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SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

Capsular Release

Adhesive Capsulitis (Frozen Shoulder) — Non-operative Staged Management & Post-operative Rehabilitation (Capsular Release)

Topic scope: Both (A) non-operative staged management of primary/secondary adhesive capsulitis (freezing -> frozen -> thawing), including physiotherapy, intra-articular steroid and hydrodilatation; and (B) post-operative rehabilitation after **arthroscopic capsular release (ACR)**.

> *Defining principle of surgical rehab here (the inversion): Unlike virtually every other shoulder operation – where a repair (cuff, labrum, pec major, instability) must be protected with a sling and ROM is restricted to avoid disrupting healing tissue – frozen-shoulder release rehab is the OPPOSITE: the goal is to prevent re-formation of the capsular contracture. So the protocol is immediate, aggressive ROM, usually NO sling, passive + active ROM starting the same day or day 1, with stretching to the end of the freshly gained range. Delay or immobilisation is the enemy (re-stiffening), not the protector. This is the single most important point distinguishing this protocol from the others in this audit.*

A. NON-OPERATIVE STAGED MANAGEMENT

NATURAL HISTORY / STAGING (CONSENSUS, WEAK EVIDENCE – DESCRIPTIVE, NO RCT)

Frozen shoulder is self-limiting in most but typically lasts **12-18 months** across **3 clinical stages** (Reeves' classic model; staging boundaries overlap and are not sharply separable in practice – flagged as **weak/consensus** evidence; the original Reeves model was a single prospective cohort of 49 patients, not an RCT) [Brigham SOC; Chan 2017; Reeves 1975 via Willmore 2020]:

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Stage	Name	Typical duration	Clinical picture	Management emphasis
1	**Freezing** (painful/ inflammatory)	**2-9 months**	Diffuse constant pain, worse at night; progressive ROM loss in a **capsular pattern (ER > ABD > flexion > IR)**; loss of passive ER with arm at side is the hallmark	Pain control; intra-articular steroid; **gentle** ROM within pain limits – do NOT force end-range while highly inflamed
2	**Frozen** (adhesive/stiff)	**4-12 months**	Pain subsides to dull ache; stiffness dominant; marked functional loss	Restore motion: stretching, joint mobilisation grades III-IV, hydrodilatation; consider surgery if recalcitrant
3	**Thawing**	**6-9 months** (Brigham)	Gradual spontaneous return of motion	Progressive ROM + strengthening; PT 2-3x/week

(Stage durations from Brigham Standard of Care 2010 and Chan 2017: freezing 2-9 mo, frozen 4-12 mo, thawing 6-9 mo.)

STEPPED NON-OPERATIVE INTERVENTIONS

1. **Education / "supervised neglect" + analgesia** – many resolve with reassurance, activity modification and analgesia alone (Codman; Hsu 2011 review). *Weak (cohort/expert).*
2. **Physiotherapy** – pendulum, PROM/AAROM/AROM, capsular stretching, joint mobilisation (grades I-II early for pain, III-IV later for tissue extensibility), scapular/posture work. Brigham: PT **1-2x/week** in early stages (mainly HEP instruction), **2-3x/week** in thawing. PT is best supported as an **adjunct** to mobilisation/injection/distension, not as a stand-alone cure (Itoi 2016 Current Concepts; Kelley/McClure/ Leggin JOSPT 2009 guidance). *Moderate; intensity/timing debated.* **Intensity caveat:** end-range/high-intensity stretching is appropriate in the frozen/thawing phase but can be **counter-productive in the acutely inflamed freezing phase** – match intensity to irritability (Kelley 2009).
3. **Intra-articular corticosteroid (glenohumeral)** – superior to placebo and to physiotherapy for **short-term (up to 4-12 weeks)** pain and function; benefit **wanes after ~3 months**. *Strong for short term* (multiple RCTs; Koh 2016 systematic review of 10 RCTs; Cochrane Buchbinder shoulder injection review). BESS pathway: GH steroid recommended for short-term symptom control; **long-term (>3 mo) benefit not demonstrated** (Rupani/Gwilym BESS 2025). Earlier injection (freezing phase) is the rationale – steroid targets the inflammatory component.
4. **Hydrodilatation (distension arthrography)** – distends/ruptures the contracted capsule with saline +/- steroid +/- LA. A controlled, image-guided alternative to surgery. RCT/meta-analytic evidence is **mixed**: generally produces a **transient** functional/ROM gain, with **no clear superiority over IA steroid alone** in several network meta-analyses (Wu 2017 SR/MA of RCTs; Lin 2018 network MA). Some evidence hydrodilatation + steroid > steroid alone in refractory cases (Lee 2017 RCT). Low rate of needing later surgery after distension arthrogram (Nicholson 2020). *Moderate; conflicting.*

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B. POST-OPERATIVE REHABILITATION (the "immediate aggressive ROM" protocols)

Surgery is reserved for cases **recalcitrant to >=3-6 months of adequate non-operative care** (Struyf 2024; Mullen 2025).

ARTHROSCOPIC CAPSULAR RELEASE (ACR)

- **Controlled, direct-vision** release of the contracted capsule (rotator interval, CHL, anterior +/- inferior +/- 360 degree capsulotomy; care re axillary nerve inferiorly). Allows graded release with a **low risk of iatrogenic fracture or cuff tear** (Kanbe 2018, n=255; Jerosch 2001 360 degree release). Achieves reliable gains in final forward elevation and may shorten recovery (most improved by ~4 months – McAllister/ CORR Insights 2025; Saade 2023 MA favoured ACR for AFE). A gentle, controlled manipulation is often performed as part of the arthroscopic release to confirm the gained range.

CONSENSUS POST-OP PHASED TIMELINE (APPLIES AFTER ARTHROSCOPIC CAPSULAR RELEASE)

The hallmark is **immediate motion, no protective sling, same-day/day-1 ROM** to hold the range just won in theatre.

Phase	Window	Sling	ROM	Active ROM	Strengthening	Notes
0 – Immediate	**Day 0-1 (same day)**	**NO sling** (or sling only briefly for comfort/ analgesia, discarded fast)	**Full passive ROM immediately**; PT-assisted forward flexion + ER begun day 1; +/- **continuous passive motion (CPM)**; pendulums; patient does HEP **several times/day**	**AAROM/ AROM started day 1** alongside PROM (no protected period)	–	Intra-articular steroid often injected at time of release to damp post-op inflammatory re-stiffening
1 – Early	**Week 0-2**	None	Aggressive PROM/ AAROM to maintain gained range; stretch into end-range	Active motion continued	Light scapular/ rotator-cuff activation as pain allows	Pain control critical to allow the patient to *move* – adequate analgesia / interscalene

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Phase	Window	Sling	ROM	Active ROM	Strengthening	Notes
			daily; hold ER/ ABD/flexion			block / oral steroid taper
2 – Strengthening	**Week 2-6**	None	Continue to full ROM	Full AROM goal	**Rotator cuff + scapular strengthening begins ~week 2** (Kanbe protocol)	Most back to normal daily activity / work by **4-6 weeks**
3 – Return to function	**~6 weeks-3 months**	None	Maintain full ROM	Full	Progressive strengthening to full	Recurrence of stiffness is the main failure mode -> continued HEP emphasised

Representative published protocol (Kanbe 2018, J Orthop Surg Res, n=255, ACR): "passive, assisted-active and stooping (pendulum) exercises for forward flexion and external rotation commenced **1 day after surgery**… after **2 weeks** of passive exercise, patients began active exercise to strengthen the rotator cuff and scapular stabilisers… after **4-6 weeks** patients returned to normal work without limitation." Many ACR series add an **intra-articular steroid + controlled manipulation** at the index procedure (Filip Struyf 2024; PMC5137660).

Post-surgical physiotherapy is universally agreed to be essential but is **under-standardised** – there is no high-level RCT defining the optimal post-release regimen; protocols are consensus/expert and vary widely (Willmore 2020 Shoulder & Elbow, "Post-surgical physiotherapy in frozen shoulder: a review"). *Weak/consensus.*

KEY CONTROVERSIES

1. **Evidence base for arthroscopic release.** ACR gives a controlled, direct-vision release with a low iatrogenic fracture/cuff-tear risk and reliable gains in final elevation. Systematic reviews show consistently acceptable results, though there is **no definitive RCT** defining the optimal technique (Saade 2023 MA; McAllister 2025). *Weak/moderate evidence (large cohorts).*
2. **Steroid timing.** Strong short-term benefit (<12 wk) but **no durable >3-month benefit**; debate over injecting early (freezing/inflammatory phase) vs reserving for refractory cases (Koh 2016; Rupani/Gwilym BESS 2025; Lin 2018).
3. **Aggressive vs gentle physiotherapy.** High-intensity end-range stretching helps in the frozen/thawing phases but may **worsen pain and prolong** the condition if applied to the acutely inflamed freezing phase – "intensity should match irritability" (Kelley/McClure 2009; Itoi 2016). Post-operatively, by contrast, **aggressive immediate ROM is mandatory** to prevent re-stiffening.

4. **Hydrodilatation worth it?** Transient benefit only and not clearly better than IA steroid alone in pooled RCT data (Wu 2017; Lin 2018), though some refractory-case RCT support (Lee 2017) and a low rate of needing later surgery (Nicholson 2020).
5. **Does anything change the natural history?** No intervention is proven to shorten the overall 12-18 month course in the highest-quality reviews; most accelerate symptom relief rather than alter end-point (Rookmoneea 2010 JBJS Br; Hsu 2011). *Strong (negative).*

EVIDENCE STRENGTH FLAGS (summary)

- **STRONG (RCT / SR-MA):** IA corticosteroid short-term benefit (Koh 2016 SR of 10 RCTs; Cochrane); hydrodilatation = transient, not superior to steroid (Wu 2017 SR-MA of RCTs; Lin 2018 network MA).
- **MODERATE:** end-range/scapular mobilisation (Yang 2012 RCT); ACR clinical outcomes (large cohorts – Kanbe 2018 n=255; Jerosch 2001).
- **WEAK / CONSENSUS ONLY:** 3-stage natural-history model & stage durations (Reeves cohort, descriptive); the **post-operative rehab protocol itself** (no defining RCT; expert/consensus – Willmore 2020); optimal ACR technique (published series are heterogeneous).

CITATIONS

RAG CORPUS (180,000+ ORTHOPAEDIC ARTICLES)

- Guyver P, Bruce D, Rees J. Frozen shoulder – a stiff problem that requires a flexible approach. Maturitas. 2014.
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- Rupani N, Gwilym SE. British Elbow and Shoulder Society patient care pathway: Frozen shoulder. Shoulder & Elbow. 2025;17(4).
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- Itoi E, Arce G, Bain GI, et al. Shoulder Stiffness: Current Concepts and Concerns. Arthroscopy. 2016;32(7).
- Kanbe K. Clinical outcome of arthroscopic capsular release for frozen shoulder: essential technical points in 255 patients. J Orthop Surg Res. 2018;13(1). (post-op protocol: day-1 ROM, 4-6 wk RTW)
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- Wu W, Chang K, Han D, et al. Effectiveness of glenohumeral joint dilatation for treatment of frozen shoulder: a systematic review and meta-analysis of RCTs. Sci Rep. 2017. (SR-MA of RCTs)
- Lin M, Hsiao M, Tu Y, et al. Comparative efficacy of intra-articular steroid injection and distension… a systematic review and network meta-analysis. Arch Phys Med Rehabil. 2018. (network MA)
- Lee D, Yoon S, Lee MY, et al. Capsule-preserving hydrodilatation with corticosteroid vs corticosteroid alone in refractory adhesive capsulitis: a randomized controlled trial. Arch Phys Med Rehabil. 2017. (RCT)
- Nicholson JA, Slader B, Martindale A, et al. Distension arthrogram in the treatment of adhesive capsulitis has a low rate of repeat intervention. Bone Joint J. 2020;102-B(5).
- Uppal HS. Frozen shoulder: a systematic review of therapeutic options. World J Orthop. 2015.
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- Yang J, Jan M, Chang C, et al. Effectiveness of the end-range mobilization and scapular mobilization approach… a randomized control trial. Manual Therapy. 2012. (RCT)
- Rookmoneea M, et al. The effectiveness of interventions in the management of patients with primary frozen shoulder. J Bone Joint Surg Br. 2010;92-B(9).
- Struyf F. Frozen Shoulder. 2024 (surgical indication & post-op steroid + controlled manipulation).

PUBLISHED REHAB PROTOCOLS (URLS)

- **Brigham & Women's Hospital – Standard of Care: Shoulder Adhesive Capsulitis** (Dept of Rehabilitation Services, 2010): https://www.brighamandwomens.org/assets/BWH/patients-and-families/rehabilitation-services/pdfs/shoulder-adhesive-capsulitis.pdf (source for the 12-18 mo / 3-stage durations, capsular pattern, PT frequency 1-2x/wk early & 2-3x/wk thawing, mobilisation grades, steroid 4-6 wk short-term benefit).
- **BESS (British Elbow & Shoulder Society) Frozen Shoulder patient care pathway** – Rupani & Gwilym, Shoulder & Elbow 2025 (GH steroid short-term only, no >3 mo benefit).
- Kanbe 2018 ACR open-access (post-op day-1 ROM protocol): https://pmc.ncbi.nlm.nih.gov/articles/PMC5857121/
- ChoosePT / APTA patient guide to frozen shoulder (lay phased overview): https://www.choosept.com/guide/physical-therapy-guide-frozen-shoulder-adhesive-capsulitis

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