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SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

Distal Clavicle Excision

Distal Clavicle Excision (Mumford) — Surgical Rationale & Post-operative Rehabilitation

Topic scope: the evidence underpinning **distal clavicle excision (DCE)** — also called distal clavicle resection, AC joint excision, or the **Mumford procedure** — for the two main indications (**acromioclavicular [AC] joint osteoarthritis** and **distal clavicular osteolysis**, the "weightlifter's shoulder"), and the post-operative rehabilitation that follows. Covers open vs arthroscopic technique, direct vs indirect (bursal) approach, **how much bone to resect**, the **iatrogenic-instability** risk of over-resection, and the (consensus-based) phased rehab timeline.

> *Defining principle of the rehab here: DCE removes a few millimetres of worn bone from the end of the collarbone and repairs nothing that needs months of protection — provided the AC ligaments and superior/posterior capsule are preserved. So (like a debridement or subacromial decompression, and **unlike** a cuff repair, labral repair or AC-joint stabilisation) this is an **early-motion** pathway: a short sling for comfort only, movement from day one, strengthening as range returns. The single important caveat runs the other way: **if the surgeon resects too much bone, or the stabilising AC ligaments/capsule are violated, the joint can become iatrogenically unstable** — which is why technique (resection amount, ligament preservation) matters more here than the rehab calendar. The two operation-specific quirks the rehab respects are that **cross-body (horizontal adduction) movement compresses the resected area** and is the slowest to settle, and **heavy pressing (bench press, dips, push-ups) loads the AC joint hardest** and returns last.*

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A. THE OPERATION & ITS INDICATIONS

DCE removes the worn or eroded outer end of the clavicle so the acromion and clavicle no longer grind at the AC joint. Two indications dominate:

- **AC joint osteoarthritis** — degenerative wear, often with a history of prior AC injury or simply age-related change. Surgery follows failed non-operative care (activity modification, analgesia, AC joint corticosteroid injection).
- **Distal clavicular osteolysis ("weightlifter's shoulder")** — atraumatic, repetitive-microtrauma resorption of the distal clavicle seen in weightlifters and overhead athletes. **Activity modification and rehabilitation are first-line**; injection or surgery is reserved for refractory cases or athletes unwilling to stop loading [StatPearls 2023; Charron 1998].

DCE is frequently combined with **subacromial decompression** (for room/co-existing impingement) and the rehab is unchanged by that addition. If a **rotator cuff repair** is also performed, the slower protected cuff-repair pathway takes over.

B. EVIDENCE BY THEME

1. OPEN VS ARTHROSCOPIC — EQUIVALENT LONG-TERM OUTCOME, FASTER ARTHROSCOPIC RECOVERY

A randomised, prospective trial (Robertson et al., corpus, DOI 10.1016/j.jse.2006.10.006) and a systematic review (Pensak et al., *Arthroscopy* 2010) found **similar long-term functional outcomes for open and arthroscopic DCE**, with both **arthroscopic techniques exceeding 90% good/excellent results**. Across measures there was a **trend toward earlier or better outcomes after arthroscopic treatment** — less post-operative pain and a quicker return to daily activities — without a difference in the final result [Robertson RCT; Pensak SR 2010]. A second comparative cohort reached the same conclusion (corpus, DOI 10.1177/0363546511419633). *Moderate (RCT + SR + cohort).*

2. DIRECT VS INDIRECT (BURSAL) ARTHROSCOPIC APPROACH — DIRECT IS FASTER

Among arthroscopic techniques, the **direct (superior, top-down) approach permits a quicker return to athletic activity than the indirect/bursal approach**, with equivalent long-term results — one comparison reporting a mean **return to sport of ~21 days (direct) vs ~42 days (indirect)** [Pensak SR 2010; arthroscopic-approach comparison]. *Moderate.*

3. HOW MUCH BONE TO RESECT — AND WHY OVER-RESECTION IS DANGEROUS

This is the central technical controversy and the reason DCE rehab cannot be reduced to a calendar:

- The stabilising **superior and posterior AC ligament/capsule** runs from the anterior acromion to the **posterior** distal clavicle, and the **coracoclavicular (trapezoid) ligament** inserts on the clavicle

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undersurface roughly **22–25 mm from the tip** [Renfree; capsule/ligament-insertion cadaveric study, corpus DOI 10.1016/j.arthro.2009.04.072; clavicular-strut cadaveric study, corpus DOI 10.1016/j.jse.2013.01.004].

- **Anatomic work suggests as little as ~2.3–2.6 mm of resection can begin to violate the superior AC ligament** [Renfree, via PMC6930955]; biomechanical models show **AC joint anteroposterior translation increases after either open or arthroscopic excision**, and **stability falls as the resection lengthens** [Blazar; resection-length biomechanical model, corpus DOI 10.1016/j.arthro.2007.07.004; DCE-vs-symmetric-resection biomechanics, corpus DOI 10.1177/0363546512469873].
- The practical consensus is to resect **enough to abolish bony contact but no more — commonly quoted as ~5 mm (sufficient to clear contact in cadaveric models) up to ~8 mm, and not beyond ~8 mm, preserving the posterior/superior capsule and AC ligaments** [PMC6930955; StatPearls 2023; resection-length biomechanics, corpus DOI 10.1016/j.arthro.2007.07.004].
- **Over-resection or capsular violation can produce iatrogenic AC instability** — a recognised (though uncommon) cause of persistent pain after DCE that may itself require ligament reconstruction [iatrogenic-instability case, PMC6930955; Painful Conditions of the AC Joint, corpus DOI 10.5435/00124635-199905000-00004].

Moderate (cadaveric/biomechanical + anatomic + expert consensus); exact safe threshold is debated.

4. OUTCOMES & RETURN TO ACTIVITY

DCE is a **reliable, high-satisfaction operation for the right indication** — arthroscopic series report **>90% good/excellent results** [Robertson RCT; Pensak SR 2010]. For **osteolysis in weightlifters**, an arthroscopic-resection series reported **return to sport at a mean of ~3 days and to the preoperative weight-training program at ~9 days**, remaining asymptomatic and able to progress load beyond pre-operative levels at ~19-month follow-up [Charron, *Am J Sports Med* 1998, PMID 9548111]. Across the literature, **most everyday activity returns within weeks and heavy pressing/overhead sport over ~3–4 months**, consistent with the published rehab protocols. *Moderate (cohort).* A noted exception: **worse ("poor") results cluster in patients with pre-existing post-traumatic AC instability or Workers'-Compensation claims** [Pensak SR 2010] — DCE alone does not fix an unstable joint.

C. PHASED POST-OPERATIVE TIMELINE (isolated DCE ± subacromial decompression)

Week ranges are **typical, not fixed** — progression is criteria-based, guided by the physiotherapist.

Phase	Window	Sling	ROM / use	Strengthening	Operation-specific notes
	Week 0–2	Comfort only; weaned/	Elbow/wrist/hand + pendulums from **day 1**; passive +		**Avoid cross-body (horizontal) adduction** — it

Phase	Window	Sling	ROM / use	Strengthening	Operation-specific notes
I – Early recovery & movement		discarded within **1–2 weeks**	active-assisted shoulder elevation/ ER/behind-the-back IR; scapular setting	Grip; gentle isometrics as pain allows	compresses the resected area. No driving in the sling; no weight-bearing through the arm
II – Restoring range	**Week 2–6**	Off	Progress assisted → active ROM to full in all planes; **reintroduce cross-body adduction gradually** (end-range pinching is common, settles)	Begin cuff + scapular band work once active range near full; lifting ≤ ~5 kg	Light lower-body conditioning (walk/ bike/jog) from ~wk 4
III – Strengthening & return	**Week 6–12**	Off	Full functional ROM	Bands → dumbbells; functional + sport-specific; **most return to sport/ heavier work ~8–12 wk**	**Reintroduce AC-loading presses (bench/dips/push-ups) last** – light, shallow depth, elbows not behind the body line
IV – Return to full activity	**Week 12+**	Off	Full	Progressive heavy pressing; return to previous bench performance can take **~4 months**; overhead athletes progressed over **~2–4 months**	Symptom-guided – recurrent AC ache with a lift = adjust load/technique before progressing

The phased structure is drawn from **published surgeon/physiotherapy protocols** (Saint Louis University; University of Utah Sports Medicine; Sports Surgery New York; Palm Beach Orthopaedic Institute; OrthoVirginia; Specialty Physicians of Illinois – see Citations). These are **consensus/expert** documents; no rehab RCT defines the optimal post-DCE regimen.

D. KEY CONTROVERSIES / EVIDENCE QUALITY

1. **How much bone to resect is the real debate, not the rehab.** Too little leaves residual bony contact; too much risks iatrogenic instability. The safe window (~5–8 mm, capsule preserved) is supported by cadaveric/

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biomechanical and anatomic work, **not by an RCT** — exact thresholds vary by source. *Moderate, technique-dependent.*

2. **Open vs arthroscopic, direct vs indirect.** Long-term outcomes converge; arthroscopic (and specifically the direct approach) recovers faster. *Moderate (RCT + SR).*
3. **Patient selection matters more than approach.** Pre-existing AC instability and Workers'-Compensation status predict poorer results — DCE treats a worn/eroded joint, not an unstable one. *Moderate.*
4. **The rehab protocol itself is consensus.** Phase timings come from surgeon patient-guidance protocols, not a rehab trial. *Weak/consensus.*

E. EVIDENCE STRENGTH FLAGS (summary)

- **MODERATE (RCT / SR):** open vs arthroscopic equivalence with faster arthroscopic recovery (Robertson RCT; Pensak SR 2010, >90% good/excellent); direct > indirect for return speed.
- **MODERATE (cadaveric / biomechanical / anatomic):** resection-length vs stability relationship and the iatrogenic-instability mechanism (resection-length model, corpus DOI 10.1016/j.arthro.2007.07.004; DCE-vs-symmetric biomechanics, corpus DOI 10.1177/0363546512469873; capsule/ligament insertions, corpus DOI 10.1016/j.arthro.2009.04.072).
- **MODERATE (cohort):** osteolysis-in-weightlifters return-to-sport (Charron 1998); high overall satisfaction; poorer results with pre-existing instability / WorkCover.
- **WEAK / CONSENSUS:** the post-operative **rehabilitation protocol** (surgeon patient-guidance documents; no defining rehab RCT); the exact "safe" resection threshold.

CITATIONS

RAG CORPUS (180,000+ ORTHOPAEDIC ARTICLES)

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- Acromioclavicular joint ligamentous system contributing to clavicular strut function: a cadaveric study. *J Shoulder Elbow Surg*. 2013. DOI: 10.1016/j.jse.2013.01.004
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LITERATURE (URLS)

- Pensak M, et al. Open versus arthroscopic distal clavicle resection (systematic review; >90% good/excellent, direct > indirect return). *Arthroscopy*. 2010. PMID 20434670. https://pubmed.ncbi.nlm.nih.gov/20434670/
- Charron KM, et al. Arthroscopic distal clavicle resection for isolated atraumatic osteolysis in weight lifters (return to sport ~3 d, training ~9 d). *Am J Sports Med*. 1998. PMID 9548111. https://pubmed.ncbi.nlm.nih.gov/9548111/
- Distal clavicular osteolysis (cause, activity-modification first line, ~8 mm resection preserving AC ligaments). *StatPearls*. 2023. https://www.ncbi.nlm.nih.gov/books/NBK582148/
- Distal clavicular augmentation with AC and CC ligament reconstruction in iatrogenic AC instability (~5 mm safe-resection guidance; Renfree ~2.3–2.6 mm violates superior AC ligament; trapezoid 22–25 mm from tip; Blazar AP-translation increase). PMC6930955. https://pmc.ncbi.nlm.nih.gov/articles/PMC6930955/
- A sports medicine clinician's guide to the diagnosis and management of distal clavicular osteolysis. PubMed. https://pubmed.ncbi.nlm.nih.gov/37294199/
- Distal clavicular osteolysis (review). *Physiopedia*. https://www.physio-pedia.com/Distal_Clavicular_Osteolysis

PUBLISHED REHAB PROTOCOLS (PATIENT-GUIDANCE — BASIS FOR THE PHASE STRUCTURE)

- Saint Louis University Dept of Orthopaedic Surgery. Subacromial Decompression / Distal Clavicle Excision Rehab Protocol. https://www.slu.edu/medicine/orthopaedic-surgery/sports-medicine/-pdf/shoulder-subacromial-decompression-and-distal-clavicle-excision.pdf
- Burks RT. Distal Clavicle Resection/Mumford Post-Op Protocol. University of Utah Sports Medicine. https://www.robertburksmd.med.utah.edu/pdfs/distal-clavicle-resection-mumford-protocol.pdf
- Sports Surgery New York. Arthroscopic Subacromial Decompression / Distal Clavicle Excision Rehab Protocol. https://www.sportssurgerynewyork.com/pdf/arthroscopic-subacromial-decompression-distal-clavicle-excision-rehab-protocol.pdf
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