

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

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