

Total Knee Arthroplasty Protocol

Prehabilitation	Post-op Week 1-3
Initial Evaluation	Initial Evaluation
<ul style="list-style-type: none"> ➤ History of knee OA conservative management / PMH ➤ History of functional / recreational activity level ➤ Social/occupational history (i.e. post-op support) ➤ Pain assessment ➤ Observation / Alignment ➤ Range of motion (knee, ankle, hip) ➤ Strength (quad, HS, glutes, gastroc, core, UE) ➤ Balance / Proprioception ➤ Gait / mobility (consider TUG, BERG for fall risk) 	<ul style="list-style-type: none"> ➤ History of injury/ Premorbid activity level ➤ Range of motion ➤ Patella mobility ➤ Swelling/ Wound integrity ➤ Inspect for infection/signs of DVT ➤ Strength/Quad Recruitment ➤ Gait / mobility ➤ Assess functional expectations and/or RTW
Patient Education	Patient Education
<ul style="list-style-type: none"> ➤ Review benefits of Prehab exercise program prior to surgery (i.e. potential shorter length of hospital stay, more likely to d/c to home) ➤ Discuss frequency and duration of prescribed exercise program (i.e. minimally 3-4 x/wk, 6-8 wks prior DOS) ➤ Emphasis on joint protection and symptom management during/after exercise ➤ Address questions re: post-operative care/ recovery 	<ul style="list-style-type: none"> ➤ Compliance with post-op precautions ➤ Discuss frequency of treatment (2-3x/wk.) ➤ Review HEP to include: SAQ, Clamshells, Squats, Ankle Pumps ➤ Orient to pool program if appropriate
Therapeutic Exercise	Therapeutic Exercise
<ul style="list-style-type: none"> ➤ Low impact aerobic exercise (i.e. Nu-step, Bike, Walking program) ➤ Flexibility exercises (i.e. hip flexors, quads, HS, calf) ➤ Strengthening exercises (quad, HS, glutes, calf, triceps, lats), trunk stabilization exercises ➤ Balance training (i.e. SLS, airex, BOSU) 	<ul style="list-style-type: none"> ➤ Begin recumbent bike/nu-step at 2 weeks ➤ Initiate isotonic exercise(use NMES if needed) including multi hip, leg press, leg extension, heel raises, and hamstring curl ➤ Begin closed chain exercises to include: sit to stands, multidirectional stepping, marching
Gait Activities	Gait Activities
<ul style="list-style-type: none"> ➤ Consider recommendation of AD for gait pattern and symptom management 	<ul style="list-style-type: none"> ➤ Reinforce use of appropriate assistive device with normal gait pattern
Aquatics	Manual Techniques
<ul style="list-style-type: none"> ➤ Gait: Walking forward/backward/sideways ➤ Shallow end: Open chain (i.e. marching, HS curls) and closed chain (mini-squats, step ups) LE exercise ➤ Deep end: Open chain (i.e. bicycles), aerobic exercise 	<ul style="list-style-type: none"> ➤ PROM/ AAROM knee flexion and extension ➤ Stretch hip flexors, ITB as needed ➤ Gentle joint mobilization to encourage normal knee arthrokinematics
Goals	Aquatics
<ul style="list-style-type: none"> ➤ Individualized prescription of Prehab exercise program and pre-operative patient education 	<ul style="list-style-type: none"> ➤ Initiate at 2 weeks, Tegaderm use per clinician discretion ➤ Gait: Walking fwd/backward/sideways ➤ Shallow end: Open chain (i.e. marching, HS curls), closed chain (mini-squats, step ups, stairs lunges) LE exercise ➤ Deep end: Open chain (i.e. bicycles), consider focus on duration versus repetitions
	Goals
	<ul style="list-style-type: none"> ➤ Range of motion 0° extension to 100° flexion ➤ Independent ambulation with assistive device ➤ Minimize swelling and pain ➤ Independent with post-op TKA precautions ➤ Fair+ quad recruitment

Week 4-6	Week 6-Discharge
Evaluate	Evaluate
<ul style="list-style-type: none"> ➤ Range of Motion ➤ Signs of infection or DVT ➤ Gait pattern/ assistive device use ➤ Strength/Quad Recruitment ➤ Balance ➤ Functional activities 	<ul style="list-style-type: none"> ➤ Gait pattern and assistive device use ➤ ROM ➤ Balance ➤ Strength ➤ Incision mobility ➤ Assess foot/ankle for biomechanical optimization
Patient Education	Patient Education
<ul style="list-style-type: none"> ➤ Progression of HEP to include 15-30 min of walking 	<ul style="list-style-type: none"> ➤ Continue progression of HEP up to 30 minutes of walking, elliptical, swimming with discussion of continued independent fitness program
Therapeutic Exercise	Therapeutic Exercise
<ul style="list-style-type: none"> ➤ Continue stretching program ➤ Advance isotonic to include single leg with focus on eccentric quad control (NMES if needed) ➤ Advance closed chain strengthening exercises: Step ups F/L/D, lunging ➤ Advance balance/ proprioception activities to include: S.L Balance, Teeter Board, Wall slides to 90, Stability ball supine hip extensions 	<ul style="list-style-type: none"> ➤ Advance to higher level strengthening exercises: Single Leg Isotonic Exercises with Eccentric focus. ➤ CKC: Step F/L/D, multi-directional lunging, wall slides with 5-10 second holds at 90. ➤ Stability Ball: Hip Extension with knee flexion. ➤ Agility: Side Shuffle, Braiding, Backward Walking
Gait Activities	Gait Training Activities
<ul style="list-style-type: none"> ➤ Gait training with least restrictive or no device 	<ul style="list-style-type: none"> ➤ Uneven surfaces ➤ Stairs: Reciprocal pattern with least restrictive device
Manual Techniques	
<ul style="list-style-type: none"> ➤ Continue PROM to assist in achieving full flexion and extension of knee 	
Aquatics	Aquatics
<ul style="list-style-type: none"> ➤ Progress to dynamic gait exercise (i.e. walking with marching and clap behind back, side-step squats) ➤ Shallow end: Progress open chain (i.e. 4 count kick) and closed chain (i.e. mini-squats on first step, static lunges) LE exercise ➤ Deep end: Continue with open chain exercise ➤ Balance: Initiate SLS balance ➤ Utilize Hydrocuffs for increasing flexibility ➤ Consider manual therapy techniques after aquatic exercise to maximize flexibility 	<ul style="list-style-type: none"> ➤ Continue dynamic gait exercise ➤ Shallow end: Continue progression of open chain and closed chain LE exercise ➤ Deep end: Continue with open chain exercise and add closed chain exercise (i.e. SKTC with kickboard) ➤ Balance: Progress SLS balance, add dynamic UE movement patterns ➤ Utilize fins for progressing resistance training ➤ Consider manual therapy techniques after aquatic exercise to maximize flexibility
Goals	Goals
<ul style="list-style-type: none"> ➤ Range of motion 0° extension to 120° ➤ Independent ambulation with least restrictive assistive device including stairs ➤ Knee strength 4/5, Good Quad Recruitment ➤ Normal incision mobility and hypersensitivity ➤ Minimal effusion 	<ul style="list-style-type: none"> ➤ Range of motion 0° to 120-130° ➤ Knee and hip strength 5-/5 ➤ Good quadriceps recruitment ➤ Normal gait on all surfaces ➤ Independent with advanced home exercise program ➤ Return to work/ recreational activities

References

- Stevens, J., Balter, J., Wolfe, P., Eckoff, D., Schwartz, R., Schenkman, M., Kohrt, W. (2012). Relationship Between Intensity of Quadriceps Muscle Neuromuscular Electrical Stimulation and Strength Recovery After Total Knee Arthroplasty, *Phys Ther* 92 (2), 1187-1196 PubMed
- Bade, M., Stevens-Lapsley, J. (2011). Early High-Intensity Rehabilitation Following Total Knee Arthroplasty Improves Outcomes. *JOSPT*. 41(12), 932-41 PubMed
- Villalta, E.M, Peiris, C., (2013). Early Aquatic Physical Therapy Improves Function and Does Not Increase Risk of Wound-Related Adverse Events for Adults After Orthopedic Surgery: A Systematic Review and Meta-Analysis. *Arch Phys Med Rehabil*. 94(1):138-48. PubMed
- McAvoy, R. (2009). Aquatic and Land Based Therapy vs. Land Therapy on the Outcome of Total Knee Arthroplasty: A Pilot Randomized Clinical Trial. *Journ of Aqua Phys Ther*, 17(1), 8-15.
- Goerhring, M., Bergmooswer, A., Decker, K., Mason, N., Kinne, B. (2015). Systematic Literature Review: The Effectiveness of Aquatic Therapy Following Total Hip or Total Knee Arthroplasty: A Systematic Review. *The Journal of Aquatic Physical Therapy*, 23(2) 2-10.
- Wilkins, B. (2017). The Effectiveness of Aquatic Therapy Following Total Hip or Total Knee Arthroplasty: A Systematic Literature Review. *Aqualines*, 29(2), 15-21.
- Calatayud, J. Casaña, J. Ezzatvar, Y. Jakobsen, M., Sundstrup, E., Andersen, L. (2017). High-Intensity Preoperative Training Improves Physical and Functional Recovery in the Early Post-Operative Periods after Total Knee Arthroplasty: A Randomized Controlled Trial. *Knee Surg Sports Traumatol Arthrosc*, 25, 2864–2872.
- Desmeules, F. Hall, J. Woodhouse, L.J. (2013). Prehabilitation Improves Physical Function of Individuals with Severe Disability from Hip or Knee Osteoarthritis. *Physiotherapy Canada* 2013; 65(2):116–124.
- Rooks, D.S., Huang, J. Bierbaum, B.E., Bolus, S.A., Rubano, J., Connolly, C.E., Alpert, S., Iversen, M.D., Katz, J.N. (2006). Effect of Preoperative Exercise on Measures of Functional Status in Men and Women Undergoing Total Hip and Knee Arthroplasty. *Arthritis and Rheumatism (Arthritis Care & Research)*, 55(5), 700-708.

Created 1/15/14, updated 10/3/2018