Meniscus Repair (All-Inside)
Post-Operative Rehabilitation Protocol

Outpatient Physical Therapy | Evidence-Based, Criteria-Driven

Procedure: All-Inside Meniscus Repair (Arthroscopic)
Setting: Outpatient Physical Therapy
Frequency: 2–3 sessions per week
Protocol Type: Criteria-based and time-guided
Date Issued: October 2026

ⓘ CLINICAL NOTE — READ BEFORE INITIATING
Progression requires meeting **ALL criteria** for the current phase before advancing. This protocol is a general framework — individualize based on surgeon intraoperative notes, tear type and location (vertical longitudinal, ramp, radial, root, horizontal cleavage), tissue quality, fixation method, and patient response at each session. When in doubt, consult the operating surgeon prior to advancing loading parameters.

General Principles & Precautions

Apply throughout all phases of rehabilitation.

- Meniscus healing is biological and time-dependent — do **not** accelerate beyond phase criteria regardless of subjective pain levels or patient motivation.
- **Avoid tibial rotation** for the first 6 weeks — rotational shear forces directly disrupt the repair site.
- **Avoid isolated resisted knee flexion** (open-chain hamstring curls) for the first 6 weeks — semimembranosus and popliteus attach to the medial and lateral menisci, respectively, and generate direct tensile stress on the repair.
- **Non-weight-bearing motion is unrestricted from Day 1** — full active and passive ROM (including flexion beyond 90° in supine, seated, and gravity-eliminated positions) is encouraged immediately to restore mobility. **Avoid deep knee flexion beyond 90° in weight-bearing** for the first 4–6 months — compressive and shear loads increase nonlinearly beyond this range. All flexion restrictions apply to loaded, closed-chain activities only.
- **Prioritize full passive knee extension restoration immediately** — 0° extension is the most stable, lowest-stress position for the meniscus and delays in extension recovery predict worse outcomes.
- Monitor for **increased effusion or joint line tenderness** at the start of each session — both are indicators of tissue stress; reduce load and consult surgeon if persistent.
- All resisted exercises: begin with **low resistance and high repetitions** in a pain-free range; progress load only when motion and effusion are controlled.
- Apply **cryotherapy 15–20 minutes** with compression and elevation after each session and PRN throughout the day.
- Precautions differ by tear morphology — document tear type in the patient chart:
  - **Vertical longitudinal / Ramp tears:** WBAT with brace locked in full extension immediately post-op.
  - **Radial / Root / Horizontal cleavage tears:** Consult surgeon — typically NWB × 4–6 weeks; these are not covered under this all-inside protocol.

PHASE 1 — Protection & Edema Control

Weeks 0–2 | Primary Focus: Swelling Control, Quadriceps Activation, Safe Gait

⚠ **PHASE 1 PRECAUTIONS**

- **Brace locked at 0° at ALL times** — including during sleep. Remove only for hygiene and supervised home exercise.
- **No weight-bearing with knee flexion beyond 90°** during this phase. Non-weight-bearing ROM is unrestricted.
- **No isolated resisted knee flexion** (hamstring loading of any kind).
- **No tibial rotation** — avoid pivot, twist, or rotational forces on the joint.
- If extensor lag is present on SLR, **discontinue flexion-plane SLRs** immediately until lag is resolved.

Goals

- Control post-operative pain and effusion.
- Restore full knee ROM immediately (unrestricted in non-weight-bearing positions); restore full passive extension as the immediate priority.
- Achieve voluntary quadriceps activation without extensor lag.
- Establish a safe, braced gait pattern.

Weight-Bearing Status

Full weight-bearing (FWB) with brace locked at 0°. Provide bilateral axillary crutches for assistance as needed. Progress to single crutch or no crutches as gait normalizes while maintaining brace locked during all ambulation.

Brace

Hinged knee brace locked at 0° at all times, including sleep. Remove only for hygiene and supervised home exercise program.

Range of Motion

Non-weight-bearing ROM is unrestricted from Day 1. Pursue full passive and active-assisted motion through the full comfortable range in supine and seated positions. Restore full passive extension first — use supine heel prop technique. The brace remains locked at 0° during standing and ambulation only; remove for non-weight-bearing ROM exercises. Flexion beyond 90° is restricted only when weight-bearing.

Therapeutic Exercises

- Perform **ankle pumps / calf pumps** — 10 repetitions every waking hour for DVT prophylaxis.
- Perform **quadriceps sets** — isometric quad contraction, 10 × 10-second holds; use NMES if voluntary activation is absent.
- Perform **straight-leg raises (SLR)** in 4 planes (flexion, abduction, adduction, extension) — perform in brace; discontinue flexion SLR if extensor lag is present.
- Perform **passive heel prop** — supine, heel elevated on bolster to achieve terminal knee extension via gravity.
- Perform **supine heel slides** — active-assisted ROM through full available range (unrestricted), patient-controlled, pain-free.
- Perform **patellar mobilizations** — superior/inferior and medial/lateral glides after surgeon clears suture line (typically by Day 10–14).
- Perform **diaphragmatic breathing** and transverse abdominis isometric activation — initiate early core recruitment.

- Perform **supine hip abduction and adduction** — no resistance; maintain proximal hip strength without loading the knee.

Modalities

- Apply **cryotherapy with compression wrapping** — 15–20 minutes post-exercise and PRN for edema control.
- Apply **NMES to quadriceps** — if patient cannot achieve voluntary quad set; use motor-level stimulation to facilitate VMO and quad bulk.
- Maintain **lower extremity elevation** when at rest — above heart level where possible.

✓ CRITERIA TO ADVANCE TO PHASE 2

- Full passive extension (0°) and comfortable non-weight-bearing flexion progressing toward full range.
- Voluntary quad set with no extensor lag; SLR without lag in brace.
- Pain ≤ 3/10 at rest; effusion minimal (trace or absent on modified stroke test).
- Surgeon clearance at first post-operative visit (typically 1–2 weeks).

PHASE 2 — Controlled Motion & Early Strengthening

Weeks 2–6 | Primary Focus: ROM Restoration, Gait Normalization, Proximal Strength

⚠ PHASE 2 PRECAUTIONS

- **NO isolated resisted knee flexion** (open-chain hamstring curls) through the end of Week 6.
- **NO tibial rotation exercises**, pivoting, or rotational lower extremity loading.
- **NO plyometric or ballistic loading** of any kind.
- **Non-weight-bearing ROM is unrestricted** — avoid aggressive forced overpressure beyond patient tolerance; allow joint reactivity to guide progression.
- **NO weight-bearing with knee flexion beyond 90°** — do not exceed 90° on leg press or squat variants.

Goals

- Regain full passive ROM by end of Week 6 (0° extension, ≥120° flexion).
- Normalize gait pattern — eliminate antalgic deviations, Trendelenburg, or vaulting.
- Begin progressive closed-chain strengthening.
- Develop proximal hip, gluteal, and core muscular endurance.

Weight-Bearing Status

Full weight-bearing with brace unlocked. Weight-bearing flexion limited to 90° (restriction applies to loaded positions only; non-weight-bearing motion remains unrestricted). Discontinue brace at Week 6 if quadriceps strength and gait pattern are adequate.

Brace

Unlocked during the day for ambulation (weight-bearing flexion limit 90°). May remove at night by Week 4 if cleared by surgeon. Discontinue at Week 6.

Range of Motion

Progressively advance passive and active ROM toward full by end of phase. Utilize low-load prolonged stretch (LLPS) with moist heat for persistent flexion deficits. Maintain daily focus on full passive extension.

Therapeutic Exercises — Weeks 2–4

- Continue all applicable Phase 1 exercises.
- Perform **short arc quads (SAQ)** — 0–30° arc, light resistance as tolerated; emphasize full terminal extension.
- Perform **seated ankle ROM and foot intrinsic** exercises for proprioceptive baseline.
- Perform **side-lying hip abduction** — progress to banded clamshells and lateral hip series.
- Perform **prone hip extension** — gluteal activation; no simultaneous knee flexion resistance.
- Perform **standing bilateral heel raises** — brace on; 3 × 15 repetitions, controlled descent.
- Perform **gait training** — heel-to-toe pattern, normalize cadence, step length, and stride symmetry.
- Use **upper body ergometer (UBE)** for cardiovascular conditioning without lower extremity loading.

Therapeutic Exercises — Weeks 4–6

- Continue and progress all Week 2–4 exercises.
- Perform **bilateral mini-squats 0–60°** — pain-free, controlled descent, full extension at top.
- Perform **bilateral leg press 0–60°**, progressing toward 0–90° — do **not** exceed 90° of knee flexion under load.
- Perform **eccentric quadriceps step-offs** — 4-count slow lowering from step; emphasize quad control throughout descent.
- Perform **closed-chain hip and core series** — dead bugs, bird-dogs, side-lying hip strengthening progression.
- Perform **treadmill gait normalization** — slow walking on level surface; monitor for Trendelenburg, hip drop, or knee vaulting.
- Perform **inclined closed-chain press (Total Gym or similar)** — low angle, low load; sagittal plane only.

✓ CRITERIA TO ADVANCE TO PHASE 3

- Full passive ROM achieved: 0° extension and ≥120° flexion (or symmetric to contralateral limb).
- Pain-free FWB gait without assistive device or brace.
- Minimal to no effusion at rest and after exercise.
- Able to perform 10 unilateral SLRs without extensor lag.
- Surgeon clearance at 6-week post-operative visit.

PHASE 3 — Progressive Strengthening & Neuromuscular Control

Weeks 6–12 | Primary Focus: Single-Leg Strength, Proprioception, Cardiovascular Conditioning

⚠ PHASE 3 PRECAUTIONS

- **No plyometric or jump-landing tasks** during this phase.
- **No running** — walking, stationary cycling, and aquatic therapy only for cardiovascular work.
- **No tibial rotation or cutting maneuvers**.
- **Do not exceed 90° knee flexion** under load (leg press, squat variants) until 4-month mark and surgeon clearance.
- If joint line tenderness or effusion develops after a session, **reduce load and volume** immediately and reassess at next visit.

Goals

- Achieve full, symmetrical ROM equal to contralateral side.
- Progress closed-chain strength toward single-leg activities.
- Restore proprioception and neuromuscular control in single-leg stance.

- Begin structured cardiovascular conditioning.

Weight-Bearing Status

Full, unrestricted. Brace discontinued.

Range of Motion

Full. Maintain with stretching, stationary cycling, and functional movement patterns.

Therapeutic Exercises

- Begin **stationary bike** at Week 6 — no resistance for first 1–2 weeks; progress resistance and duration gradually. Set seat height to allow comfortable flexion within available range.
- Perform **bilateral-to-unilateral leg press 0–90°** — progressively increase load; do not exceed 90° through month 4.
- Perform **lateral band walking** — hip abduction resistance, flat surface, upright trunk posture.
- Perform **retro treadmill walking** — low speed; promotes quad activation and reduces tibiofemoral compressive loading.
- Perform **forward and lateral lunges 0–60°** during Weeks 6–8; advance to 0–90° as tolerated with no pain or effusion response.
- Perform **step-ups and step-downs** — begin with 4-inch step; progress height incrementally as strength and control improve.
- Perform **single-leg balance progression** — static stance → dynamic arm reach → eyes closed → dual-task challenge (cognitive or UE task).
- Perform **proprioception progression** — foam pad, BOSU (flat side up initially), perturbation board, biomechanical ankle platform (BAPS).
- Begin **eccentric hamstring loading at Week 6** — Nordic curl regression, Romanian deadlift (bilateral first, progress to unilateral).
- Perform **hip and gluteal strengthening progression** — single-leg RDL (bilateral to unilateral), lateral step-downs, hip thrust with progression to loaded barbell.
- Perform **core stability series** — plank progressions, dead bugs, Pallof press, anti-rotation holds.
- Begin **aquatic therapy at Week 8** (confirm incisions fully healed) — pool walking in sagittal plane, water-resistance exercises; avoid breaststroke kick or whip kick through month 4.

✓ CRITERIA TO ADVANCE TO PHASE 4

- Full, pain-free ROM equal to contralateral limb.
- Normal gait on all surfaces — level ground, incline, stairs — without compensation.
- Single-leg squat to 30–45° with adequate frontal plane control (no Trendelenburg or medial knee collapse).
- Quadriceps strength ≥ 70% of uninvolved limb (MMT grade 4+/5 or handheld dynamometry).
- No joint line tenderness; no effusion at rest or following functional activity.
- Surgeon clearance at approximately 12-week post-operative visit.

PHASE 4 — Functional Training & Return-to-Activity Preparation

Weeks 12–20+ | Primary Focus: Strength Symmetry, Sport-Specific Tasks, Return-to-Run Clearance

⚠ PHASE 4 PRECAUTIONS

- **No return to running before Week 16** and only when ALL return-to-run criteria are met (see below).

- **No return to full sport contact or competition** before 4–6 months and with documented criteria-based clearance.
- **Avoid breaststroke kick** through Month 4–5 even if swimming is permitted.
- Monitor for effusion or joint line tenderness with each new activity — regress load if present.

Goals

- Achieve ≥ 90% quadriceps and hamstring limb symmetry index (LSI) before unrestricted sport return.
- Complete progressive sport-specific or functional task demands without pain or effusion.
- Return to running, cutting, and jumping no sooner than Week 16 and only with all criteria met.

Weight-Bearing Status

Full, unrestricted. Functional brace for return to sport is optional per surgeon preference.

Therapeutic Exercises — Weeks 12–16

- Continue and increase intensity and volume of all Phase 3 exercises.
- Perform **walking lunges** — forward, lateral, and diagonal; full range as tolerated.
- Perform **Bulgarian split squat / rear-foot elevated split squat** — progress load progressively.
- Perform **Swiss ball hamstring curls** — bilateral to unilateral progression.
- Perform **full plank progression** — single-leg plank, plank with contralateral reach, perturbation challenge.
- Perform **bridges** — bilateral to single-leg; add resistance band or barbell load progression.
- Perform **half-BOSU single-leg stands** with dynamic arm or perturbation challenge.
- Begin **freestyle or backstroke swimming** at Week 12 — avoid breaststroke kick through Month 4–5.
- Apply **blood flow restriction (BFR) training** as adjunct — low-load BFR quad and hamstring exercises to accelerate hypertrophy while limiting joint stress; evidence-supported in meniscus repair populations.

Return-to-Running Protocol

Begin no earlier than Week 16. The following criteria must ALL be met prior to initiating any running progression:

▲ **RETURN-TO-RUN CRITERIA CHECKLIST (All must be satisfied)**

1. No pain, swelling, or joint line tenderness with all Phase 4 activities.
2. Quadriceps LSI ≥ 80% (target ≥ 90% before unrestricted running).
3. Hamstring LSI ≥ 80%.
4. Single-leg hop test (single, triple, and crossover) ≥ 80% limb symmetry.
5. Y-Balance Test anterior reach asymmetry ≤ 4 cm side-to-side.
6. Surgeon clearance documented.

Running Progression Sequence

1. Walk/jog intervals on level surface (e.g., 1 min jog / 2 min walk × 10 cycles)
2. Continuous jogging at conversational pace — flat, level surface
3. Progressive distance increase — no more than 10% weekly volume increase
4. Introduction of gentle change of direction at reduced speed
5. Progressive speed work and acceleration/deceleration drills
6. Sport-specific cutting, pivoting, and reactive tasks

Sport-Specific Drills — Weeks 16–20+

- Begin after return-to-run criteria are formally met and documented.
- Perform **lateral shuffles, backpedaling, and carioca** at controlled speed; progress to reactive cues.
- Perform **bilateral plyometrics** — box step-offs, bilateral jump-land with soft landing mechanics; progress to single-leg landing.
- Perform **deceleration and change-of-direction drills** — begin at 50–75% effort, progress to full speed.
- Allow **return to full sport contact and competition** no sooner than 4–6 months from surgery, criteria-based, with documented surgeon clearance.

Outcome Measures

Administer at each phase transition and document in the patient chart. Use objective data to guide progression decisions.

Outcome Measure	Assessment Tool	Target / Benchmark	Phase of Relevance
Quadriceps strength	Handheld dynamometry (HHD) or isokinetic testing (Biodex)	≥ 90% LSI before full return to sport	Phase 3–4
Hamstring strength	Handheld dynamometry or isokinetic testing	≥ 90% LSI before full return to sport	Phase 3–4
Single-leg hop performance	Single hop, triple hop, crossover hop for distance	≥ 90% LSI (≥ 80% to initiate running)	Phase 4
Dynamic balance	Y-Balance Test — anterior reach composite	≤ 4 cm asymmetry side-to-side	Phase 3–4
Knee flexion ROM	Standard long-arm goniometry	Within 5° of contralateral limb	All phases
Joint effusion	Modified Stroke Test (0–3+ scale) or joint circumference measurement	Zero effusion before sport return; ≤ trace acceptable during strengthening phases	All phases
Patient-reported outcome	IKDC Subjective Knee Form or KOOS (Knee Injury and Osteoarthritis Outcome Score)	≥ 75/100 at return-to-sport clearance	Phase 3–4
Functional movement quality	Lateral step-down test (observational error scoring 0–6)	≤ 3 errors out of 6 at 6-month assessment	Phase 3–4

Key Evidence References

[1] Current literature supports immediate WBAT with brace locked in full extension for vertical longitudinal all-inside meniscus repairs. Accelerated weight-bearing has not been shown to compromise repair integrity when brace protection is maintained. *(Systematic Review, SAGE Open Medicine / Orthopaedic Journal of Sports Medicine, 2023–2024)*

[2] Early motion does not adversely affect the tensile properties of the repaired meniscus. Prolonged immobilization increases the risk of arthrofibrosis without meaningful biological benefit to the repair. *(Gundersen Health System Post-Operative Protocol, Updated 2023; Shelbourne & Nitz, JOSPT)*

[3] Rehabilitation should be both time-based and criteria-based; the presence of effusion or joint line tenderness following functional activity is a reliable clinical indicator of delayed healing or excessive tissue stress, and should prompt load reduction. *(PMC Review: Current Principles of Meniscus Repair Rehabilitation, NCBI PMC)*

[4] Return to sport should not be attempted before 4 months post-operatively; a limb symmetry index of ≥ 90% on strength and hop

testing is recommended for safe, criteria-based clearance. Early return (before 3–4 months) is associated with significantly higher re-tear rates. *(Poulsen et al., Am J Sports Med, 2022; Systematic Review BJSM)*

[5] Isolated resisted hamstring exercises should be avoided for a minimum of 6 weeks post-repair due to the anatomical attachment of the semimembranosus tendon to the posteromedial joint capsule and medial meniscus — direct eccentric loading in this period places measurable tensile stress on the repair site. *(Greis et al., J Am Acad Orthop Surg; Fox et al., Meniscus Anatomy and Repair, Clin Sports Med)*

[6] Blood flow restriction (BFR) training has demonstrated efficacy in post-surgical knee rehabilitation, preserving muscle hypertrophy and strength under low articular loads — making it a clinically appropriate adjunct during the early functional phases of meniscus repair rehabilitation. *(Hughes & Patterson, Strength Cond Res, 2020; PMC7927891)*

This protocol is intended as a general clinical guideline for post-operative rehabilitation following arthroscopic all-inside meniscus repair. Modify all parameters based on individual surgical findings, intraoperative tissue quality, tear morphology, fixation method, patient presentation, and the direction of the operating surgeon. This document does not substitute for clinical judgment or direct surgical consultation.

Protocol developed for outpatient physical therapy use | September 2026 | Audience: Licensed Physical Therapists and Sports Medicine Clinicians