

MACI - Mixed Tibiofemoral + Patellofemoral Lesions

Physical therapy protocol

Patient: _____ Surgery / procedure date: _____

This is the full Pacific Bone & Joint postoperative protocol. Patient-specific operative and discharge orders take precedence over this default pathway.

Selected by surgeon _____ PT start _____ Next review _____

Protection and early recovery

Use when matrix-induced autologous chondrocyte implantation (MACI) treats both tibiofemoral and patellofemoral surfaces. Time starts at implantation, not biopsy. This combined schedule protects tibiofemoral loading while retaining patellofemoral motion precautions.

Document all graft locations, sizes, containment and the safe loaded arc. Kissing or bipolar disease, tibial-plateau grafts, substantial bone grafting or associated osteotomy/repair requires surgeon-specific modifications.

Combined loading and motion schedule

Table week 1 = days 0-6; week 2 = days 7-13. Other time intervals are elapsed time after surgery. Percentages are maximum fractions of body weight on the operated leg; teach with a scale and two crutches. The exact percentages below are proposed clinic defaults. Do not use immediate full loading from an isolated patellofemoral protocol.

Time after implantation: Maximum load on operated leg - Unloaded motion and brace

- Week 1: 15% maximum - 0-45 deg; brace locked straight for gait
- Week 2: 30% maximum - 0-60 deg; retain two crutches
- Week 3: 45% maximum - 0-75 deg; keep brace locked straight for gait
- Week 4: 55% maximum - 0-90 deg; keep brace locked straight for gait
- Week 5: 65% maximum - 0-105 deg; active motion from day 28; unlock only if cleared
- Week 6: 75% maximum - 0-120 deg; maintain prescribed gait arc
- Week 7: 85% maximum - Toward 135 deg if comfortable; retain aids as needed
- Weeks 8-9: Full when cleared - Comfortable full motion; wean aids by criteria

Apply both compartments' protections

- Keep the brace locked straight for walking and transfers for 4 completed weeks. After day 28, unlock only in the surgeon-authorized gait arc, when quadriceps control prevents buckling. Night use follows the discharge order.
- Begin passive or assisted flexion immediately within the table limits. For this conservative combined pathway, start active knee motion after 4 completed weeks (day 28); develop full active control at 8-10 weeks after surgery.

- Maintain tibiofemoral loading limits even if the patellofemoral graft is contained. Full loading generally develops at 7-9 weeks after surgery. Brace and crutch weaning may continue until 8-12 weeks after surgery.
- Avoid resisted knee-extension machines initially. No deep loaded flexion, kneeling, impact or pivoting; identify a safe exercise arc that protects every graft.
- Follow stricter limits from osteotomy, meniscus-root repair, BEAR or other ligament repair. Obtain a combined order when restrictions conflict rather than averaging two protocols.

This is a clinical synthesis of the more protective components, not a separately validated manufacturer protocol. Progress requires both elapsed healing time and the functional criteria; recurring effusion warrants slower loading and surgeon review.

Therapy and home exercises

First 2 weeks after surgery

Start outpatient physical therapy during the first week. Initial visits teach safe transfers, crutch use, the permitted load and the brace setting. Suggested frequency is 1-2 visits weekly initially, adjusted to deficits and progress; complete the home program daily.

- Perform ankle pumps regularly while awake. Practice gentle quadriceps and gluteal tightening, with 5-10 second holds for 10 repetitions, 3-5 times daily.
- Use supported passive or assisted bending within the weekly ceiling. Support the heel and calf to regain extension; avoid forceful hyperextension or prolonged support directly behind the knee.
- If continuous passive motion (CPM) is prescribed, start within 12-24 hours at 0-45 deg. A proposed initial dose is 60 minutes daily in tolerable sessions for 3 weeks, then reassess. Follow the same weekly flexion ceiling.

2 to 6 weeks after surgery

Begin gentle active knee motion after 4 completed weeks (day 28), within the permitted range. Straight-leg raises keep the knee straight; use the locked brace if needed to prevent lag. Add hip and trunk work without twisting or loading the operated knee. Therapist-directed neuromuscular electrical stimulation may help quadriceps recruitment.

A stationary cycle may start at 5-6 weeks after surgery for gentle motion only. Use partial revolutions if needed; never force the knee past its flexion limit. Delay resistance until approved. Avoid resisted knee-extension machines during this protection phase.

6 to 12 weeks after surgery

After full loading is authorized, restore an even gait and progress balance. Introduce low-load mini-squats and leg press in the documented graft-safe arc, initially shallow. Add controlled calf and hip strengthening. Begin resisted knee-extension work only after the surgeon specifies its safe arc and timing.

3 to 6 months after surgery

Progress strength, step control and low-impact conditioning. Increase resistance gradually; movement quality and the next-day knee response guide dosing. Deep loaded flexion and terminal extension loading require lesion-specific clearance.

- Keep exercise discomfort mild and stop for sharp joint pain, catching or new swelling. Do not stretch through a mechanical block.
- No running, jumping, twisting, loaded deep squats or forceful kneeling during early rehabilitation. Permission for passive knee bending does not authorize bending under body weight.
- Pool exercise starts only after wounds are fully closed, dry and cleared. Follow the separate surgical instructions for dressings, medicines and blood-clot prevention.

Progression and return to activity

Progress by healing time and measured function

- Advance loading only when the current level causes no increase in pain, knee fluid or limp through the following morning. If symptoms increase, return to the last comfortable level and contact the therapist.
- Wean crutches or brace only after the surgeon allows the load, full active extension is present, 20 straight-leg raises show no lag, and walking is smooth without buckling. Do not remove aids needed to maintain a loading limit.
- Before running: painless full motion, stable gait, no reactive swelling, and measured quadriceps and hamstring strength at least 80% of the opposite limb. Perform landing or hopping assessment only after impact testing is cleared.

Running and sport

Assess running readiness around 8 months. If the grafts, examination and functional tests support progression, the usual running window is 10-12 months. Extensive or bipolar disease may favor long-term low-impact exercise. Begin level walk-jog intervals only after clearance.

For unrestricted sport, require surgeon clearance, at least 90% quadriceps and hamstring strength symmetry, at least 90% symmetry on the approved hop battery, controlled sport-specific movement, and no pain or swelling after progressive practice. Compare absolute strength and endurance as well as limb symmetry; both legs may be weak.

This clinic schedule reserves pivoting, cutting and contact sport until at least 12 months; complex repairs may need 12-18 months. These are review windows, not automatic clearance. Return to physical work also requires the lifting, kneeling and climbing demands to be demonstrated safely.

When to contact the office

- Request prompt review for new locking, loss of extension, a painful pop with swelling, instability, wound drainage, spreading redness or fever.
- Seek urgent assessment for new calf pain or swelling. Call 911 for chest pain, shortness of breath or fainting.

Schedule note: exact weekly loading percentages, brace steps and the 12 month contact-sport floor are proposed clinic defaults within published guidance; surgeon orders may modify them.

Sources: Vericel. MACI Rehabilitation Manual, PP.US.MAC.1310 v5.0 (2024), <https://www.maci.com/pdf/MACI-Rehabilitation-Manual.pdf>. Flanigan DC et al. Cartilage 2021; doi:10.1177/1947603520968876. Ohio State University. Autologous Chondrocyte Implantation Clinical Practice Guideline, April 2023. Review date October 23, 2026.