

## Rehabilitation Protocol for Total Knee Arthroplasty

The intent of this physical therapy protocol is to provide the clinician with a guideline of the post-operative rehabilitation course of a patient who has undergone a total knee arthroplasty (TKA) with Ortho Rhode Island. It is by no means intended to be a substitute for one's clinical decision making regarding the progression of a patient's postoperative course based on their physical exam/findings, individual progress, and/or the presence of post-operative complications. If a clinician requires assistance in the progression of a post-operative patient, the clinician should consult with the referring surgeon.

### Phase 1: Immediate Phase (Day 0 – 3)

<b>Rehabilitation Goals</b>	<ul style="list-style-type: none"> <li>• Enable patient to perform bed/chair/toilet/commode transfers as independently as possible</li> <li>• Instruct patient on proper use of walker or crutches for ambulation and stair management</li> <li>• Decrease inflammation, swelling, and pain</li> <li>• Initiate home exercise program with emphasis on increasing ROM</li> </ul>
<b>Interventions</b>	<ul style="list-style-type: none"> <li>• Modalities- RICE protocol</li> <li>• Gentle soft tissue mobilization, avoid incision until fully healed (quad/hamstring)</li> <li>• Therex- Ankle pumps, glut set, quad set, heel prop LLLD stretch (3-5 min), heel slides, seated flx/ext AAROM, heel/toe raise, bed mobility/transfers</li> <li>• NMES- Biphasic/Russian up to twice daily for up to 6 weeks (consider home unit)</li> <li>• Gait training- bend and kick, heel to toe, step through regardless of AD</li> <li>• Balance- weight shifts, narrow stance, tandem stance</li> <li>• Stair training- step to pattern, affected LE supported with AD/railing</li> </ul>
<b>Criteria to Progress</b>	<ul style="list-style-type: none"> <li>• Involved knee flexion ROM <math>\geq</math> 80 degrees, knee extension <math>&lt; / =</math> -10 degrees</li> <li>• Independent/safe bed mobility transfers with least restrictive assistive device</li> <li>• Pt ambulating with least restrictive AD with min antalgic gait/limp</li> </ul>

### Phase 2: Early Rehab (Day 3 – 2 Weeks)

<b>Rehabilitation Goals</b>	<ul style="list-style-type: none"> <li>• Protect healing joint and prosthesis stabilization</li> <li>• Pain and edema control</li> <li>• Screen for/rule out DVT and infection</li> <li>• Emphasize achieving full knee extension in supine and in stance phase of gait</li> <li>• Ambulate independently with least restrictive assistive device</li> <li>• Modified Independence with all ADLs</li> <li>• Progress ROM to a minimum of 0-110 degrees (~10 degrees flx/week)</li> <li>• Mobilize patella</li> </ul>
<b>Red/Yellow Flags</b>	<ul style="list-style-type: none"> <li>• Contact Doctor immediately if concerned about infection or DVT</li> <li>• Emphasize consistent education regarding pain/stiffness expectations and lengthy TKA recovery</li> <li>• Emphasize importance of TKE during stance phase of gait</li> </ul>
<b>Interventions</b>	<p>Modalities: Heat/Ice as needed, STM, patellar/scar mobilizations (teach self), NMES daily</p> <p><b>Gait/Balance:</b></p> <ul style="list-style-type: none"> <li>• Circle/cone/hurdle walking, sled push (bend and extend), side stepping, turning</li> <li>• Tandem walk, SLS, foam beams, foam pads, SL RDL</li> </ul> <p><b>Therex:</b></p> <ul style="list-style-type: none"> <li>• Stationary bike for ROM, beginning with partial revolutions (no resistance)</li> <li>• Manual OP as indicated to achieve TKE and flex ROM benchmarks</li> <li>• Quad set towel under heel, TKE strap stretch, TKE ball wall</li> <li>• Hamstring stretch supine strap&gt;seated, wall heel slides&gt;foot on step stretch, gastroc/soleus stretch</li> <li>• SAQ/LAQ, hamstring curl prone/standing, hip AROM on table or standing</li> <li>• Mini squat, step up forward and lateral</li> </ul>
<b>Criteria to Progress</b>	<ul style="list-style-type: none"> <li>• ROM 0-100 degrees</li> <li>• <math>\geq</math> 3+/5 quad/hamstring (pt should be able to demonstrate good LAQ/hamstring curl at this point)</li> <li>• Discharged AD, good gait pattern</li> <li>• Minimal-Mod pain at most with functional activities/PT interventions</li> </ul>



Phase 3: Mid Stage Rehab (Week 2 – Week 6)	
<b>Rehabilitation Goals</b>	<ul style="list-style-type: none"> <li>• Pain and edema control</li> <li>• Knee ext WNL</li> <li>• Knee flexion within 90% of contralateral limb (110-130 degrees)</li> <li>• Normalize gait pattern w/o AD</li> <li>• Progress functional movement patterns</li> <li>• Independent with all ADLs</li> </ul>
<b>Red/Yellow Flags</b>	<ul style="list-style-type: none"> <li>• If pt is not making expected ROM progress (~110 degrees by 6 weeks), initiate discussion with pt or MD prior to their 6-week follow up.</li> </ul>
<b>Interventions</b> <i>Cont. all exercises from previous phase as necessary</i>	<p>Modalities: d/c or decrease frequency</p> <p><b>Therex:</b></p> <ul style="list-style-type: none"> <li>• Full revs on stationary bike, prone quad stretch, kneeling flexion stretch, seated figure 4 stretch</li> <li>• Band assisted/resisted TKE in standing, combined TKE strap and ball stretch</li> <li>• Sit to stand&gt;squat&gt;wall sit, lat heel tap&gt;ant heel tap, ¼ split squat&gt;retro slider lunge&gt;split squat</li> <li>• Hip hinge, RDL, dead lift from box</li> <li>• Band resisted hip exercises (march, bridge, clamshell, sidestep)</li> <li>• Machine resisted strengthening quad/hamstring, multi-hip, leg press</li> </ul> <p><b>Gait/Balance/Stability</b></p> <ul style="list-style-type: none"> <li>• Foam beam- tandem walking, hurdle walking lateral, hurdle walking forward, cone taps</li> <li>• Foam pad- SL RDL, 3-way hip</li> <li>• Bosu ball- BL balance, mini squat</li> </ul>
<b>Criteria to Progress</b>	<ul style="list-style-type: none"> <li>• Flexion ROM&gt;/= 90% contralateral limb</li> <li>• Quad/hamstring strength&gt;/= 4-/5 (~60% LSI)</li> <li>• No gait deviations</li> <li>• Min difficulty/pain with ADLs (including stairs)</li> <li>• TUG and 30s STS ~80% of age predicted norms</li> </ul>

Phase 4: Late Stage Rehab (Week 6 – Week 12)	
<b>Rehabilitation Goals</b>	<ul style="list-style-type: none"> <li>• Maximize muscular performance</li> <li>• Maximize functional performance of ADLs</li> <li>• Return to work related tasks if applicable</li> <li>• Return to recreational activities if applicable (prepare for impact activities at ~12 weeks)</li> <li>• Decrease frequency of PT while maintaining progress, emphasize self-management</li> </ul>
<b>D/c Planning</b>	<ul style="list-style-type: none"> <li>• <b>Pending progress and pt confidence, d/c to self-management appropriate in this phase</b></li> </ul>
<b>Interventions</b>	<p>Modalities- consider dry needling if soft tissue restrictions persist</p> <p><b>Therex:</b></p> <ul style="list-style-type: none"> <li>• Elliptical/aerodyne/treadmill walking/aquatic program</li> <li>• 4-way slider lunge&gt;curtsy step up&gt;4-way lunge&gt;RFE split squat&gt;4-way heel tap</li> <li>• Single leg squat to box&gt;shrimp squat&gt;unsupported single leg squat</li> <li>• Ball bridge- BL straight leg, BL hamstring curl, single leg eccentric, single leg full</li> <li>• Dead lift from ground, lift and carry, chaos carry, waiter's carry</li> <li>• Front plank, side plank, adductor side plank</li> <li>• Walking dynamic stretching</li> </ul> <p><b>Stability/Speed prep:</b></p> <ul style="list-style-type: none"> <li>• Non-impact plyometrics- shuttle kick back (slow&gt;fast), med ball slam to mini squat (BL/UL), Split squat med ball slam, SL RDL row (slow&gt;fast), SL RDL med ball throw</li> <li>• Dynamic stability- bosu lunge (forward/lateral), bosu med ball catch and pass, bosu med ball slams, bosu SL RDL, foam beam med ball slams, SLS unstable surface catch and pass</li> </ul>
<b>Criteria to Progress</b>	<ul style="list-style-type: none"> <li>• Quad/hamstring strength&gt;/= 4+/5 (~80% LSI)</li> <li>• Flexion ROM WNL/Maximized and functional</li> <li>• TUG and 30s STS ~90% of age predicted norms</li> <li>• No difficulty with ADLs/work tasks</li> <li>• Discharge majority of patients to self-management</li> </ul>

### Phase 5: Advanced Rehab (Week 12+)

<p><b>Rehabilitation Goals</b></p>	<ul style="list-style-type: none"> <li>• Return to appropriate recreational sports/activities as indicated</li> <li>• Enhance strength, endurance and proprioception as needed for ADLs, work tasks and recreational activities</li> </ul>
<p><b>Interventions</b></p>	<ul style="list-style-type: none"> <li>• Patients considering plyometrics with the intent to resume running should consult with their physician and be objectively assessed for return to sport readiness</li> <li>• Criteria to initiate impact activities             <ul style="list-style-type: none"> <li>• Full and functional pain free ROM</li> <li>• &gt;/=90% LSI via dynamometry</li> <li>• 10x pistol squats*/shrimp squats*/forward heel taps from 8-inch box* without hip compensatory pattern                 <ul style="list-style-type: none"> <li>• -60 degrees of knee flexion during testing*</li> </ul> </li> </ul> </li> <li>• Initiate with PWB- band assisted or shuttle BL jumps (assess landing mechanics) straight plane&gt;AP/ML, scissor hops&gt;SL jumps straight plane&gt;SL jumps AP/ML</li> <li>• Initiate FWB- box jumps up&gt;box jumps down&gt;lateral box jumps up&gt;lateral box jumps down, step down knee to foam roller&gt;box jump up 2 to 1&gt;box jump down 2 to 1, single leg box jumps up&gt;down.</li> <li>• Progress FWB- in place jumps with reset&gt;reactive&gt;line jumps AP&gt;line jumps ML&gt;scissor hops&gt;single leg jumps in place&gt;AP&gt;ML, jogging in place&gt;jog in place land on one leg, jogging forward&gt;skipping&gt;high skipping&gt;broad jump&gt;lateral bound&gt;diagonal bound&gt;forward single leg bound</li> <li>• Once pt has demonstrated tolerance to 200-250 foot contacts without reactive effusion, may initiate return to running protocol</li> </ul> <p><b>Return to racket sport/golf/swimming-</b></p> <ul style="list-style-type: none"> <li>• Consider interval return to sport protocol</li> </ul>
<p><b>Functional Tests for Discharge</b></p>	<ul style="list-style-type: none"> <li>• Return to sport testing             <ul style="list-style-type: none"> <li>• 90-100% quad/hamstring LSI</li> <li>• Hop testing 90-100% contralateral limb</li> </ul> </li> </ul>