

Rehabilitation Protocol for High Tibial Osteotomy Reconstruction

These guidelines are designed to assist clinicians in managing the post-operative course for High Tibial Osteotomy (HTO) reconstruction. The protocol is both time-based, depending on tissue healing, and criterion-based. Treatment should be individualized based on the patient's needs, exam findings, and clinical judgment. The expected timelines for recovery milestones outlined in this guideline may vary depending on the surgeon's preferences, any additional procedures performed, and the presence of complications. Clinicians seeking guidance on patient progression should consult with the referring surgeon.

The interventions listed are not exhaustive and should be adapted based on the patient's progress and at the discretion of the clinician.

Considerations for Post-operative Care Various factors, including the presence of additional surgical procedures, can influence the outcomes of post-operative high tibial osteotomy rehabilitation. It is recommended that clinicians collaborate closely with the referring physician regarding the rehabilitation protocol.

If the patient experiences a fever, unresolving numbness/tingling, excessive drainage from the incision, uncontrolled pain, or any other concerning symptoms, the referring physician should be contacted immediately.

PHASE I: IMMEDIATE POST-OP (WEEKS 0-6 AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Protect the anatomic repair • Monitor wound healing • Minimize knee effusion • Increase tibial-femoral and patella-femoral mobility • Restore quadriceps control • Gently increase ROM per guidelines - emphasis on extension
<p>Precautions</p>	<ul style="list-style-type: none"> • No active knee extension • No resisted closed chain or open chain until 6 weeks post-op
<p>Weight Bearing</p>	<ul style="list-style-type: none"> • Week 0-4: NWB/ TDWB with brace locked in extension • Week 4-6: TDWB with brace locked in extension progressing to PWB <ul style="list-style-type: none"> ◦ Progress to brace unlocked in PWB if have full extension and good quadriceps control
<p>Brace</p>	<ul style="list-style-type: none"> • Hinged knee brace locked in 0 degrees extension for all mobility and gait until at least 4 weeks post-op, full knee extension achieved and good quad control. • Brace may be unlocked when sitting or in bed
<p>Interventions</p>	<p><i>Range of Motion</i></p> <ul style="list-style-type: none"> • Knee AAROM/PROM - Passive extension only <ul style="list-style-type: none"> ◦ Week 0-4: 0-90 degrees ◦ Week 4-6: 0-120 degrees ◦ Prone hangs, supine knee extension with heel prop, heel slides with PROM for knee extension, knee flexion in sitting with P/AAROM for knee extension <p><i>Strengthening</i></p> <ul style="list-style-type: none"> • Quad sets • Gluteal sets

PHASE I: IMMEDIATE POST-OP

(WEEKS 0-6 AFTER SURGERY) CONTINUED

<p>Interventions</p>	<ul style="list-style-type: none"> • Ankle pumps • Side-lying hip ABD - with brace until elimination of quad lag • Prone Hip Extension - with brace until elimination of quad lag • SLR - per MD recommendation, depending on surgical approach, may be inappropriate <ul style="list-style-type: none"> ◦ Perform with brace locked in extension, D/C brace when performed without a lag • Side-lying Hip Adduction - with brace until elimination of quad lag • Clam shell • Hamstring stretch • ITB stretch • Gastroc-soleus stretch • Bike - No resistance <p><i>Aquatic therapy - if available</i></p> <ul style="list-style-type: none"> • Deep water (chest/shoulder height) - walking and ROM exercises <ul style="list-style-type: none"> ◦ Core stability and UE exercises <p><i>Manual Therapy</i></p> <ul style="list-style-type: none"> • Patella mobilizations - immediately post-op • Gentle STM - 2-3 weeks post-op <p><i>Modalities</i></p> <ul style="list-style-type: none"> • NMES for quadriceps re-education/biofeedback. • Cryotherapy for swelling and pain management. • Taping - pain and swelling management.
<p>Criteria to Progress</p>	<ul style="list-style-type: none"> • Knee PROM: 0-120 degrees • Adequate pain control • Minimal swelling • Able to perform SLR without quadriceps lag

PHASE II: PROTECTION PHASE

(WEEKS 7 - 12 AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Increase mobility • Restore quadriceps control • Restoration of full ROM by week 8-12 • Progress weight bearing • Normalize gait pattern without assistive device - goal of 2 miles at 15min/mile pace on a treadmill • Gradual progression of therapeutic exercises for strengthening, stretching and balance
<p>Precautions</p>	<ul style="list-style-type: none"> • No weight bearing stretching into knee flexion until week 8 • Avoid descending stairs reciprocally until adequate quadriceps control as demonstrated by SLR • Avoid exercises/activities with excessive patella-femoral compression forces (deep squats, resisted open chain terminal knee extension) • Avoid medial collapse due strengthening and functional activities • No running, jumping or plyometrics until 4-6 months post-surgery • Do not overload the surgical site • Modify activity level if increased pain, edema or catching occurs
<p>Weight Bearing</p>	<ul style="list-style-type: none"> • WBAT per MD, based on X-ray
<p>Brace</p>	<ul style="list-style-type: none"> • Brace unlocked for ambulation if there is good quad control, crutches as needed • Hinge brace until week 8 then replace with patellofemoral brace with lateral buttress

PHASE II: PROTECTION PHASE
(WEEKS 7 - 12 AFTER SURGERY)

<p>Additional Interventions *Continue with Phase I interventions as needed</p>	<p><i>Modalities</i></p> <ul style="list-style-type: none"> • NMES for quadriceps re-education - as needed • Cryotherapy for edema and pain management <p><i>Manual Therapy</i></p> <ul style="list-style-type: none"> • Patella mobilizations • Soft tissue mobilization <p><i>Range of Motion</i></p> <ul style="list-style-type: none"> • Progress PROM/AAROM/AROM of knee as tolerated <p><i>Stretching</i></p> <ul style="list-style-type: none"> • Hamstring • Gastroc -Soleus • Prone Quadriceps with strap <p><i>Strengthening</i></p> <ul style="list-style-type: none"> • TKE - 0-40 degrees • Leg press • Partial range wall squats <ul style="list-style-type: none"> o 0-45 degrees • Forward step ups, Lateral step ups • Forward, Lateral, Retro step downs • Bridge with physioball • Romanian Deadlifts - Week 7 <ul style="list-style-type: none"> o Standing upright to weight just below knees. • Band walks - Week 8 • Stool walks - Week 8 • BOSU Partial squat - Week 9 <ul style="list-style-type: none"> o 0-60 degrees • Prone Hamstring curl - 10 weeks <ul style="list-style-type: none"> o Begin with ankle weights and progress to weight machine <p><i>Cardiovascular Exercise</i></p> <ul style="list-style-type: none"> • Stationary Bike - light resistance • Treadmill - forward and backwards • Elliptical - week 9-10 <p><i>Aquatic Therapy</i></p> <ul style="list-style-type: none"> • Flutter kicks • Straight leg scissor kicks • Running in waist deep water <p><i>Balance</i></p> <ul style="list-style-type: none"> • Progress from double to single leg balance • Progress from static to dynamic: <ul style="list-style-type: none"> o BAPS o Ball toss o Body blade o Fitter o Slide board
<p>Criteria to Progress</p>	<ul style="list-style-type: none"> • Full range of motion • Elimination of swelling • Restoration of normal gait • Quad strength > 70% of uninvolved leg

For further assistance or to schedule an appointment, please contact **iOrtho - The Orthopedic Institute** at **833-464-6784** or visit our website at **iorthomd.com** to text/email us. Our team is dedicated to providing personalized care and guidance throughout your rehabilitation journey.

PHASE III: ADVANCED STRENGTHENING
(WEEKS 13-16 AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Normal tibial-femoral and patella-femoral mobility • Restoration of quadriceps control • Progress muscle strength, endurance, and balance activities
<p>Precautions</p>	<ul style="list-style-type: none"> • No running, jumping or plyometrics till 4-6 months post-op • May continue with patellofemoral hinged brace until 12 months post-op for lighter level activities - Based on MD recommendation.
<p>Additional Interventions *Continue with Phase I-II Interventions</p>	<p><i>Strengthening</i></p> <ul style="list-style-type: none"> • Total leg strengthening • Single leg strengthening • Hamstring isotonic exercises through full ROM • Quadriceps isotonic exercises <p><i>Proprioception</i></p> <ul style="list-style-type: none"> • Single leg balance <ul style="list-style-type: none"> ◦ Stable and unstable surfaces • Single leg balance with leg swings • Single leg balance with ball toss • Single leg balance with UE perturbations <p><i>Cardiovascular Exercise</i></p> <ul style="list-style-type: none"> • Bike, elliptical • Treadmill walking
<p>Criteria to Progress</p>	<ul style="list-style-type: none"> • No running, jumping or plyometrics till 4-6 months post-op • May continue with patellofemoral hinged brace until 12 months post-op for lighter level activities - Based on MD recommendation.

PHASE IV: EARLY RETURN TO SPORT PHASE
(16+ WEEKS AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Progress to higher level activities - based on functional demands and MD approval • Return to vocational, recreational and/or sport activities. • Run 2 miles at easy pace - if appropriate
<p>Additional Intervention *Continue with Phase III interventions</p>	<p><i>Running: begin at 4 months</i></p> <ul style="list-style-type: none"> • Start with light gentle slow-paced running • Treadmill running <ul style="list-style-type: none"> ◦ Must demonstrate good running form for 5 minutes with equal audibly rhythmic foot strike. • Aquatic running • Backwards and forward running • Initiate Return to running protocol <p><i>Plyometrics: 4.5 -to 5 months</i></p> <ul style="list-style-type: none"> • Start with double leg drills • Progress slowly to single leg drills • Ensure good form and proper hip and knee alignment <p><i>Agility Drills: 4.5 to 5 months</i></p> <ul style="list-style-type: none"> • Sub-max foot placement drills • Ladder drills • Line hops
<p>Criteria to Progress</p>	<p><i>Return to sport/play: 7 to 9 months</i></p> <ul style="list-style-type: none"> • Quad and hamstring strength 90% of uninvolved • Full symmetrical knee range of motion • No knee joint effusion • Single leg hop test: Limb symmetry of 90% • Triple hop test: limb symmetry of 90% • Cross-over hop test: limb symmetry of 90% • Refer to lower extremity functional assessment