

BEAR ACL REPAIR

Physical Therapy Protocol

PATIENT

SURGEON

Andrew L. Merritt, MD

DATE OF SURGERY

PT START DATE

For the patient

Your ACL was **repaired, not replaced**: the BEAR implant is a scaffold your own ligament heals across. It needs **more protection early** than a reconstruction: a locked brace, half weight, and gentle bending you do yourself. Hamstring strength is usually better kept. Return to sport takes **9 to 12 months**. You move on when your knee meets the goals, not just when the weeks pass.

PROTOCOL AT A GLANCE

WEIGHT BEARING	About half your weight with crutches for 4 weeks . Then full weight; off crutches once you walk normally (usually weeks 4–7)
BRACE	Locked straight for walking and sleep for 4 weeks ; unlocked for seated bending. Off once you bend 110°. A sports brace only if prescribed
MOTION GOALS	Seated bending to 45° for 2 weeks , then 90° to week 4 ; full motion by weeks 4–7. Your own muscles, never forced
PHYSICAL THERAPY	Starts 5 to 7 days after surgery, 2 times a week at first. Muscle stimulation (NMES) at PT visits
KEY PRECAUTIONS	No forced stretching, no CPM. No open-chain knee extension 0–40° before week 8. No pivoting or twisting
RUNNING · SPORT	Running from weeks 12–20 , after clearance and testing. Controlled cutting drills from week 30. Sport no sooner than week 36

Recovery Timeline

Phase	When	PT visits	Focus
1	Weeks 0–4	2× a week	Protect the repair, half weight, wake up the quad
2	Weeks 4–7	2× a week	Full weight, brace unlocked, off crutches
3	Weeks 7–12	1–2× a week	Full motion, gym strength, low-impact cardio
4	Weeks 12–20	1–2× a week	Advanced strength, walk-jog once cleared
5	Weeks 20–30	1× a week + home program	Running progression, jumping and landing
6	Weeks 30–36	Weekly as needed	Controlled cutting drills, plyometrics
7	Weeks 36–52	Weekly as needed	Testing and return to sport

For the Therapist

Check the surgeon notes first. They override anything else in this protocol. Questions or setbacks: call (425) 656-5060.

Surgeon notes and special instructions

General principles

- **Criterion-based.** Advance only when the phase criteria **and** the minimum time are both met. Call us about setbacks.
- **Biologic healing.** BEAR (Bridge-Enhanced ACL Repair; Miach framework, adapted) heals the native ACL across a blood-filled scaffold. Avoid excessive anterior tibial translation and torsional loads in weeks 0–12. No overpressure into extension.
- **No CPM, no manual PROM** in Phases 1–3: active and active-assisted motion only. No scar massage until week 7.
- **Open-chain knee extension** follows the ACL reconstruction rule: none in the 0–40° arc before week 8, 90–40° only until about week 12, then full arc.
- **NMES is essential:** 10–15 reps × 10 sec contraction, 50 sec rest, at PT visits only (no home unit). **QI** (quadriceps index) targets: 60–80% by Phase 3, ≥80% to stop NMES and to run, ≥90% for sport. **BFR** optional.
- **Brace:** hinged brace locked 0° for walking and sleep to week 4 (seated motion 0–45° weeks 0–2, 0–90° weeks 2–4), unlocked for walking once gait is normal, weaned once AROM ≥110°. **Functional ACL brace only if Dr. Merritt prescribes it;** then worn until return-to-sport clearance.
- **Cold compression** 20 min on, 20 min off after every session. **Prehab** is strongly recommended when surgery is delayed or motion and quad control are not yet normal.

Procedures done at the same time

Procedures that may be added (see surgeon notes)

- **Meniscus repair:** use the BEAR with meniscus repair protocol; its limits supersede this one in Phase 1.
- **LET or ALL reconstruction:** BEAR protocol applies. **MCL, cartilage, other:** confirm changes with Dr. Merritt.

PHASE

1

Immediate Post-Op

Weeks 0–4

For the patient: what to expect

Your repair is at its most delicate now. **Keep the brace locked straight when you walk and when you sleep**, and put about half your weight on the leg. Bend only while sitting, with your own muscles: to 45° for 2 weeks, then up to 90°. Never force it. Your jobs: a fully straight knee, a working quad, and less swelling.

WEIGHT BEARING	Partial, up to 50% of body weight, with crutches
BRACE	Locked 0° for walking and sleep through week 4; unlocked for seated motion
MOTION	Seated active 0–45° weeks 0–2, 0–90° weeks 2–4; active and active-assisted only

Goals

- Control effusion and pain
- Restore quad activation
- Full passive extension, equal to the other side
- Maintain hip and core strength

Move on when

- ☐ Normal gait on crutches with partial weight
- ☐ No extensor lag with SLR
- ☐ Flexion ≥90°
- ☐ Trace effusion or less; pain VAS ≤4/10

Exercises

Exercise	How
Quad sets with NMES	10–15 reps × 10 sec contraction, 50 sec rest; until QI ≥80%
Ankle pumps · heel prop	Ankle pumps from day 0; heel prop for extension, no towel under the knee
Straight-leg raise	In the locked brace, only without an extensor lag; NMES may be added
Hip strengthening	Side-lying abduction, clamshells (ER), prone hip extension
Stationary bike	After clearance (typically weeks 2–3): no load, rocking within the allowed arc
Cold compression	20 min on, 20 min off after every session

Precautions

- No resisted or short-arc extension 0–30°; quad sets and locked-brace SLR are allowed
- No manual PROM, stretching, or overpressure; no scar massage
- No pivoting, cutting, or rotational loads; no anterior tibial translation stress
- Brace locked at 0° for all walking through week 4

PHASE

2

Early Rehabilitation

Weeks 4–7

For the patient: what to expect

Around 4 weeks, once your quad is strong, the brace is unlocked for walking and you move to full weight. Keep the crutches until you walk without a limp. Strength work starts: small squats, low steps, and the bike. No running or jumping yet.

WEIGHT BEARING	As tolerated; wean crutches once gait is normal, pain-free, with no extensor lag
BRACE	Unlocked for walking once criteria are met
MOTION	Progress to full, symmetrical motion; active and active-assisted only

Goals

- Independent walking without compensation
- Full or near-full, symmetrical motion
- Consistent SLR without extensor lag
- Quad strength toward QI ≥80%

Move on when

- ☐ Full weight, normal gait, no assistive device
- ☐ Flexion ≥90°, full extension (0°)
- ☐ SLR ≥20 reps without lag
- ☐ QI progressing toward 80%; trace effusion or less

Exercises

Exercise	How
Long-arc quads	90–40° arc only (no 0–40° before week 8); add 2–3 lb a week
Straight-leg raise	All 4 planes
Mini squats	0–45°, with support for both hands
Steps · stairs	Step-ups and step-downs on a 4-inch step; stairs with a rail
Stationary bike	Full revolutions with light resistance once flexion allows; rocking until then
Standing hip · calves	Band hip abduction, extension, ER; calf raises seated and standing
NMES · BFR	NMES at PT until QI ≥80%; BFR optional

Precautions

- No overpressure, forced motion, or manual PROM
- No open-chain extension 0–40° before week 8
- No running, jumping, or impact
- Avoid an antalgic gait: keep crutches until gait is normal

PHASE

3

Intermediate Strengthening

Weeks 7–12

For the patient: what to expect

You should be walking normally without crutches, and your knee should reach full motion. You'll build strength in the gym and start low-impact cardio. The brace comes off once you bend to about 110°. No running on land yet, and no twisting.

WEIGHT BEARING	Full; discontinue crutches once criteria are met
BRACE	Wean the hinged brace once AROM $\geq 110^\circ$
MOTION	Full motion expected

Goals

- Full, symmetrical motion; walking without a device
- QI toward 60–80%
- Low-impact conditioning
- Neuromuscular control and proprioception

Move on when

- ☐ Full AROM equal to the other side, no lag
- ☐ SLR ≥ 20 reps; normal gait off crutches
- ☐ QI 60–80%; minimal effusion
- ☐ At least 12 weeks after surgery

Exercises

Exercise	How
Open-chain extension	90–40° arc only until about week 12; add 2–3 lb a week
Hamstring curls	Open chain, seated or prone, progressive resistance
Leg press	0–60°, both legs, then single leg
Lunges · step-downs	Forward and lateral, 4–6-inch step
Single-leg balance	Eyes open, progressing to perturbation
Conditioning	Bike with resistance; aqua jogging (deep water, flotation belt) from week 8; elliptical (low resistance, no incline) from week 10
NMES · BFR · scar	NMES until QI $\geq 80\%$; BFR optional; scar massage from week 7 once healed

Precautions

- No running on land until the Phase 4 running criteria are met
- No cutting, pivoting, lateral agility, or plyometrics
- No manual PROM; open-chain extension 90–40° only

PHASE

4

Advanced Strengthening

Weeks 12–20

For the patient: what to expect

Strength work gets heavier, with single-leg exercises. Once Dr. Merritt clears you and testing is good enough, you start a treadmill walk-jog program. If your knee swells after a session, back off. No jumping or cutting yet.

WEIGHT BEARING	Full, no restrictions
BRACE	Functional ACL brace only if prescribed; wean per Dr. Merritt
RUNNING	Treadmill walk-jog once all running criteria are met; not before week 12

Goals

- QI ≥80% (quad and hamstring LSI)
- Start the return-to-run program
- Single-leg strength, balance, and control

Move on when

- ☐ Running without pain or effusion, ≥4 sessions in a row
- ☐ QI ≥80%; single-leg balance 60 sec
- ☐ Single-leg hop height ≥50% (supervised clinic test only; no hop training until Phase 5)
- ☐ At least 20 weeks after surgery

Exercises

Exercise	How
Open-chain quad · hamstring	Full-arc extension and curls, progressive resistance
Leg press	0–90°, both legs and single leg
Step-ups · step-downs	Progress to a 6–8-inch step
Single-leg strength	Bulgarian split squats, single-leg squats
Hip · neuromuscular	Hip in all planes (band, cable); balance with perturbation, BOSU, wobble board
Treadmill walk-jog	Once cleared: 60 sec walk / 60 sec jog, advance weekly
Conditioning · BFR	Bike, elliptical, swimming at rising intensity; BFR optional

Running criteria (all required)

Surgeon clearance · QI ≥80% (quad and hamstring) · no effusion with activity · full motion equal to the other side · at least 12 weeks after surgery

Precautions

- No cutting, pivoting, lateral shuffles, or agility
- No jumping (including two-leg) until Phase 5
- Check effusion after each session; reduce intensity if it rises

PHASE

5

Running Progression

Weeks 20–30

For the patient: what to expect

You'll build up straight-line running, then speed. You'll also learn to jump and land safely, first on two legs, then one. Land with your knee over your toes, not caving in. Still no cutting or pivoting.

WEIGHT BEARING	Full, no restrictions
BRACE	Functional ACL brace only if prescribed
RUNNING	Straight line, progressing speed; no cutting, pivoting, or lateral agility

Goals

- Running without pain or effusion at rising speed
- Symmetrical landing, two legs and one
- Hop tests $\geq 80\%$ LSI; strength toward $\geq 90\%$ LSI

Move on when

- ☐ Running without pain or effusion
- ☐ Single-leg balance ≥ 60 sec
- ☐ Hop tests $\geq 80\%$ LSI; QI $\geq 80\%$
- ☐ At least 30 weeks after surgery

Exercises

Exercise	How
Treadmill running	Intervals: add time, then speed, up to 75% of maximum
Jump to landing	Two legs; soft landing, knee over toes, no valgus
Hopping	Two legs, then single leg (in the functional brace if prescribed); add height and distance
Heavy strength	Open-chain quad and hamstring; leg press, split squat, single-leg squat; hip in all planes
Plyometric prep	Depth landings, jump to box, low box drops
Agility prep · neuromuscular	Lateral shuffle (no pivot) late in phase, per surgeon; perturbation, reactive drills

Precautions

- No cutting or pivoting until Phase 6
- Reactive swelling means too much load; reduce it
- Correct valgus collapse on landing before advancing

PHASE

6

Pre-Sport

Weeks 30–36

For the patient: what to expect

You'll start controlled cutting and change-of-direction drills at part speed, plus harder jumping and agility work. It is still practice, not competition. Full-speed cutting and team practice wait until you pass testing, no sooner than week 36.

WEIGHT BEARING	Full, no restrictions
BRACE	Functional brace for cutting and sport only if prescribed
RUNNING	Patterns up to 75% speed; add change of direction and sport-specific patterns

Goals

- Running at 85% of maximum speed without pain or effusion
- Hop tests $\geq 85\%$ LSI; QI $\geq 85\%$
- IKDC Q10 ≥ 8 (0–10 scale); maximum vertical jump without pain

Move on when

- ☐ Maximum vertical jump without pain
- ☐ Hop tests $\geq 85\%$ LSI (single, triple, crossover, timed 6-meter)
- ☐ Running at 85% speed without pain or effusion
- ☐ IKDC Q10 ≥ 8 ; QI $\geq 85\%$
- ☐ At least 36 weeks after surgery

Exercises

Exercise	How
Running	Advance to 85% of maximum; add 45° cuts and changes of direction
Plyometrics	Two-leg and single-leg jumps, bounding, reactive hops
Agility	Ladder drills with rising speed and complexity; sport-specific movement, non-competitive
Cutting and pivoting drills	Controlled, at 50–75% speed
Strength	Heavy quad, hamstring, hip; eccentrics: Nordic curls, RDL, high step-downs
Deceleration	Refine deceleration and landing mechanics

Precautions

- No full-speed cutting or contact before week 36 (Phase 7)
- No full team practice until return-to-sport criteria are met
- Watch for effusion or pain as activity rises

PHASE

7

Return to Sport

Weeks 36–52

For the patient: what to expect

Week 36 is the earliest return; 9 to 12 months is recommended before full cutting and pivoting sports. Dr. Merritt clears you once you pass strength, hop, and knee-score testing. If you feel nervous about returning, tell your therapist. Keep lifting at least twice a week.

WEIGHT BEARING	Full, no restrictions
BRACE	Functional brace for sport only if prescribed; do not stop it without Dr. Merritt's clearance
TIMELINE	Week 36 minimum; 9–12 months recommended for cutting and pivoting sport

Goals

- All return-to-sport criteria met
- QI $\geq 90\%$; hop tests $\geq 90\%$ LSI
- IKDC Q10 ≥ 9 ; surgeon clearance

Move on when**Exercises**

Exercise	How
Sport-specific training	Drills, conditioning, team practice
Return to competition	Gradual: limited minutes, graduated exposure
Cutting · contact	Full-speed cutting and pivoting; contact drills (sport-dependent) after clearance
Maintenance	Strength $\geq 2\times$ a week; neuromuscular and proprioception work
Psychological readiness	ACL-RSI or similar (recommended)

Precautions

- Do not rush: early return significantly increases re-injury risk
- Psychological readiness is part of return to sport; address fear-avoidance

Return-to-Sport Criteria

All criteria must be met before clearance.

Measure	Target
Quadriceps strength (isokinetic)	≥90% LSI
Hamstring strength (isokinetic)	≥90% LSI
Single-leg hop testing	≥90% LSI (single, triple, crossover, timed)
Single-leg balance	60 sec, eyes open, without loss of balance
Motion	Full and pain-free, equal to the other side; no extensor lag
Effusion	No reactive effusion after functional activity
Knee score	IKDC Q10 ≥9 (0–10 scale)
Minimum time: running	Weeks 12–20 (QI ≥80%, surgeon clearance, no effusion, full motion)
Minimum time: cutting · pivoting	Controlled drills from week 30; full speed from week 36. 9–12 months recommended
Clearance	Required from Dr. Merritt; criteria-based

Functional testing

- Strength: isokinetic quadriceps and hamstring testing
- Hop battery: single hop, triple hop, crossover hop, timed 6-meter hop
- IKDC Q10 knee score
- Psychological readiness: ACL-RSI or similar (recommended)

All progressions are criteria-based, not calendar-based. Minimum times must be met and functional criteria satisfied.