim is flagged **[STRONG]** (RCT / meta-analysis / systematic review) or **[CONSENSUS]** (institutional protocol, narrative review, expert opinion) where relevant.

1. Consensus phased timeline (small/medium, "standard" 1–2 tendon repair)

Synthesised primarily from the Brigham & Women's Hospital (BWH) Arthroscopic RCR protocol and the BWH Standard of Care, cross-checked against the published institutional consensus. **[CONSENSUS]** for the exact week windows; **[STRONG]** that *no specific* week-by-week schedule is proven superior across all sizes (see controversies — Baumgarten 2009 Level I/II review; Chan 2014 meta-analysis).

Phase	Weeks	Sling	ROM allowed	Active ROM	Strengthening	Precautions
I — Passive motion / protective ("healing")	0–6	Sling + small abduction cushion worn at all times, including sleep; remove only for exercise/ icing/	PROM/ AAROM only. Pendulums. Supine passive forward elevation to ~90–100°;	**None.** No active shoulder motion (tendon ~20% of normal strength at 4 wks). Active	Submaximal scapular + cuff setting; manual scapular work only. No resisted shoulder.	No active abduction/ elevation; no pushing off with the arm for 6 wks; no NSAIDs >=12 wks

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

Phase	Weeks	Sling	ROM allowed	Active ROM	Strengthening	Precautions
		hygiene. Weaned wks 4–6.	passive ER (arm near side) to ~30°. Progress toward 120–140° FE / 30–60° ER by end of phase.	elbow/wrist/hand OK (curls only if biceps not involved).		(tendon healing).
II – Active-assisted -> active ROM	6–12	Discontinued (weaned wks 4–6).	Full PROM/AAROM to tolerance; supine->seated AAROM with cane/towel.	**AAROM starts ~6 wks; AROM starts ~6–8 wks** (gravity-eliminated -> upright). Goal >115° active FE before Phase III.	Begin light isotonic for deltoid, non-repaired cuff, scapula at **~10–12 wks (small tears); delayed to 16 wks for large/massive**.	Avoid empty-can raises ever; no straight-arm lateral raises; light waist-level use only early.
III – Strengthening	12–16	None.	Should have full ROM with good stability.	Full active use for ADLs; return to full work + modified recreation.	Progressive cuff/scapular/deltoid strengthening; endurance/power.	<=5 lb lifting; no sudden jerk/push; thumb-up (full-can) raises only.
IV – Return to sport/work prep	16–24	None.	Maintain full ROM.	Sport/work-specific conditioning, plyometrics, progressive weight program.	Advanced/sport-specific strengthening.	<=10 lb until cleared; no painful progressions.
Return to sport / heavy work	**>=4–6 months** (often 6 mo; up to 12 mo	–	–	–	–	Surgeon + therapist clearance; pain-free, adequate

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

Phase	Weeks	Sling	ROM allowed	Active ROM	Strengthening	Precautions
	for full recovery)					ROM + endurance.

Tendon-healing biology underpinning the schedule (BWH protocol): repair strength ~20% of normal at 4 wks, ~40% at 8 wks, ~60% at 12 wks, ~70% at 16 wks, ~80% at 32 wks — the rationale for *no* active motion before 6 wks and *no* strengthening before 12 wks. **[CONSENSUS]** (institutional, biologically grounded).

2. Small/medium vs large/massive tears (the key size distinction)

[STRONG] Tear size is the dominant modifier of healing/retear risk: weighted mean retear ~26.6% overall (Chamberlain/Namdari/Keener, *What's New in Shoulder & Elbow Surgery*, JBJS 2015), rising to ">90% in massive tears" (Hsu, Horneff, Gee, *Immobilization After Rotator Cuff Repair*, Orthop Clin North Am 2016). Retear correlates with larger tear size, advanced age, fatty infiltration.

Variable	Small / medium (<3 cm, 1–2 tendons, good tissue)	Large / massive (>3–5 cm, >=2 tendons, poor tissue)
Sling/immobilizer duration	4–6 wks	6 wks (commonly), abduction pillow; some delay PT to 6 wks to protect healing
PT start	within first 6 wks	**may be delayed up to 6 wks** to promote healing (BWH hybrid protocol)
Active ROM start	~6–8 wks	later, individualised; protect repair longer
Strengthening start	**~10–12 wks**	**delayed to ~16 wks**
Return to sport/heavy work	4–6 months	>=6 months, frequently longer; lower/slower return

[STRONG] Review of online RCR protocols (Coda et al., *Arthrosc Sports Med Rehabil* 2020): for **large/massive** tears, sling/immobilizer use ranged 4–10 wks, with the plurality (~55%) at 6 wks. **[STRONG]** Substantial *between-protocol variability* exists (Galetta et al., *J Shoulder Elbow Surg* 2021, ACGME-program protocol survey; Coda 2020) — i.e., no single validated schedule; size-stratification is consensus-driven.

Return-to-work pooled data: **[STRONG]** Haunschild et al. (*Am J Sports Med* 2021) systematic review/meta-analysis quantifies return-to-work after primary RCR (timeline varies with job demand; heavy-labor return slower).

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

3. KEY CONTROVERSY — Early vs Delayed (immobilization) passive motion after arthroscopic RCR

This is the central evidence debate. Two competing concerns: **early PROM** reduces post-op stiffness; **delayed/immobilization** may protect tendon-to-bone healing (reduce retear), especially in larger tears.

EVIDENCE FOR EARLY PASSIVE MOTION (LESS STIFFNESS, NO PROVEN HEALING PENALTY IN SMALL/MEDIUM)

- **[STRONG] Keener et al. RCT** — early vs delayed passive motion after arthroscopic repair of full-thickness tears, 114 patients, **small-to-medium** tears (cited in Braman/Neviaser/Parsons, *What's New in Shoulder and Elbow Surgery*, JBJS 2014): the landmark RCT in this debate; early motion improved early ROM without a clear healing penalty in this size class.
- **[STRONG] Mazzocca et al. RCT** (*Arthroscopy* 2017): **no difference** between delayed and early motion in WORC scores, clinical outcomes, or structural failure at 6 months; both protocols equivalent on patient-reported outcomes.
- **[STRONG] Saltzman et al.** (*J Shoulder Elbow Surg* 2017) — systematic review of *overlapping meta-analyses*: early-motion protocols may give superior early ROM; differences trend toward equivalence by ~1 year.
- **[STRONG] Li et al. meta-analysis** (*Medicine* 2018): early passive motion (EPM) gives superior ROM recovery, with the caveat below.

EVIDENCE FOR DELAYED MOTION / IMMOBILIZATION (PROTECT HEALING, LOWER RETEAR IN LARGER TEARS)

- **[STRONG] Chan et al. meta-analysis** (*J Shoulder Elbow Surg* 2014): documents the shift toward delaying motion over healing concerns; early motion improves ROM but raises healing-integrity questions.
- **[STRONG] Li et al. meta-analysis** (*Medicine* 2018): EPM "may adversely affect shoulder function" and "might result in lower rates of tendon healing in **large-sized** tears" — i.e., the early-motion benefit is size-dependent and may cost healing in big tears.
- **[STRONG] Gallagher et al. systematic review** (*Phys Sportsmed* 2015): early aggressive rehab may compromise repair integrity; conclusions size/quality dependent.
- **[STRONG] Stillson et al.** (*J Am Acad Orthop Surg* 2022, large Medicare cohort): **strong association between starting PT within 1 week post-op and increased revision/revision-surgery rates** — the largest study to date on rehab timing; cautions against *very* early aggressive therapy.
- Supporting basic-science: delayed early passive motion was harmless to cuff healing in animal models (rabbit model cited in Thigpen/Shaffer/Kissenberth, *Clin Sports Med* 2015, "Knowing the Speed Limit").

CURRENT CONSENSUS

[STRONG/CONSENSUS] The meta-analytic bottom line (Mazzocca 2017 RCT; Saltzman 2017; Chan 2014): for **small-to-medium** tears, early and delayed PROM converge by ~6–12 months — **timing is largely surgeon preference and does not change final outcome**, so either is defensible. For **large/massive** tears (and poor

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

tissue), the balance tips toward a **delayed / protected** approach to favor healing and lower retear (Li 2018; Hsu 2016), and *very early* (<1 wk) aggressive PT should be avoided (Stillson 2022). This is exactly the size-stratified pattern the BWH protocol encodes (delay PT/strengthening for large/massive). Note Cochrane-level certainty remains **low** — no protocol is proven superior on patient-important outcomes (Baumgarten 2009 Level I/II review found insufficient evidence for a single optimal protocol).

4. Practice shift to flag

- Historical default = **early passive motion** (minimize stiffness). Over the last decade the field moved toward **delaying/protecting motion** in larger tears on healing grounds (Chan 2014; Li 2018), then partially **back toward equipoise** for small/medium tears as RCTs/meta-analyses showed equivalent final outcomes (Mazzocca 2017; Saltzman 2017).
- Newest signal: **avoid ultra-early (<1 week) PT** regardless — associated with higher revision rates (Stillson 2022, Medicare cohort). Net current practice = **size-stratified**: standard 6-wk sling + passive-only phase, active ROM ~6–8 wks, strengthening ~12 wks for small/medium and ~16 wks for large/massive, RTS 4–6+ months.

CITATIONS

RAG CORPUS ARTICLES (TITLE / JOURNAL / YEAR)

- Keener et al. — early vs delayed passive motion after arthroscopic full-thickness RCR (small–medium, n=114). Cited in Braman J, Neviaser A, Parsons B. *What's New in Shoulder and Elbow Surgery.* J Bone Joint Surg. 2014;96(20). **[STRONG — RCT]**
- Mazzocca AD, Arciero RA, Shea KP, et al. *The Effect of Early Range of Motion on Quality of Life, Clinical Outcome, and Repair Integrity After Arthroscopic Rotator Cuff Repair.* Arthroscopy. 2017;33(6). **[STRONG — RCT]**
- Chan K, MacDermid JC, Hoppe DJ, et al. *Delayed versus early motion after arthroscopic rotator cuff repair: a meta-analysis.* J Shoulder Elbow Surg. 2014. **[STRONG — meta-analysis]**
- Saltzman BM, Zuke WA, Go B, et al. *Does early motion lead to a higher failure rate or better outcomes after arthroscopic rotator cuff repair? A systematic review of overlapping meta-analyses.* J Shoulder Elbow Surg. 2017;26(9):1681-1691. **[STRONG]**
- Li S, Sun H, Luo X, et al. *The clinical effect of rehabilitation following arthroscopic rotator cuff repair* (meta-analysis). Medicine. 2018. **[STRONG — meta-analysis]**
- Gallagher BP, Bishop ME, Tjoumakaris FP, et al. *Early versus delayed rehabilitation following arthroscopic rotator cuff repair: A systematic review.* Phys Sportsmed. 2015. **[STRONG]**

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

- Stillson QA, Sun JQ, Maninang M, et al. *Effect of Physical Therapy and Rehabilitation Timing on Rotator Cuff Repair Revisions and Capsulitis.* J Am Acad Orthop Surg. 2022 (large Medicare cohort). **[STRONG]**
- Baumgarten KM, Vidal AF, Wright RW. *Rotator Cuff Repair Rehabilitation: A Level I and II Systematic Review.* Sports Health. 2009 (insufficient evidence for a single optimal protocol). **[STRONG]**
- Parsons BO, Gruson KI, Chen DD, et al. *Does slower rehabilitation after arthroscopic rotator cuff repair lead to long-term stiffness?* J Shoulder Elbow Surg. 2010;19(7):1034-1039. **[moderate]**
- Thigpen CA, Shaffer MA, Kissenberth MJ. *Knowing the Speed Limit.* Clin Sports Med. 2015. **[CONSENSUS/review]**
- Chamberlain AM, Namdari S, Keener JD. *What's New in Shoulder and Elbow Surgery?* J Bone Joint Surg. 2015;97(20) (retear ~26.6%; predictors). **[STRONG – pooled]**
- Hsu JE, Horneff JG, Gee AO. *Immobilization After Rotator Cuff Repair.* Orthop Clin North Am. 2016 (retear up to >90% massive). **[CONSENSUS/review]**
- Coda RG, Cheema SG, Hermanns CA, et al. *A Review of Online Rehabilitation Protocols Designated for Rotator Cuff Repairs.* Arthrosc Sports Med Rehabil. 2020;2(3) (sling 4–10 wks; ~55% at 6 wks for large/massive). **[STRONG – protocol systematic review]**
- Galetta MD, Keller RE, Sabbag OD, et al. *Rehabilitation variability after rotator cuff repair.* J Shoulder Elbow Surg. 2021;30(6) (ACGME program protocol variability). **[STRONG]**
- Haunschild ED, Gilat R, Lavoie-Gagne O, et al. *Return to Work After Primary Rotator Cuff Repair: A Systematic Review and Meta-analysis.* Am J Sports Med. 2021. **[STRONG]**

PUBLISHED INSTITUTIONAL PROTOCOLS (URLS)

- Brigham & Women's Hospital – *Arthroscopic Rotator Cuff Repair Protocol* (hybrid patient/therapist; full phased timeline, tear-size stratification): https://www.brighamandwomens.org/assets/BWH/patients-and-families/rehabilitation-services/pdfs/shoulder-arthroscopic-rct-repair-protocol-hybrid-patient-therapist.pdf
- Brigham & Women's Hospital – *Standard of Care: Arthroscopic repair of a rotator cuff tear* (small/medium/large-massive protocol families; literature review): https://www.brighamandwomens.org/assets/BWH/patients-and-families/rehabilitation-services/pdfs/shoulder-rotator-cuff-repair-arthroscopic.pdf

Overall evidence grade: the *biology-based phase structure* is **[CONSENSUS]** (well-aligned across institutions). The *early-vs-delayed motion question* is supported by multiple **[STRONG]** RCTs and meta-analyses, which converge on equivalence for small/medium tears and a protect-healing tilt for large/massive – but Cochrane-level certainty for any single optimal schedule remains LOW.

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