Hip Dislocation Risk · Primary THA Component & Approach Strategy

FAST & FRUGAL TREE · PRE-OPERATIVE PLANNING AID · 3-CUE MAXIMUM

FFT · GIGERENZER FRAMEWORK

Primary & Revision THA

Walsh / OrthoScenius · 2026

DECISION TREE — THREE CUES, FOUR EXITS

CUE 1 · HIGHEST VALIDITY

Prior THA dislocation OR revision THA OR neurocognitive impairment?

(Parkinson's, dementia, stroke, severe cognitive decline, known prior instability)

Validity anchor: Dual mobility reduces dislocation 50–70% in high-risk populations (GRADE High) · Neurocognitive impairment = high-risk category — Hip Dislocation Risk Tier-A synthesis, 508 backlinks

▲ YES

EXIT 1 · HIGH-RISK PROTOCOL

Dual Mobility Cup (default)

± Constrained liner for true salvage cases

Prior dislocation, revision anatomy, and neurocognitive impairment all independently qualify for dual mobility as default implant. Constrained liner reserved for recurrent instability after dual mobility failure.

Dual mobility 50–70% dislocation reduction in high-risk (GRADE High) · Constrained = greatest prevention but greatest loosening risk — vault Tier-A synthesis 2026

▼ NO

CUE 2 · SPINOPELVIC VALIDITY

Stiff lumbar spine OR prior lumbar fusion OR PI–LL mismatch >10°?

Validity anchor: Spinopelvic mobility is a major patient-level determinant (GRADE High) · Stiff spine → reduced pelvic tilt change → impingement in sitting position → increased dislocation risk despite "safe zone" cup placement

▲ YES

EXIT 2 · SPINOPELVIC PROTOCOL

Dual Mobility + CT Planning

Functional positioning — not Lewinnek safe zone

Stiff lumbar spines fail to anteriorly tilt in sitting — standard safe-zone cup placement creates impingement. Plan cup anteversion for functional (not supine) position. Consider dual mobility regardless of final orientation.

Lewinnek safe zone empirically inadequate for stiff spines (GRADE High) · Spinopelvic-mobility framework — vault Tier-A synthesis,

▼ NO

CUE 3 · APPROACH VALIDITY

Posterior approach planned WITHOUT capsular repair?

Or: age >75 / BMI >40 / poor soft-tissue envelope

Validity anchor: Posterior approach without capsular repair = historically highest dislocation rate · Modern capsular repair equalises to other approaches (GRADE High)

▲ YES

EXIT 3 · ELEVATED RISK MITIGATION

≥32 mm head + Mandate capsular repair

Consider dual mobility if ≥2 additional risk factors

Posterior capsule + short external rotator repair converts posterior-approach risk to the profile of other approaches. Without it, dislocation risk is significantly

▼ NO

EXIT 4 · STANDARD RISK

≥32 mm head + Conventional liner

Standard primary THA protocol

Low-risk primary THA: young patient, normal cognition, normal spinopelvic mobility, planned approach with intact soft-tissue protocol. Population-level dislocation ~1–3%; counsel accordingly.

Standard-risk population dislocation rate 1–

CUE VALIDITY RANKING — QUANTIFIED EFFECT SIZES

RANK	CUE	EFFECT SIZE	SOURCE · N
1	CUE 1 Dual mobility vs standard liner (high-risk patients)	RR 0.30–0.50† (50–70% reduction) GRADE: High · multiple registries	Vault Tier-A synthesis Multi-registry evidence
1a	CUE 1 Revision THA vs primary: dislocation risk	OR 3.5–6.0† (revision vs primary) Bozic 2009 registry estimate	Bozic 2009 US revision epidemiology
2	CUE 2 Spinopelvic mobility as determinant	OR 3.2† stiff-spine vs normal GRADE: High (spinopelvic lit.)	Vault Tier-A synthesis 2026 Buckland 2014, Safran 2011
2a	CUE 2 Lewinnek safe zone failure rate (stiff spines)	Safe zone inadequate for stiff spines GRADE: High (multiple studies)	Vault Tier-A synthesis 2026 Spinopelvic-mobility literature
3	CUE 3 Posterior approach + capsular repair vs no repair	Capsular repair equalises risk to other approaches; GRADE: High	Capsular-repair comparative literature; vault synthesis
3a	CUE 3 Head size ≥32 mm vs 28 mm	Reduced jump distance; lower dislocation risk†	Multiple component-size studies (GRADE: High)

† Literature-derived estimate from landmark registry and RCT data; not a single vault-specific ORvalue. GRADE High = consistent across multiple high-quality studies.

ERROR COST ASYMMETRY · THRESHOLD RATIONALE

MISS — UNDER-PROTECT (FALSE NEGATIVE)

Dislocation occurs → Closed reduction under GA (elderly: cardiac/anaesthetic risk) → Possible open revision → Recurrent instability → Significant morbidity, rare

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FALSE ALARM — OVER-PROTECT (FALSE POSITIVE)

Dual mobility chosen when standard would have sufficed → ~$400–600 cost premium · Slightly increased intraprosthetic

Buckland 2014, Safran 2011

elevated. Use ≥36 mm head if possible.

Capsular repair reduces posterior-approach dislocation (GRADE High) · ≥32 mm vs 28 mm: reduced jump distance, lower dislocation risk (multiple studies)

3% (registry data) · Head size ≥32 mm is current minimum standard

mortality in elderly frail patients.

dislocation risk (rare, <1%) · No mortality impact.

Asymmetry Rule: THA dislocation in high-risk patients (elderly, neurocognitive impairment) carries real morbidity — closed reduction under GA in a frail patient is not trivial, and recurrent instability may mandate revision. The incremental cost of dual mobility (~$400–600) and the very low risk of intraprosthetic dislocation are substantially outweighed by the 50–70% dislocation-rate reduction in appropriate patients. **Threshold set low for dual mobility at Cues 1 and 2.** Cue 3 (approach) asymmetry is more symmetric — capsular repair adds ~10 min OR time, cost negligible; adds no procedural risk. In standard-risk patients (Exit 4), over-treating with constrained implants would reverse asymmetry — loosening risk exceeds dislocation prevention benefit.

ALWAYS: Spinopelvic mobility assessment (standing-to-sitting pelvic tilt) in all THA patients · Surgeon/centre volume is dominant outcome confounder — refer high-risk cases · Functional cup positioning, not absolute Lewinnek zone · Document explicit rationale for component choice · Postoperative dislocation precautions and activity restriction counselling

THRESHOLD CHOICES · JUSTIFICATION

- **Exit 1 (prior instability / revision / neurocognitive):** These three indicators each independently qualify for dual mobility based on GRADE High evidence. Combining them in a single cue avoids tree complexity while capturing the highest-validity signals.
- **Exit 2 (stiff spine):** PI–LL mismatch >10° or prior lumbar fusion are measurable surrogates for spinopelvic stiffness. These patients cannot compensate pelvic position in sitting — functional impingement is predicted even with radiographically "correct" cup placement. CT-based planning and dual mobility together address both the orientation and constraint problems.
- **Exit 3 (posterior approach without repair):** Posterior capsule repair is the modifiable variable that converts posterior-approach risk to the level of anterior/lateral approaches. If repair is planned, exit 3 may be resolved intraoperatively — flag preoperatively to ensure the repair protocol is part of the surgical plan.
- **Exit 4 (standard risk):** Young patient, normal cognition, normal spinopelvic mobility, approach-specific soft-tissue protocol in place. Standard of care: ≥32 mm head, conventional liner, Lewinnek-range cup orientation is appropriate.

Sources (Vault-grounded): Hip Dislocation Risk Tier-A Synthesis, Surgical-Research-Wiki (508 backlinks, GRADE summary) · Bozic et al. 2009 (US THA revision epidemiology) · Safran et al. 2011 · Boykin et al. 2011 · Buckland 2014 (spinopelvic) · Brooks 2013 (dislocation cause & cure) · Della Valle 2012 (unstable THA management) · Dual mobility evidence base (multi-registry)