CQ HAND + UPPER LIMB
SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

Total Elbow Replacement (Arthroplasty)

Total Elbow Arthroplasty (TEA) — Rehabilitation Evidence

Topic scope: post-operative rehabilitation after **semi-constrained (linked/hinged) total elbow replacement** — most commonly for rheumatoid arthritis, end-stage osteoarthritis, or a non-reconstructable distal humerus fracture in an elderly patient. This brief covers the phased rehabilitation timeline, the early triceps-protection rationale, the functional-arc goal, and — critically — the **lifelong lifting restriction** that exists to protect the implant against polyethylene wear and aseptic loosening.

> *Defining principle: unlike most joint replacements, the goal of TEA rehabilitation is a pain-free functional arc (~30–130° flexion, 60°/60° rotation), not maximal strength. The implant's long-term enemies are polyethylene wear and aseptic loosening, both driven by load, so heavy loading is restricted permanently, not just during healing — "the need for a vigorous strengthening program is not appropriate following total elbow arthroplasty." Dr Hirpara's practice: a simple sling for comfort (not a posterior splint or brace), gentle active-assisted motion from day 1–7, isometrics from ~6 weeks, light isotonic (≤ 5 lb) from 10–12 weeks, triceps protection where the triceps was reflected or detached, and a lifelong lifting limit (no repetitive lift > ~2.3 kg; no single lift > ~4.5–5 kg; no tennis/throwing/impact ever).*

Consensus phased timeline (week windows)

Anchored to the **Brigham & Women's Hospital (BWH) Total Elbow Arthroplasty Protocol** (Thornhill; semi-constrained, hinged/linked prosthesis; posterior triceps-sparing approach assumed) and cross-checked against the primary literature. Dr Hirpara's practice substitutes a **simple sling for comfort in place of BWH's 60° posterior resting splint**; the ROM and strengthening cadence and the lifelong limits are retained.

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Phase	Window	Sling / immobilisation	ROM and use	Strengthening	Lifting
I – Immediate post-surgical	**Weeks 0–6**	**Simple sling for comfort (KH – no posterior splint/ brace)**; triceps-reflected cases immobilised nearer extension	Gentle AAROM flexion/extension from **day 1–7**, elbow adducted, forearm neutral-to-pronated, gravity-assisted extension; hand/ wrist/shoulder AROM	None	**No lifting > 1 lb (0.45 kg)**; no weight-bearing/ pushing
II – Functional activity	**From 6 weeks (not before)**	Sling weaned	6 wk: submaximal mid-range isometrics, all planes · 8 wk: multi-angle submaximal isometrics (avoid end-range) · target functional arc **30–120/130°, 60°/60°**	10–12 wk: light isotonic, **no resistance > 5 lb (2.3 kg)**, single-plane → composite	Restriction continues
Late II / lifelong	**12 weeks onward**	–	Maintain pain-free functional arc	**No vigorous strengthening – ever**	**Lifelong limits apply (see below)**

Triceps-protection note. Where the triceps is **reflected** (Bryan–Morrey) rather than spared, early rehabilitation is stricter – immobilisation nearer extension and delayed/limited active and resisted extension to protect the reattachment (cf. distal-triceps-repair logic). Wiesel keeps the elbow in full extension ~24–36 h then begins active-assisted ROM, and adds no pushing/overhead for 3 months to protect the triceps; Wolfe & Ranawat's osteo-anconeus flap is immobilised ~16 days. Triceps insufficiency is a recognised TEA complication.

CRITICAL – lifelong lifting restriction numbers + sources

Source	Repetitive limit	Single-event limit	Lifelong?
BWH Standard of Care (Thornhill)	no repetitive lifts > 5 lb	no single lift > 15 lb	yes – "no heavier than 15 lb for life"; "no tennis or throwing for life"
Wiesel, Operative Techniques in Orthopaedic Surgery (2011)	> 5 lb (~2.3 kg)	> 10 lb (~4.5 kg)	yes (also no pushing/overhead × 3 months to protect triceps)
	> 1 kg	5 kg	

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Source	Repetitive limit	Single-event limit	Lifelong?
Toulemonde et al., Int Orthop 2015 (100 semi-constrained TEA)			yes; all weight-lifting avoided entirely for the first 3 months
Kumar & Mahanta, Indian J Orthop 2013	–	5 kg	permanent restriction of strenuous activity

Bottom line / patient-facing range: the canonical teaching is a **lifelong** restriction of roughly **~5 lb (2.3 kg) repetitive** and **~10–15 lb (4.5–5 kg) single event**. The exact ceiling varies by source: BWH allows up to 15 lb once; Wiesel caps single lift at 10 lb; the European series (Toulemonde) is most conservative at 1 kg repetitive / 5 kg single. Dr Hirpara quotes the conservative patient-facing range: **do not repetitively lift more than ~2 kg, or lift more than ~5 kg in a single event, for life; no tennis/throwing/impact ever.**

Key controversies / evidence quality

- **Lifting-limit variation.** Numbers range from 1 kg / 5 kg (Toulemonde 2015) to 5 lb / 15 lb (BWH). The restriction exists to protect against **polyethylene wear and aseptic loosening**, the dominant long-term failure mode — hence its permanence.
- **Triceps-sparing vs reflected approach.** Surgical handling of the triceps dictates early rehab: triceps-sparing (BWH default) permits earlier gentle AAROM; reflected approaches require protecting the reattachment with immobilisation nearer extension and delayed active/resisted extension. Triceps insufficiency/weakness is a recognised complication.
- **Longevity and compliance.** TEA was historically reserved for elderly low-demand patients owing to implant-longevity concerns (survivorship ~85–96% at 5 y, ~70–92% at 10 y in RA). As indications expand to younger, more active and post-traumatic patients, **non-compliance with activity limits drives higher complication and failure rates** — which is precisely why the lifelong limit is emphasised to every patient.

Evidence strength flags

- **MODERATE–STRONG (published protocol + restriction numbers):** the BWH institutional Standard of Care provides an explicit phased timeline with verbatim lifting limits, independently corroborated by multiple peer-reviewed primary sources (JBJS, JHS, JSES, Int Orthop, JAAOS) for the lifelong restriction and the triceps-protection rationale.
- **MODERATE (ROM / strengthening cadence):** phase timings and the isometric → light-isotonic progression are consensus/expert-driven; no high-level RCT dictates the rehab cadence. The exact lifting ceiling **varies by source**.
- **CONSENSUS:** the simple-sling (vs posterior-splint) choice and the precise functional-arc targets reflect surgeon practice and institutional protocols rather than trial data.

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CITATIONS

RAG CORPUS (180,000+ ORTHOPAEDIC ARTICLES)

- Toulemonde J, Ancelin D, Azoulay V, et al. Complications and revisions after semi-constrained total elbow arthroplasty: a mono-centre analysis of 100 cases. *Int Orthop*. 2015. (1 kg repetitive / 5 kg single; no weight-lifting first 3 months)
- Kumar S, Mahanta S. Primary total elbow arthroplasty. *Indian J Orthop*. 2013. (5-kg weight-lifting restriction)
- Schoch B, Wong J, Abboud J, et al. Results of total elbow arthroplasty in patients less than 50 years old. *J Hand Surg Am*. 2017. (longevity/survivorship driving the restriction)
- Seitz WH, Evans PJ, Bismar H, Peers S. Complications of total elbow arthroplasty in nonrheumatoid patients. *J Hand Surg Am*. 2014. (active patients, poor compliance → complications)
- Baghdadi YM, Veillette CJ, Malone AA, et al. Total elbow arthroplasty in obese patients. *J Bone Joint Surg Am*. 2014;96(9). (higher failure with high BMI)
- Barlow JD, Morrey BF, O'Driscoll SW, et al. Activities after total elbow arthroplasty. *J Shoulder Elbow Surg*. 2013;22(6):787–791.
- You D, King G, Dehghan N, et al. Optimizing outcomes in total elbow arthroplasty. *J Am Acad Orthop Surg (JAAOS)*. 2025. (modern failure-reduction review)
- Burnier M, Nguyen NTV, Morrey ME, et al. Revision elbow arthroplasty using a proximal ulnar allograft with allograft triceps for combined ulnar bone loss and triceps insufficiency. *J Bone Joint Surg Am*. 2020;102(22). (triceps insufficiency complication)
- Na K, Song S, Lee Y, et al. Modified triceps fascial tongue approach for primary total elbow arthroplasty. *J Shoulder Elbow Surg*. 2018;27(5):887–893. (triceps weakness after TEA; approach effect)
- Wolfe SW, Ranawat CS. The osteo-anconeus flap: an approach for total elbow arthroplasty. *J Bone Joint Surg Am*. 1990;72(5). (triceps-continuity-preserving approach; ~16-day immobilisation)
- Ring D. Instability after total elbow arthroplasty. *Hand Clin*. 2008. (triceps/LCL reattachment and stability)
- Wiesel SW. *Operative Techniques in Orthopaedic Surgery*. 2011. (5 lb repetitive / 10 lb single; full-extension splint 24–36 h; no pushing/overhead × 3 months to protect triceps)

PUBLISHED PROTOCOL (WEB)

- Brigham & Women's Hospital, Department of Rehabilitation Services. Total Elbow Arthroplasty Protocol (J. Sayles OTR/L, R.B. Wilcox III PT; reviewer T.S. Thornhill MD; 2010). https://www.brighamandwomens.org/assets/bwh/patients-and-families/rehabilitation-services/pdfs/elbow-total-elbow-arthroplasty-bwh.pdf
- Brigham & Women's Hospital — Physical Therapy Standards of Care index. https://www.brighamandwomens.org/patients-and-families/rehabilitation-services/physical-therapy-protocols

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