



**Bradley Smith, MD**  
**5316 S. Woodrow St. #200**  
**Murray, UT 84107**  
 Office: (801) 747-1020  
 Fax: (801) 747-1023



## Rehabilitation Protocol for Tibial Tubercle Osteotomy

### PHASE I: *Immediate Postoperative Phase (0-6 WEEKS AFTER SURGERY)*

<b>Rehabilitation Goals</b>	<ul style="list-style-type: none"> <li>● Protect the anatomic repair</li> <li>● Monitor wound healing</li> <li>● Minimize knee effusion</li> <li>● Increase tibial-femoral and patella-femoral mobility</li> <li>● Restore quadriceps control</li> <li>● Gently increase ROM per guidelines – emphasis on extension</li> </ul>
<b>Weight-bearing</b>	<ul style="list-style-type: none"> <li>● NWB/TDWB with brace locking in extension</li> </ul>
<b>Brace</b>	<ul style="list-style-type: none"> <li>● 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.</li> <li>● Brace may be unlocked when sitting or in bed</li> </ul>
<b>Precautions</b>	<ul style="list-style-type: none"> <li>● <b>No active knee extension</b></li> <li>● <b>No resisted closed chain or open chain until 6 weeks post-op</b></li> </ul>
<b>Intervention</b>	<p><i>Range of Motion</i></p> <ul style="list-style-type: none"> <li>● Knee AAROM/PROM – <b>Passive extension only</b> <ul style="list-style-type: none"> <li>○ 0-90 degrees</li> <li>○ 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</li> </ul> </li> </ul> <p><i>Strengthening</i></p> <ul style="list-style-type: none"> <li>● Quad sets, co-contraction, ankle pumps</li> <li>● 2 weeks: Begin floor based core, hip, and glutes work</li> </ul> <p><i>Manual Therapy</i></p> <ul style="list-style-type: none"> <li>● Patella mobilizations – immediately post-op</li> <li>● Gentle STM – 2-3 weeks post-op</li> </ul> <p><i>Modalities</i></p> <ul style="list-style-type: none"> <li>● NMES for quadriceps re-education/biofeedback.</li> <li>● Cryotherapy for swelling and pain management.</li> <li>● Taping – pain and swelling management</li> </ul>
<b>Criteria to Progress</b>	<ul style="list-style-type: none"> <li>● Knee PROM: 0-90 degrees</li> <li>● Adequate pain control</li> <li>● Minimal swelling</li> <li>● Able to perform SLR without quadriceps lag</li> </ul>

**PHASE II: Protection Phase (6-12 WEEKS AFTER SURGERY)**

<p><b>Rehabilitation Goals</b></p>	<ul style="list-style-type: none"> <li>● Increase mobility</li> <li>● Restore quadriceps control</li> <li>● Restoration of full ROM by week 8-12</li> <li>● Progress weight bearing</li> <li>● Normalize gait pattern without assistive device</li> <li>● Gradual progression of therapeutic exercises for strengthening, stretching and balance</li> </ul>
<p><b>Weight-bearing</b></p>	<ul style="list-style-type: none"> <li>● Progress to PWB weeks 6-8             <ul style="list-style-type: none"> <li>○ 25% then 50%</li> </ul> </li> <li>● WBAT after week 8</li> </ul>
<p><b>Brace</b></p>	<ul style="list-style-type: none"> <li>● Brace unlocked for ambulation if there is good quad control, crutches as needed</li> <li>● Hinge brace until week 8 then replace with patellofemoral brace with lateral buttress</li> </ul>
<p><b>Precautions</b></p>	<ul style="list-style-type: none"> <li>● <b>No weight bearing stretching into knee flexion until week 8</b></li> <li>● <b>Avoid descending stairs reciprocally until adequate quadriceps control as demonstrated by SLR</b></li> <li>● <b>Avoid exercises/activities with excessive patellofemoral compression forces (deep squats, resisted open chain terminal knee extension)</b></li> <li>● <b>Avoid medial collapse due strengthening and functional activities</b></li> <li>● <b>No running, jumping or plyometrics until 4-6 months post-surgery</b></li> <li>● <b>Do not overload the surgical site</b></li> <li>● <b>Modify activity level if increased pain, edema or catching occurs</b></li> </ul>
<p><b>Intervention</b> -Continue with Phase I interventions as needed</p>	<p><i>Modalities</i></p> <ul style="list-style-type: none"> <li>● NMES for quadriceps re-education – as needed</li> <li>● Cryotherapy for edema and pain management Manual Therapy</li> <li>● Patella mobilizations</li> <li>● Soft tissue mobilization</li> </ul> <p><i>Range of Motion</i></p> <ul style="list-style-type: none"> <li>● Progress PROM/AAROM/AROM of knee as tolerated</li> </ul> <p><i>Stretching</i></p> <ul style="list-style-type: none"> <li>● Hamstring</li> <li>● Gastroc-Soleus</li> <li>● Prone Quadriceps with strap</li> </ul> <p><i>Strengthening</i></p> <ul style="list-style-type: none"> <li>● TKE – 0-40 degrees</li> <li>● Leg press</li> <li>● Partial range wall squats             <ul style="list-style-type: none"> <li>○ 0-45 degrees</li> </ul> </li> <li>● Forward step ups, Lateral step ups</li> <li>● Forward, Lateral, Retro step downs</li> <li>● Bridge with physioball</li> <li>● Romanian Deadlifts – Week 8             <ul style="list-style-type: none"> <li>○ Standing upright to weight just below knees.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>● Band walks – Week 8</li> <li>● Stool walks – Week 8</li> <li>● BOSU Partial squat – Week 9 <ul style="list-style-type: none"> <li>○ 0-60 degrees</li> </ul> </li> <li>● Prone Hamstring curl – 10 weeks <ul style="list-style-type: none"> <li>○ Begin with ankle weights and progress to weight machine</li> </ul> </li> </ul> <p><i>Cardiovascular Exercise</i></p> <ul style="list-style-type: none"> <li>● Stationary Bike – light resistance</li> <li>● Treadmill – week 8, forward and backwards</li> <li>● Elliptical – week 9-10</li> </ul> <p><i>Aquatic Therapy (if available)</i></p> <ul style="list-style-type: none"> <li>● Flutter kicks</li> <li>● Straight leg scissor kicks</li> <li>● Running in waist deep water</li> </ul> <p><i>Balance - week 8</i></p> <ul style="list-style-type: none"> <li>● Progress from double to single leg balance</li> <li>● Progress from static to dynamic: <ul style="list-style-type: none"> <li>○ BAPS</li> <li>○ Ball toss</li> <li>○ Body blade</li> <li>○ Fitter</li> <li>○ Slide board</li> </ul> </li> </ul>
<b>Criteria to Progress</b>	<ul style="list-style-type: none"> <li>● Full range of motion</li> <li>● Elimination of swelling</li> <li>● Restoration of normal gait</li> <li>● Quad strength &gt; 70% of uninvolved leg</li> </ul>

### PHASE III: *Advanced Strengthening (12-16 WEEKS AFTER SURGERY)*

<b>Rehabilitation Goals</b>	<ul style="list-style-type: none"> <li>● Normal tibial-femoral and patella-femoral mobility</li> <li>● Restoration of quadriceps control</li> <li>● Progress muscle strength, endurance, and balance activities</li> </ul>
<b>Precautions</b>	<ul style="list-style-type: none"> <li>● No running, jumping or plyometrics till 4-6 months post-op</li> <li>● May continue with patellofemoral hinged brace until 12 months post-op for lighter level activities</li> </ul>
<b>Intervention</b> <i>-Continue with Phase I-II interventions</i>	<p><i>Strengthening</i></p> <ul style="list-style-type: none"> <li>● Total leg strengthening</li> <li>● Single leg strengthening</li> <li>● Hamstring isotonic exercises through full ROM</li> <li>● Quadriceps isotonic exercises</li> </ul> <p><i>Proprioception</i></p> <ul style="list-style-type: none"> <li>● Single leg balance</li> </ul>

	<ul style="list-style-type: none"> <li>○ Stable and unstable surfaces</li> <li>● Single leg balance with leg swings</li> <li>● Single leg balance with ball toss</li> <li>● Single leg balance with UE perturbations</li> </ul> <p><i>Cardiovascular Exercise</i></p> <ul style="list-style-type: none"> <li>● Bike, elliptical</li> <li>● Treadmill walking</li> </ul>
<b>Criteria to Progress</b>	<ul style="list-style-type: none"> <li>● Full, symmetrical pain-free ROM</li> <li>● Strength: 80%+ of uninvolved leg</li> <li>● Satisfactory clinical exam</li> </ul>

#### **PHASE IV: Early Return to Sport Phase (16+ WEEKS AFTER SURGERY)**

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

Protocol adapted from Mass General Sports Medicine Physical Therapy Rehabilitation Protocols. See <https://www.massgeneral.org/orthopaedics/sports-medicine/physical-therapy/sports-rehab-protocols>