

OSTEOCHONDRAL ALLOGRAFT OF THE KNEECAP OR TROCHLEA

Physical Therapy Protocol

PATIENT

SURGEON

Andrew L. Merritt, MD

DATE OF SURGERY

PT START DATE

For the patient

A donor plug of cartilage and bone replaced the damaged area on your kneecap or the groove it runs in (the trochlea). It heals **bone to bone**, so most people return to sport at about 6 months. **You can put weight on your leg right away, with the brace locked straight**, which keeps the kneecap from pressing hard on the graft. For 4 weeks, nothing that pushes against resistance to straighten the knee. You move to each phase when your knee meets the goals.

PROTOCOL AT A GLANCE

WEIGHT BEARING	Full weight as tolerated from day 1 , brace locked straight. Crutches for comfort for 2 to 3 weeks
BRACE	Locked straight for walking and sleep for 6 weeks . Opened over weeks 7–8; off by 8 to 10 weeks
MOTION GOALS	Bending 90° by 2 to 3 weeks , sitting or lying down. No limit on bending without weight
PHYSICAL THERAPY	Starts 5 to 7 days after surgery, 2 times a week at first
KEY PRECAUTIONS	No anti-inflammatory medicines for 6 weeks . For 4 weeks: no leg-extension machine, ankle weights, or resisted straightening
RUNNING · SPORT	Running around 14 to 16 weeks , after a step-down test. Sport after 6 months , once cleared

Recovery Timeline

Phase	When	PT visits	Focus
1	Weeks 0–6	2× a week	Brace locked straight, quad and VMO activation
2	Weeks 7–12	2× a week	Brace opened and stopped, progressive strength
3	Weeks 13–16	1–2× a week + home program	Step-downs, plyometrics, start running
4	Weeks 17–26	As needed	Cutting from 22 weeks, testing, 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

- **Osseous integration.** Like the condyle OCA, the plug heals bone to bone at the graft-host interface, supporting return to sport at about 6 months (MACI 12–18 months).
- **Weight as tolerated, brace locked at 0°.** The locked brace prevents loaded knee flexion in stance and protects the graft. Crutches for comfort for 2–3 weeks, then wean.
- **Brace:** locked at 0° for all standing, walking, and sleep for 6 weeks; unlocked only for seated or supine ROM and hygiene. Opened gradually over weeks 7–8; stopped by weeks 8–10.
- **No resisted extension × 4 weeks:** no leg-extension machine, ankle weights, or banded or resisted straightening. After week 4, bands and light open-chain work; weighted open-chain from week 7. **No leg-extension machine until week 14.**
- **Motion, no CPM.** Active and active-assisted, seated or supine. Flexion 90° by weeks 2–3; no limit on unloaded motion. Gentle patellar mobilization from day 1.
- **No NSAIDs for 6 weeks, including topical** (e.g., diclofenac gel). They can slow bone and cartilage healing.
- **NMES** at PT visits from the first visit; no home unit. **Ice:** 20 min on, 20 min off.
- **Criteria-based.** Anterior knee pain with loading means regress before advancing.

Procedures done at the same time

MPFL reconstruction

- No change to this protocol; follow the standard OCA kneecap or trochlea timeline.

Lateral retinacular lengthening

- No change to this protocol. Gentle medial patellar mobilization per surgeon preference; avoid compressing the kneecap against the graft.

PHASE

1

Protection

Weeks 0–6

For the patient: what to expect

Full weight is fine, but **your brace stays locked straight when you stand, walk, or sleep**. Crutches help for 2 to 3 weeks. Bend sitting or lying down: 90° by 2 to 3 weeks. For 4 weeks, no resisted straightening of any kind.

WEIGHT BEARING	As tolerated, brace locked at 0°. Crutches for comfort weeks 0–3, then wean
BRACE	Locked at 0° for standing, walking, and sleep × 6 weeks; unlocked only for ROM and hygiene
MOTION	Seated or supine only, no CPM. Flexion 90° by weeks 2–3; no limit on unloaded motion

Goals

- Brace locked for weight bearing × 6 weeks
- No resisted extension × 4 weeks; flexion 90° by weeks 2–3
- SLR without extensor lag by week 3
- Patellar mobilization from day 1; swelling controlled

Move on when

- ☐ Brace locked for all weight bearing × 6 weeks
- ☐ Flexion ≥90°
- ☐ SLR without extensor lag
- ☐ Pain and swelling decreasing

Exercises

Exercise	How
NMES	Quadriceps, 20–30 min at PT visits from the first visit
Quad sets · ankle pumps	Quad sets 3 × 15 every waking hour (VMO priority); ankle pumps hourly
SLR · heel slides	SLR hip flexion, then 4 planes, 3 × 10. Heel slides 3 × 15
Hamstrings · hip · calf	Hamstring curls 3 × 12. Hip abductors, adductors, gastrocnemius 3 × 15
Patellar mobilization	Superior, inferior, gentle medial; 2 × 10, 2× a day from day 1; no graft compression
Standing work	Bilateral stance, brace locked, no resistance, from weeks 2–3
Banded extension	After week 4: light bands (limited arc initially, avoiding deep flexion loading)
Recumbent bike	Once flexion ≥90° (typically weeks 3–4); low resistance, 10–15 min
Pool · conditioning	Deep-water walking weeks 4–5 once healed (surgeon approval). Other-leg cardio. Ice after sessions

Precautions

- Brace locked at 0° for all weight bearing × 6 weeks; not negotiable
- No resisted extension × 4 weeks: no machine, ankle weights, or banded straightening
- ROM seated or supine only; no loaded knee flexion. Gentle patellar glides. Reactive effusion: less load

Why: Bone-to-bone healing takes 6–8 weeks; the locked brace prevents loaded patellofemoral contact in stance.

PHASE

2

Return to Loading

Weeks 7–12

For the patient: what to expect

Your brace is opened step by step over weeks 7 and 8, so you can bend more while walking. Most people are out of the brace by 8 to 10 weeks, once the quad is strong enough. Straightening exercises with light weight start now and build each week. The bike and pool are your main cardio.

WEIGHT BEARING	Full. Brace opened gradually over weeks 7–8; stopped by weeks 8–10 once quad control is confirmed
RESISTED EXTENSION	Bands and light open-chain from week 4; weighted from week 7 (5 lb, +2–3 lb a week). No leg-extension machine until week 14
LOADED FLEXION	≤60° in weeks 7–10; past 60° only after weeks 10–12; to 90° by week 14

Goals

- Out of the brace by weeks 8–10, quad control confirmed
- Quad strength 50–60% of the other leg
- Open-chain extension with progressive resistance
- Cycling and closed-chain work without pain

Move on when

- ☐ Full weight without brace, near-normal gait
- ☐ Mini squat 0–45° × 15 without PF pain
- ☐ 20 min bike without reactive effusion
- ☐ Quad strength ≥55% of the other leg

Exercises

Exercise	How
Open-chain extension	5 lb at week 7, +2–3 lb a week, 3 × 15 (limited arc initially, avoiding deep flexion loading)
Bike · elliptical	Bike to 20–25 min, more resistance. Elliptical once out of the brace (weeks 10–12)
Mini squats	0–45°, 3 × 15; 60° by week 10; 0–90° as tolerated after that
Leg press	0–60°, 3 × 12, no loaded deep flexion; 0–90° by week 14
Step-ups	2–4-inch, 3 × 10; 4–6-inch in weeks 10–12
Hip · hamstrings · calf	Standing hip, 4 directions, 3 × 12; resisted curls 3 × 12; calf raises 3 × 15
Single-leg balance	Firm surface 3 × 30 sec; foam or unstable in weeks 10–12
Aquatherapy · ice	Shallow-water walking and strengthening. Ice after every session

Precautions

- Confirm quad control before walking without the brace
- No loaded flexion past 60° through weeks 10–12 (highest patellofemoral compression)
- PF pain with squats or leg press: stop the movement and return to isometrics
- No leg-extension machine until week 14. No running, jumping, or impact

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3

Return to Function

Weeks 13–16

For the patient: what to expect

This phase adds jumping drills, a step-down program, and running preparation. Running starts when you can step down from an 8-inch step with good control, usually at 14 to 16 weeks. Deeper squats are now allowed. If the front of your knee hurts with squats or leg press, stop those and tell your therapist.

WEIGHT BEARING	Full, unrestricted
MOTION	Full. Loaded flexion past 90° now allowed
RUNNING	Walk-jog once the 8-inch step-down is met, not before 14 weeks

Goals

- Quad strength $\geq 80\%$ of the other leg
- 8-inch step-down, symmetric, no PF symptoms
- Start bilateral plyometrics
- Start walk-jog intervals at 14–16 weeks

Move on when

- ☐ Quad strength $\geq 80\%$ of the other leg
- ☐ 8-inch step-down, symmetric (required before running)
- ☐ Running ≥ 10 min without pain or anterior knee symptoms
- ☐ Bilateral plyometrics without pain or effusion

Exercises

Exercise	How
Phase 2 program	Continue with progressive resistance and duration
Squats	90° to full depth, more resistance. Anterior knee pain: isometrics for a while
Leg press	Progress ROM and resistance. PF pain: back to isometrics
Step-down program	4 → 6 → 8-inch; eccentric control and patellar tracking
Balance board squats	Both legs, then single leg
Plyometrics	From weeks 13–14: bilateral jump and land, progressing to single-leg hops
Conditioning	Bike, StairMaster, elliptical; progressive resistance and duration
Walk-jog intervals	Once the 8-inch step-down is met (after 14–16 weeks); flat surface, short intervals
Agility	Ladder, lateral shuffles, change of direction at low intensity

Precautions

- Running not before 14 weeks and not before the step-down is met; both are required
- PF pain with squats or leg press: stop and return to isometrics; do not push through anterior knee pain
- No cutting, jumping, or pivoting sports before 22 weeks. Reactive effusion: reduce intensity

PHASE

4

Return to Impact Activities

Weeks 17–26

For the patient: what to expect

Running builds toward steady, sport-level running. Cutting, jumping, and agility drills start, but not before 22 weeks. Return to sport is gradual and cleared by Dr. Merritt, usually after 6 months once you meet all the goals.

WEIGHT BEARING	Full, unrestricted
CUTTING · JUMPING	Not before 22 weeks; criteria-based only

Goals

- Isokinetic quad $\geq 90\%$ and hamstring $\geq 100\%$ of the other leg
- Single-leg hop $\geq 90\%$ LSI
- Full return to sport or recreation

Move on when

- ☐ Quad $\geq 90\%$ and hamstring $\geq 100\%$ LSI; hop $\geq 90\%$ LSI
- ☐ Running 20 min without anterior knee pain or effusion
- ☐ Knee scores done (IKDC, KOOS, Lysholm, Tegner)
- ☐ Surgeon clearance: gradual return after 6 months

Exercises

Exercise	How
Running program	Walk-jog intervals to continuous running; duration, then pace
Cutting · jumping · agility	Not before 22 weeks after surgery
Sport-specific program	Agility and skill work of increasing difficulty
Plyometric progression	Bilateral jump and land → single-leg hops → reactive drills
Hop testing	Single hop, triple hop, crossover hop, timed 6-meter hop
Maintenance	Quad and hip program 3–4× a week

Precautions

- Cutting, jumping, and pivoting not before 22 weeks, and only when criteria are met
- Gradual return to full sport after 6 months, directed by Dr. Merritt; not on subjective readiness alone
- Anterior knee pain or effusion with running needs imaging before progressing

Return to Activity

All criteria must be met, and Dr. Merritt must clear the patient, before cutting, jumping, or pivoting sports.

Measure	Target
Isokinetic quadriceps	≥90% LSI
Isokinetic hamstrings	≥100% LSI
Single-leg hop testing	≥90% LSI (single, triple, crossover, timed)
ROM · effusion	Full, pain-free, equal to the other knee; no effusion after activity
Functional knee scores	IKDC, KOOS, Lysholm, Tegner completed
Earliest running	14–16 weeks, after the 8-inch step-down is met
Earliest cutting · jumping	22 weeks
Clearance	Dr. Merritt; gradual return to sport after 6 months

Clinical Timeline Summary

WEIGHT · CRUTCHES	As tolerated from day 1, brace locked; off crutches weeks 2–3
BRACE	Locked weeks 0–6 (day and night); opened weeks 7–8; stopped weeks 8–10
NO NSAIDS	Weeks 0–6, including topical
RESISTED EXTENSION	None weeks 0–4; bands from week 4; weighted from week 7; no machine until week 14
LOADED FLEXION	≤60° to weeks 10–12; 90° by week 14
CARDIO · PLYOMETRICS	Bike once flexion ≥90°; elliptical once out of the brace. Plyometrics weeks 13–14
RUNNING	14–16 weeks, after the 8-inch step-down
CUTTING · SPORT	Not before 22 weeks; sport after 6 months, criteria-based