

Rehabilitation Protocol: Cartilage Restoration – Patella / Trochlea (MACI / ACI / DeNovo NT Implantation)

Date of Surgery: _____

Procedure: ☐ MACI/ACI ☐ DeNovo NT Location: ☐ Patella ☐ Trochlea

Concomitant: ☐ MPFL Reconstruction ☐ TTO ☐ Lateral Lengthening – follow the more conservative restriction of the two protocols

Early controlled motion prevents stiffness – **do not force ROM**. Avoid loading through the arc of the lesion. Monitor edema throughout; if persistent, reduce load/volume and contact our office. No pillow under the knee. Please contact our office with any questions or concerns.

☐ **Phase I – Protection (Weeks 0–2)**

- **Weightbearing: Non-weightbearing with crutches**
- **Hinged Knee Brace:** Locked in extension for ambulation and sleep
- **Range of Motion** – Immediate pain-free AAROM (seated flexion off table). **Week 1: 0–20°; week 2: 0–60°. CPM 2 hours, 3× daily.** Full passive extension immediately (heel props several times daily)
- **Therapeutic Exercises**
 - Quad re-education with NMES (quad stim); SLR all planes – in brace if lag or pain
 - Patellar mobilization (all planes); soft tissue mobilization (quads, hamstrings, calf, suprapatellar pouch, infrapatellar tissue)
 - Hamstring/gastroc-soleus stretching; ankle PREs
 - Consider BFR training; cryotherapy
- **Criteria to Progress:** ROM 0–60°; pain and edema controlled; SLR without lag

☐ **Phase II – Early Motion (Weeks 2–6)**

- **Weightbearing: Partial weightbearing (30–40 lbs) with crutches**, brace locked in extension
- **Hinged Knee Brace:** Locked in extension for ambulation through 6 weeks
- **Range of Motion** – **0–110° by week 4; 0–125° by week 6** (do not force). Continue CPM 2 hours 3× daily through 6 weeks. Step flexion stretch, wall heel slides; maintain full extension
- **Therapeutic Exercises**
 - Short crank bike at 85–90° flexion, progressing to upright bike at 110–115°
 - Multi-angle quad isometrics (avoid lesion arc); continue NMES
 - Weight shifts, double-leg balance, standing heel raises
 - Core and multiplanar hip strengthening: SLR without brace or lag, clamshells, bridges with band
 - **Week 4+:** Light bilateral leg press (monitor arc of motion); aquatic therapy once incisions healed
- **Criteria to Progress:** Tolerating partial weightbearing with crutches and locked brace; steady progression toward full ROM; normal patellar mobility; minimal edema

☐ **Phase III – Gait and Strengthening (Weeks 7–12)**

- **Weightbearing/Brace:** Continue partial weightbearing (30–40 lbs) through week 8, progressing to one crutch at weeks 6–8. Weeks 8–12: progress to full weightbearing and discontinue crutches once gait is non-antalgic. Unlock brace once adequate quad control; discontinue per our office
- **Range of Motion** – Progress to functional limits; prone knee flexion and hip flexor stretching; foam rolling

- **Therapeutic Exercises**

- Gait training: heel-toe pattern, retro walking; underwater/anti-gravity treadmill if gait remains abnormal
- Leg press bilateral to eccentric; weight-bearing resisted TKEs
- Chair/box squats (band at knees), lowering height as tolerated; **week 8:** suspension squats
- Forward step-ups 4" to 8"; forward step-downs 4" to 6" – no hip drop or valgus
- RDLs (double to single leg); monster walks, wall abduction isometrics, windmills, bridge progression
- Balance and core progression; bike; elliptical once able to do an 8" step-up

- **Criteria to Progress:** Full weightbearing with normal gait; functional ROM; 8" step-up; symmetric squat 0–90°; single leg stance >30 seconds; minimal edema

☐ **Phase IV – Advanced Strengthening (Weeks 12–18)**

- **Therapeutic Exercises**

- Progress squat and eccentric leg press programs; eccentric double-leg and controlled single-leg squats
- Progress step-ups/step-downs (height, then load); perturbation training
- Bike, elliptical, climber; aquatics; core/kinetic linking

- **Criteria to Progress:** Quad strength $\geq 80\%$ of other side (dynamometry); no pain or effusion after activity; controlled 8" step-down; controlled single-leg squat to 45–60°

☐ **Phase V – Return to Activity (Week 18+)**

- **Therapeutic Exercises**

- **Running (week 20+)** once controlled 8" step-down: AlterG or pool first, then interval treadmill running once 95% WB on AlterG is symptom-free
- Plyometrics double to single leg; agility, balance, and sport-specific programs; monitor load and edema
- Strength maintenance: squats, leg press, lunges, single-leg RDLs, hip strengthening; foam rolling

- **Return to Impact Athletics: ~16 months if pain-free**, with physician clearance

- **Criteria for Discharge / Return to Sport:** Quad and hamstring strength $\geq 90\%$ of other side on dynamometry, isokinetic, and functional/hop testing; no pain, edema, or apprehension; independent with gym program