CQ HAND + UPPER LIMB
SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

DIP Joint Fusion

DIP Joint Fusion — Procedure Outcomes & Post-operative Rehabilitation (Distal Interphalangeal Arthrodesis)

Topic scope: post-operative rehabilitation after **arthrodesis (fusion) of the distal interphalangeal (DIP) joint** — most often for end-stage osteoarthritis (Heberden's nodes), or to excise a mucous cyst together with its underlying osteophyte. This is a *fusion*, not a reconstruction: the joint is deliberately and permanently abolished and set in a slightly flexed, functional position, so the rehabilitation is a **protect-to-union** pathway built around oedema control, scar/nail-fold management, and preservation of motion at every adjacent joint, followed by progressive reloading — not restoration of DIP motion.

> *Defining principle of the rehab here: a DIP arthrodesis is* ***meant to stop moving.*** *The single therapeutic goal is to deliver a solid, pain-free, well-aligned bony union while keeping the rest of the hand fully mobile. The fingertip is immobilised in a P2–P3 (Stax/mallet-type) orthosis that blocks the DIP but* ***leaves the PIP free****; the deliberate restraints are protection of the fixation and avoidance of pinch/grip loading until union. The principal branch points are the* ***fixation method*** *(buried headless compression screw — no removal — versus K-wire, removed at ~6 weeks) and whether a* ***mucous cyst with skin/nail-fold excision*** *was performed, which adds soft-tissue/scar care. Union, not the calendar, gates splint weaning and loading.*

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A. PROCEDURE OUTCOMES (fusion union, position, fixation)

DIP arthrodesis is a reliable pain-relieving operation; the principal technical debates are over *fixation method* and *fusion position*, not whether to fuse a painful, end-stage joint.

- **High union rates with headless compression screw fixation.** A series of 64 joints fused with a Herbert-type headless compression screw reported reliable bony union with a low complication profile, supporting the buried-screw construct that requires no later removal [Hand 2010, DOI: 10.1007/s11552-010-9295-3]. *Moderate (observational case series).*
- **Radiographic union averages around ten weeks.** A review of DIP arthrodesis techniques reports a mean time to radiographic fusion of approximately **10 weeks**, with reported union rates such as ~85% in the Brutus cohort, underlining that clinical comfort precedes full radiographic consolidation [J Hand Surg Am 2013, DOI: 10.1016/j.jhsa.2013.06.010]. *Moderate (review of case series).*
- **Fusion position is a consensus, not a controversy.** Technique descriptions place the DIP in slight flexion in a functional position for pinch; dorsal-plate and screw techniques are described with attention to setting and holding this position during fixation [J Hand Surg Am 2018, DOI: 10.1016/j.jhsa.2018.03.049]. *Mechanistic / consensus.*
- **Screw fit depends on bony dimensions.** Anatomical sizing work shows the headless screw must be matched to the medullary dimensions of the distal phalanx, informing implant selection and reducing fixation-related complications [Hand 2014, DOI: 10.1007/s11552-014-9679-x]. *Mechanistic.*
- **Fixation choice carries differing complication patterns.** Comparative data on K-wire versus headless (Herbert) screw fixation describe differences in infection and hardware-related events, relevant to the protective pin care needed when a K-wire is used and removed at ~6 weeks [J Hand Surg Am 2013, DOI: 10.1016/j.jhsa.2013.01.017]. *Moderate (comparative series).*
- **Acute arthrodesis is an established option in trauma.** Primary IP-joint arthrodesis for acute injury is a recognised technique, supporting fusion as a durable solution beyond degenerative disease [J Hand Surg / Thieme 2017, DOI: 10.1055/s-0037-1608691]. *Moderate (case series).*

B. REHABILITATION / THERAPY EVIDENCE

There are **no randomised trials** of rehabilitation after DIP arthrodesis. The rehab pathway is built from surgical-outcome timing data (union ~6–8 weeks clinical, ~10 weeks radiographic) plus **published hand-therapy protocols** and standard hand-therapy practice. The therapeutic logic is to immobilise only the fused joint, keep every other joint moving, control swelling and scar, and reload pinch/grip only after union.

- **Immobilise the DIP, free the PIP.** Published finger-fusion therapy protocols use a custom removable DIP-blocking (Stax/mallet-type) orthosis spanning P2–P3 that holds the fingertip joint while leaving the PIP free for active motion — continual early wear, weaning to activity-only after X-ray union [TCO; Hand

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Wisconsin; Alaska Ortho; Melbourne Arm Clinic protocols, URLs below]. *Weak (consensus / published protocols).*

- **Preserve motion at all uninvolved joints from day one.** Active motion of the PIP, MCP, thumb, wrist and all other digits, plus tendon glides, is standard hand-therapy practice to prevent stiffness while the DIP consolidates [published protocols, URLs below]. *Consensus / standard practice.*
- **Oedema and scar control are routine adjuncts.** Elevation and compression for swelling, and scar massage once healed (with nail-fold care after mucous-cyst excision), follow standard hand-therapy practice rather than trial evidence. *Consensus / standard practice.*
- **Loading is gated by union, not by date.** Protocols withhold power grasp/pinch until the fusion is radiographically united, then progress strengthening gradually — reflecting the ~10-week mean radiographic union from the outcome literature [J Hand Surg Am 2013, DOI: 10.1016/j.jhsa.2013.06.010]. *Weak–moderate (timing anchored to outcome series; rehab schedule consensus).*

RECOVERY TRAJECTORY (EXPECTED, EVIDENCE-ANCHORED)

Phase	Window	Restraint	Hand use / therapy focus	Strength / load	Notes
1 — Protect & settle	**Week 0–2**	Bulky dressing/ splint; DIP unloaded	Elevation; AROM of **all uninvolved joints** (PIP, MCP, thumb, wrist, other digits); begin tendon glides	None to the fingertip	Keep dressing dry; review pin/ cyst-excision wound
2 — DIP-blocking splint with activity	**Week 2–6**	Custom P2–P3 DIP-block, **PIP free**, worn continually	Active PIP/MCP/ thumb/wrist + all-other-digit motion; tendon glides; oedema (Coban/ sleeve); **scar massage once healed**	**No power grasp/pinch; ~2 lb (≈ 1 kg) limit**	Clinical union emerging ~6 wk
3 — Wean splint & gentle strengthening	**Week 6–8**	Splint weaned **once united on X-ray**; **K-wire out ~6 wk**	Begin **gentle grip/ pinch** (putty, light pinch/grip); continue full motion elsewhere; continue scar care	**~5 lb (≈ 2 kg)** from 8 wk	Buried screw needs no removal
4 — Progressive strengthening & discharge	**Week 8–12**	Restrictions lifting	Progressive grip/pinch strengthening; restore full hand use	**~10 lb (≈ 4.5 kg)** at 10 wk; **no restriction ~12 wk**	Discharge when fusion solid + pain-free

(Phase windows mirror the precautions and recovery-curve structure in the patient protocol; clinical union ~6–8 weeks and radiographic union ~10 weeks are anchored to the outcome series, while the exact phase timings are low-level expert consensus, not trial-derived deadlines, and are subject to surgeon discretion and X-ray confirmation of union.)

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C. KEY CONTROVERSIES / EVIDENCE QUALITY

1. **Fixation method.** Buried headless compression screw (no removal) versus K-wire (removed ~6 weeks) — both achieve union; the comparative literature describes differing infection and hardware-event profiles, and the choice drives whether pin-site protection is needed in rehab [DOI: 10.1007/s11552-010-9295-3; DOI: 10.1016/j.jhsa.2013.01.017]. *Moderate.*
2. **Fusion position.** Slight flexion (up to ~35°) in a functional pinch position is a settled consensus across technique descriptions, not a live controversy [DOI: 10.1016/j.jhsa.2018.03.049]. *Consensus.*
3. **Union timing.** Clinical comfort (~6–8 weeks) precedes radiographic union (~10 weeks mean), so splint weaning and loading should follow the X-ray rather than the calendar [DOI: 10.1016/j.jhsa.2013.06.010]. *Moderate.*
4. **Rehabilitation schedule.** No RCTs exist for DIP-fusion rehab; phase timings are derived from published therapy protocols and standard hand-therapy practice anchored to surgical union data. *Low-level expert consensus.*
5. **Mucous-cyst cases.** Excision of a mucous cyst with its osteophyte adds skin/nail-fold and scar care to the standard fusion rehab; this is a soft-tissue management addition rather than a change to the bony-union pathway. *Consensus / standard practice.*

D. EVIDENCE STRENGTH FLAGS (summary)

- **MODERATE (observational case series / reviews):** reliable bony union with headless compression screw fixation; mean radiographic union ~10 weeks (~85% union, Brutus); differing complication profiles by fixation method; acute IP arthrodesis as an established trauma option.
- **CONSENSUS / MECHANISTIC:** slight-flexion functional fusion position; screw sizing to phalangeal dimensions; immobilise-the-DIP / free-the-PIP splinting principle.
- **WEAK / LOW-LEVEL CONSENSUS:** the specific phased **rehabilitation schedule** (no RCTs; derived from published therapy protocols + standard hand-therapy practice, anchored to union timing); exact phase timings and load limits (typical guides, not trial-derived); oedema/scar adjuncts (standard practice).

CITATIONS

RAG CORPUS (180,000+ ORTHOPAEDIC ARTICLES)

- Distal interphalangeal joint arthrodesis using a dorsal plate: technique and fusion position. *J Hand Surg Am*. 2018. DOI: 10.1016/j.jhsa.2018.03.049
- Distal interphalangeal joint arthrodesis with the Herbert headless compression screw: union and complications in 64 joints. *Hand (N Y)*. 2010. DOI: 10.1007/s11552-010-9295-3

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- Distal interphalangeal joint arthrodesis: review of techniques and outcomes (mean ~10-week radiographic fusion; Brutus ~85% union). *J Hand Surg Am*. 2013. DOI: 10.1016/j.jhsa.2013.06.010
- K-wire versus Herbert screw fixation for distal interphalangeal joint arthrodesis: infection and hardware events. *J Hand Surg Am*. 2013. DOI: 10.1016/j.jhsa.2013.01.017
- Anatomical sizing of headless compression screws for distal phalangeal fixation. *Hand (N Y)*. 2014. DOI: 10.1007/s11552-014-9679-x
- Acute interphalangeal joint arthrodesis in trauma. *J Hand Surg / Thieme*. 2017. DOI: 10.1055/s-0037-1608691

DIP-FUSION REHABILITATION LITERATURE (URLS)

- Twin Cities Orthopedics — Distal Interphalangeal (DIP) Joint Fusion post-op protocol. https://www.tcomn.com/wp-content/uploads/2016/06/Distal-Interphalangeal-DIP-Joint-Fusion.pdf
- Hand Wisconsin — Finger-joint fusion therapy protocol. https://handwisconsin.com/wp-content/uploads/2016/09/fusion-finger-joint-therapy-protocol.pdf
- Alaska Orthopaedics — Arthrodesis (DIP / PIP or MCP) joint fusion protocol. https://www.akortho.com/wp-content/uploads/Arthrodesis-DIP-PIP-or-MCP-Joint-Fusion.pdf
- Melbourne Arm Clinic — PIP / DIP arthrodesis rehabilitation protocol. https://melbournearmclinic.com.au/orthopaedic-rehabilitation/shoulder-rehabilitation/pip-dip-arthrodesis-protocol/

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