



BS Structured Summary



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A Systematic Review of Studies With a Minimum 7-Year
Follow-up

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INTRODUCTION / BACKGROUND

Multiligament knee injuries (MLKIs) — defined as disruption of at least two of the four principal knee ligaments — are uncommon but potentially devastating, with consequences that can shape a patient's function and quality of life for decades. Mechanisms span low-velocity (sport, falls) to high-velocity (motor-vehicle) trauma, with or without frank dislocation; when a dislocation is present, the added risk of neurovascular compromise worsens the prognosis.

Management remains genuinely unsettled: there is ongoing debate over preoperative stabilisation, repair versus reconstruction, surgical timing, staging and rehabilitation, and the literature offers little consensus. Prior systematic reviews have mostly addressed slices of the problem — return to sport, surgical timing, mechanism, or repair-versus-reconstruction — leaving a real gap in long-term patient-reported outcomes (PROs).

This review set out to fill that gap by reporting clinical and functional outcomes at a minimum 7-year follow-up, hypothesising that most long-term IKDC and Lysholm scores would meet or exceed published Patient Acceptable Symptom State (PASS) thresholds for MLKI surgery — a deliberately patient-centred benchmark rather than a raw mean.

OBJECTIVE

To report the long-term clinical and functional outcomes — PROs, return to sport, osteoarthritis development, complications, reoperations and revisions — after multiligament knee injuries at a minimum 7-year postoperative follow-up.

METHODS

PRISMA-guided systematic review, prospectively registered in PROSPERO (CRD420251078013). PubMed, Embase and Scopus were searched in July 2025 with a Boolean strategy combining knee-dislocation/instability terms, multiligament/ligament-injury terms and outcome terms. Two authors screened independently, with disagreements resolved by consensus.

Eligible studies reported clinical and/or functional outcomes at ≥ 7 years postoperatively in patients of any age with an MLKI and/or knee dislocation, published 2000–2025. Cadaveric/translational work, studies without PROs, follow-up < 7 years, and reviews/abstracts/technical notes were excluded; for overlapping cohorts, the most recent study with the largest sample was kept.

Extracted data covered demographics, ligaments involved, Schenck classification, vascular/nerve injury, time to surgery, staging and technique, and postoperative PROs (IKDC, Tegner, Lysholm), plus OA (radiographic / Kellgren-Lawrence), return to sport, ROM and stability tests, complications, reoperations, conversions and revisions. Study quality used the MINORS criteria. Given heterogeneity, data were not pooled — a qualitative synthesis was performed, with forest plots as visual summaries of mean PROs and a stratified trend analysis by era, timing, repair-versus-reconstruction and rehabilitation.

MAIN RESULTS

Sixteen studies (730 knees) were included — 6 retrospective comparative and 10 retrospective case series; mean age ranged 18.1–44.0 years and mean follow-up 7.0–13.1 years. MINORS scores indicated a sufficiently low risk of bias (all ≥ 9). KDI injuries made up 8.4% overall; the peroneal nerve was the most commonly injured nerve, and reported vascular- and nerve-injury incidences ranged 0–37.5% and 0–45.0%.

Patient-reported outcomes were modest and variable: Lysholm means 61.1–87.6 (13 studies), Tegner 3.8–7.0 (9 studies) and IKDC 55.6–84.0 (7 studies). Against published PASS thresholds (IKDC 67.9; Lysholm 80.0), about 61% of Lysholm-reporting studies and 62.5% of IKDC-reporting studies met the mark — supporting the hypothesis, but with roughly 40% falling short, so satisfactory function is far from universal.

Return to sport ranged 60.4–85% (8 studies), though return to pre-injury level was reported inconsistently and was often lower. The durable problems were degenerative and stiffness-related: osteoarthritis (Kellgren-Lawrence grade 3–4) reached 12–71.7% at final follow-up; reoperations ran 1.7–34.3%, most often manipulation under anesthesia and lysis of adhesions for stiffness; conversion to total knee arthroplasty was 0–10.9%; and repeat ligament surgery was dominated by PCL-reconstruction failures.

The stratified analysis told a coherent story: modern-era cohorts (2015–2025, anatomic reconstruction + early controlled motion) showed higher IKDC/Lysholm means and fewer stiffness reoperations than early-era cohorts; acute surgery (≤ 21 days) and reconstruction (over repair) were associated with better long-term function and stability; and early ROM reduced arthrofibrosis without compromising stability — although OA progression remained common across all subgroups.

AUTHORS' CONCLUSION

At more than 7 years, treatment of MLKIs delivers meaningful restoration of function and sport participation, but the long-term picture is tempered by high rates of osteoarthritis and reoperation for stiffness. Advances in surgical technique and early rehabilitation have improved results in contemporary cohorts. Continued prospective evaluation using standardised (Delphi-aligned) protocols is essential to enhance joint preservation and quality of life. Level of Evidence: IV.

BS DISCUSSION

This is not our paper, but the MLKI is the deepest end of our pool — the dislocated, multiligament knee is where everything we teach about the cruciates, the corners and the medial side converges under pressure. What makes this review worth a BS slot is the time horizon: 16 studies, 730 knees, minimum 7 years. Most of what we quote to patients about MLKIs is 2-year data; this is the long view, and the long view is sobering.

The honest headline to carry into the consult is two-sided. Yes, function and sport largely come back — RTS 60–85%, and most cohorts clear the PASS bar for IKDC/Lysholm. But osteoarthritis (KL 3–4 in up to 71.7%) and reoperation for stiffness (up to 34.3%) are not footnotes — they are the expected long-term trajectory. The patient deserves to hear both halves before surgery: ‘you will likely play again, and you will likely develop arthritis’.

The most actionable signal for our Labs and Summit is the stratified trend, because it maps onto things we control. Acute surgery (≤ 21 days), anatomic reconstruction over repair, and early controlled motion each tracked with better long-term function and less stiffness. That is a teachable operative-and-rehab algorithm, not just an observation — and it lines up with the 2024 Murray Delphi consensus the authors lean on. For a teaching platform, ‘do it early, do it anatomic, move it early’ is a clean through-line.

Two specifics are worth drilling. First, PCL-reconstruction failure was the dominant revision — plausibly the legacy of nonanatomic, single-bundle PCL techniques in the early-2000s cohorts, which argues for modern double-bundle/anatomic PCLR and for honest counselling that the PCL is the weak link. Second, stiffness is the most common reoperation, and paradoxically the highest MUA/LOA rate (34.3%, Merle du Bourg) fell in the acutely-operated group — a reminder that ‘operate early’ and ‘move early’ must travel together, or early surgery buys stiffness.



I would temper how hard we lean on this at the Summit, for reasons the authors are candid about. It is Level IV: 16 retrospective studies spanning 25 years of evolving technique, no data pooling, heterogeneous classification and rehab, heavy reliance on subjective scores, and sparse objective stability testing (stress radiographs in only 37.5%, arthrometry in 25%) — so true residual laxity is almost certainly underestimated. The right BS framing: a strong, teachable direction of travel (early/anatomic/early-motion, OA is common, PCL is the weak link), explicitly labelled as low-level evidence whose main call to action is Delphi-standardised prospective study.



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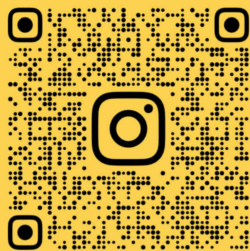
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