



High Tibial Osteotomy Procedure

Post-Operative Rehabilitation Protocol

0-6 weeks

- NWB for 6 weeks with crutches
- Brace locked in extension
- May remove brace for hygiene (on for sleeping for the first 2 weeks)
- ROM 0–90 (Passive, Active Assist)
- Quad sets, ankle pumps
- 2 weeks: Begin floor-based core, hip and glutes work and patellar mobilization and SLR, Progress non-weight bearing flexibility, modalities.

6-8 weeks

- Begin WBAT progression advance to PWB (25% then 50%) starting at 6 weeks
- Discontinue crutches when gait normalized and non-antalgic
- Discontinue brace once adequate quad control
- Full unlimited Active/Passive ROM. Advance as tolerated
- Advance closed chain quads, progress balance
- Core/pelvic and stability work
- Begin stationary bike at 6 weeks
- Advance SLR, floor-based exercise; hip/core

8-16 weeks

- Advance to full WBAT by 8 weeks
- Progress flexibility/strengthening
- Progression of functional balance, core, glutes program
- Advance bike, add elliptical at 12 weeks as tolerated. Swimming okay at 12 weeks

>16 weeks

- Advance Phase IV activity
- Progress to functional training, including impact activity after 20 weeks when cleared by MD

Weight Bearing Status

NWB x 6 weeks

Brace Settings

Locked straight x 6 weeks when ambulating or sleeping. Otherwise open brace once good quad control

ROM Restrictions

PROM 0-90° beginning POD 1



Exercise	Week														
	1	2	3	4	5	6	7	8	9	10	12	16	20	24	
Initial Exercises:															
ROM Goals	0-90°				0-125°				Progress to full						
Flexion/extension, heel slides/seated	[Green bar]														
Patella/Tendon mobilization	[Green bar]														
Quad Series	0° ISOs, SLR				60° ISO				70-30° arc-resisted			Full arc resisted			
Hamstring series/strength progression	ISOS, hip based				Knee-based resisted arc				[Green bar]						
Sit and reach for hamstrings	[Green bar]														
Ankle Pumps	[Green bar]														
Crutch weaning	NWB						Begin WBAT progress to full by 8 weeks				[Green bar]				
Heel prop knee extension stretch	[Green bar]														
SLR (w/ brace until quad control restored)	[Green bar]														
Toe and heel raises	[Green bar]														
Balance series	[Green bar]														
Weight-bearing Strength Exercises:															
Double knee bends	[Green bar]					NWB				[Green bar]					
Leg Bridges (2 → 1 leg)	[Green bar]					NWB				[Green bar]					
Begin cord exercises	[Green bar]					NWB				[Green bar]					
Leg press (ISO → reps, 2 → 1 leg)	[Green bar]					NWB				[Green bar]					
Reverse lunge- static hold	[Green bar]					NWB				[Green bar]					
Dead Lift (2 → 1 leg)	[Green bar]					NWB				[Green bar]					
Sports Test exercises	[Green bar]					NWB				[Green bar]					
Cardiovascular Exercises:															
Bike with both legs-no resistance	[Green bar]					NWB				[Green bar]					
Bike with both legs- resistance	[Green bar]					NWB				[Green bar]					
Aqua jogging	[Green bar]					NWB				[Green bar]					
Treadmill-walking (no limp)	[Green bar]					NWB				[Green bar]					
Swimming with fins-light flutter kick	[Green bar]					NWB				[Green bar]					
Elliptical Trainer	[Green bar]					NWB				[Green bar]					
Stair stepper	[Green bar]					NWB				[Green bar]					
*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	[Green bar]					NWB				[Green bar]					
Initial-Single Plane	[Green bar]					NWB				[Green bar]					
Advance-Multi Directional	[Green bar]					NWB				[Green bar]					
Functional Sports Test	[Green bar]					NWB				[Green bar]					
High Level Activities:															
Golf Progression	[Green bar]					NWB				[Green bar]					
Outdoor biking, hiking, running	[Green bar]					NWB				[Green bar]					
Return to Full Sport at 6-8 months post-op	[Green bar]					NWB				[Green bar]					

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



Quad Series:

- Quad sets (5 sec hold) also quick contractions (NMES to supplement)
- Prone quad sets
- SLR with no extension leg
- Progression of Quad Strengthening (WB exercises at 6 weeks)
 - LAQ in safe range -no added resistance to begin
 - Once weight bearing tandem stance TKE with 5 sec hold
 - Isometric wall sit
 - SLR with resistance
 - Step up progression
 - Squat progression
 - Leg press progression
 - Lunge progression

Hamstring Series:

- Hamstring stretching (supine/prone)
- Hamstring set (heel dig)- contract hamstring with knee flexed pressing heel into the floor (5 sec hold)
- Hamstring curls
- Progress to resisted hamstring curl

Sport Test Exercises:

- Goals: impact training and introduction of directional drills
- Double leg squat jumps
- Box jumps
- Speed skaters
- Double leg jumps for height and distance progress to single leg as tolerated
- Blaze pod change of direction drills

Further Clarifications and Considerations.

- Double Knee Bends: feet shoulder width apart, bend knees to 30°, keeping knees behind the toes.
- Cord exercises (resistance band/cord): resisted double knee bends, resisted hamstring curls
- May begin to implement BFR as early as 1 week into post-op period



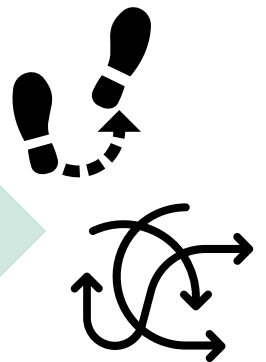
Return to Running Criteria

- Trace effusion, flexion within 5 degrees of contralateral side
- LSI on anterior reach Y balance test $\geq 90\%$
- LSI on quadriceps torque output on isometric measurement $\geq 75\%$
- 12" SL squat tolerance
- Able to walk > 1 mile with no limping or pain
- Able to "hop" with UE assist on operative leg 5 times without pain or compensation
- SL balance with eyes closed 30 seconds without loss of balance



Return to Agility/Change of Direction Criteria

- Return to running criteria listed above met
- No effusion
- Full ROM
- Quad LSI on isokinetic $\geq 85\%$
- Hamstring LSI on isokinetic $\geq 85\%$
- LSI on anterior reach Y-balance $\geq 95\%$
- SL hopping pain-free and effusion free



Return to Sport Criteria

- In order to test must demonstrate full AROM, no pain, no/trace effusion, 5/5 strength, negative lachman and pivot shift, LSI $\geq 95\%$ hamstring curl and leg press
- Quadricep strength $\geq 95\%$ of contralateral side (< 2 cm of atrophy)
- Able to perform single leg squat with correct form
- LSI SL hop $\geq 95\%$
- Y-Balance $\geq 95\%$ (mean of 3 trials in anterior, posterolateral, posteromedial /100)
- Vertical jump test, single leg hop distance, and timed single leg hop over 20 -feet $\geq 90\%$ of contralateral side

