



Trochleoplasty ± Tibial Tubercle Osteotomy (TTO) ± MPFL Reconstruction Rehabilitation Protocol

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Procedure: Trochleoplasty ± Tibial Tubercle Osteotomy ± MPFL Reconstruction

PT Frequency: 2-4 times per week

ROM Restrictions: 0-60° x 2 weeks, then 0-90° until 6 weeks, then advance as tolerated

Brace: Locked in full extension x 2 weeks, then unlocked 0-90 until 6-8 weeks

Weightbearing: TTWB x 6 weeks, then PWB (25% with progression to full WBAT at 8 weeks)

PHASE I (Weeks 0 – 2):

- **Weightbearing:** Touch Down Weightbearing (TDWB) x 6 weeks with crutches and brace
- **Brace:** Worn at all times locked in full extension. Ok to remove for hygiene and exercises.
- **Range of Motion:** 0-60° with emphasis on full extension
- **Home Exercises:** Quad sets with brace locked at 0°, patellar mobilization, straight leg raise in brace locked at 0°, calf/ankle pumps, passive leg hangs to 90°

Phase II (Weeks 2 – 8)

- **Weightbearing:** TDWB weeks 2-6, then progress to partial weightbearing (25% then 50%) with goal of weightbearing as tolerated (WBAT) with crutches and brace by 8 weeks
 - Discontinue crutches when gait normalized and non-antalgic
 - Discontinue brace once fully WBAT without crutches
- **Brace:** Unlocked during day 0-90°, off at night, for hygiene and exercises
 - Discontinue after 6-8 weeks when WB comfortably
- **Range of Motion:** Full unlimited active/passive ROM
- **Exercises:**
 - PROM/AAROM to tolerance, patella and tibiofibular joint mobs
 - Begin floor based core and glute/quad/hamstring exercises
 - 6-8 weeks: Addition of heel raises, closed chain lower body, gait normalization, eccentric quads/hamstrings; advance core, glutes and pelvic stability
 - Begin stationary bike as tolerated after 6 weeks

Phase III (Weeks 8 – 12)

- **Weightbearing:** Full WBAT
- **Hinged Knee Brace:** None
- **Range of Motion:** Full; avoid weight bearing knee flexion > 90° until **4 months**
- **Exercises:**
 - Progress closed chain activities
 - Begin hamstring work, lunges/leg press 0-90°, proprioception exercises, balance/core/hip/glutes



Phase IV (Weeks 12 – 16)

- **Weightbearing:** Full WBAT
- **Brace:** None
- **Range of Motion:** Full; avoid weight bearing knee flexion $> 90^\circ$ until **4 months**
- **Exercises:**
 - Progress Phase III exercises and functional activities: walking lunges, planks, bridges, swiss ball, half-bosu exercises
 - Advance core/glutes, balance, flexibility
 - May advance to elliptical, pool as tolerated after 12 weeks

Phase V (Weeks 16+)

- **Weightbearing:** Full WBAT
- **Brace:** None
- **Range of Motion:** Full
- **Exercises:**
 - Slowly advance all activity as tolerated
 - Progress to functional training, including running, jumping, pivoting, and sports activity after 16 weeks
 - Running:
 - Ok to start running if:
 - Full ROM
 - Pain ≤ 2 VAS and no effusion despite adequate loading
 - Limb symmetry index (LSI) $\geq 70\%$ for quadriceps and hamstring strength
 - Graduated running program
 - Start with 4-minute walk, 1 minute run (4:1) for 20 minutes
 - Decrease walking time and increase running time by 1 minute each week (3:2, 2:3, 1:4, 0:5)
 - Patient should be able to run for 20 minutes after 5 weeks
 - Once running program complete, introduce backwards and sideways running
 - Progress running from single to multi-plane specific agility drills
 - Neuromuscular training:
 - Increase difficulty of neuromuscular and perturbation training
 - Introduce jumping/landing exercises if required based on patient's goals, from week 16
 - Emphasize sports-specific movements
 - Maintain quality of movement/performance during strength and sports exercises
 - Increase difficulty of neuromuscular and perturbation training (e.g. single legged jumps)
 - Introduce reactive/unanticipated movements
 - Emphasize sports-specific movements
 - Maintain quality of movement/performance during strength and sports exercises
 - Sport-specific training
 - Increase intensity of agility training (e.g. cutting, pivoting)



- Build sports-specific load regarding energy expenditure (aerobic, anaerobic)
- Build sports-specific load regarding surface (grass, court etc.)
- Restart training with patient's team
- Criteria for returning to play:
 - No knee pain or effusion with sports-specific activities
 - No giving way or fear of giving way during sports-specific activities
 - Active dynamic gait pattern and symmetrical jogging pattern
 - Correct quality of performance with all sports-specific activities
 - Limb symmetry index (LSI) >90% for quads and hamstrings strength
 - LSI >90% for hop battery tests
 - Patient psychologically ready/confident to return to sports
 - Expected return between 6-9 months since surgery
- Return to play as tolerated when cleared by MD



Exercise	Week															
	1	2	3	4	5	6	7	8	9	10	12	16	20	24		
Initial Exercises:																
ROM Goals	0-30°				0-60°				0-90°				Progress to full			
Flexion/extension, heel slides/seated																
Patella/Tendon mobilization																
Quad Series	0° ISOs, SLR					60° ISO				70-30° arc-resisted			Full arc resisted			
Hamstring series																
Sit and reach for hamstrings																
Ankle Pumps																
Crutch weaning	NWB						Begin WBAT progress to full by 8 weeks									
Heel prop knee extension stretch																
SLR (w/ brace until quad control restored)																
Toe and heel raises																
Balance series																
Weight-bearing Strength Exercises:																
Double knee bends	1	2	3	4	5	6	7	8	9	10	12	16	20	24		
Leg Bridges (2 □ 1 leg)	NWB															
Begin cord exercises																
Leg press (ISO □reps, 2 □ 1 leg)																
Reverse lunge- static hold																
Dead Lift (2 □1 leg)																
Sports Test exercises																
Cardiovascular Exercises:																
Bike with both legs-no resistance	1	2	3	4	5	6	7	8	9	10	12	16	20	24		
Bike with both legs- resistance	NWB															
Aqua jogging																
Treadmill-walking (no limp)																
Swimming with fins-light flutter kick																
Elliptical Trainer																
Stair stepper																
*Cardio Exercises						Must tolerate daily walking with no limp & no significant increase in pain/swelling prior to initiating WB cardio (walk, elliptical, stepper)										
Agility Exercises:																
Running Progression	1	2	3	4	5	6	7	8	9	10	12	16	20	24		
Initial-Single Plane	NWB															
Advance-Multi Directional																
Functional Sports Test																
High Level Activities:																
Golf Progression	1	2	3	4	5	6	7	8	9	10	12	16	20	24		
Outdoor biking, hiking, running	NWB															
Return to Full Sport at 6-8 months post-op																

Adapted from post-operative protocol by Dr. Jorge Chahla created by Howard Head Physical Therapy, Jill Monson, PT, OCS and Jon Schoenecker, PT, OCS, CSCS