



Total Knee Arthroplasty

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GENERAL PRINCIPLES

Physical Therapy Guidelines for Uni-compartmental and Tri-compartmental Knee arthroplasty rehabilitation using [AlterG Anti-Gravity Treadmill®](#). This document will serve as a general guideline for Physical Therapy. It should be noted that this protocol gives general guidelines for progression of therapies after TKA. It does not substitute for professional and clinical judgement of trained and licensed health care professionals.

Physical Therapy prerequisites for excellent outcomes from joint arthroplasty surgery:

- Early patellar mobilization and knee range of motion will maximize function and minimize ROM restrictions.
- Early quadriceps retraining and strength training will allow the patient to utilize available range of motion to the fullest extent.
- Early pain-free weight bearing will maximize the potential for early return to full function.
- Decreased joint swelling and pain will reduce chances of developing complications during the rehabilitation process.

CONSIDERATIONS:

- Uni-compartmental vs Tri-compartmental
- Primary total knee arthroplasty vs. revision arthroplasty and the type of prosthesis used - certain revision implants emphasize stability and limit range of motion of the knee.
- Rehabilitation goals are based on age, gender, previous activity level and other orthopedic and medical problems
- Pre-operative knee range of motion - If arthrofibrosis or stiffness was present prior to surgery, rehabilitation programs are customized and expectations of post-operative range of motion need to reflect that.

OVERALL GOALS:

- To maximize range of motion early in the rehabilitation phase.
- To improve strength to improve functional independence and mobility.
- To normalize gait mechanics.
- Eliminate pain.

Phase I Acute Phase Inpatient Rehabilitation (Day 0-3)

GOALS

- Ensure ability of patient to perform safe transfers in and out of bed, chair, and on and off toilet.
- Train patient to safely ambulate with a rolling walker or crutches.
- Initiate home exercise program, with emphasis on knee range of motion and swelling reduction.

TREATMENT PLAN:

- Post-operatively on day of surgery or AM next day, initiate transfer and gait training with assistance of the involved extremity to improve functional mobility.
- Progress to assistive device with consideration of the patient's balance, home environment, and support system.
- Therapeutic exercise to involve quad sets, ankle pumps, heel slides, short arc quads, and straight leg raises. 10 repetitions for all exercises, 3 sets each except for quad sets 10 sets of 10.
- Initiate SAFTE (Slide and flex and tighten and extend) one set of ten reps 3 to 4 times a day
- **Modalities:** Ice/Cold pack therapy should be applied at the end of each treatment to manage joint swelling and pain, with compression and elevation.
- Neuromuscular electrical stimulation initiated to quadriceps muscle in patients with extension lag greater than 20 degrees in SLR to improve early stability in gait and manage swelling in the lower extremity. Start with quad sets and progress to long arc quads.

CONSIDERATIONS FOR ACUTE PHASE:

- If patient is unable to return home safely post-operative day 2-3, then inpatient rehabilitation may be needed and acute phase goals extended to be covered during the inpatient rehabilitation stay.

Phase II Outpatient Rehabilitation - Early Scar Phase (Week 1-4)

GOALS

- To achieve at least 0-90 degrees knee passive range of motion.
- To improve quadriceps strength to 3/5 or better to allow safe progression through assistive devices. (From walker to single point cane, if balance is acceptable).
- To achieve independent ambulation for household distances without an assistive device.

TREATMENT PLAN:

Manual Therapy:

- Joint mobilizations: to include the patella in all directions, knee flexion mobilization, knee extension mobilization, hip extension mobilization, and ankle dorsiflexion mobilization.
- Soft tissue mobilization: Apply to restricted tissue to break up adhesions caused by swelling and inflammation.
 - Augmentation with use of tools (ASTYM, Graston) can be very effective, especially in those who had previous arthrofibrosis and joint limitation.
- Emphasis on a strong, mobile scar.

Therapeutic exercise:

- Use the stationary bike for AAROM of the knee.
- Initiate closed chain quadriceps exercises to include step-ups, squats, lunges, leg press machine.

- If the patient is having difficulty with equal use of extremities or tolerance to closed chain exercises, then the **AlterG Anti-Gravity Treadmill®** is a useful tool (see section below). With positive pressure body weight support, the patient can titrate support to achieve pain relief, thus improving their ability to perform closed chain exercises in a fall-safe environment.

Gait Training:

- The **AlterG Anti-Gravity Treadmill®** is used to effectively retrain the patient’s normal gait mechanics within the safety of the air chamber. General unloading guidelines are provided in the Table below, but precise body weight support should be customized based upon individual pain relief parameters. The patient should choose a level of support and speed to allow reasonably pain-free ambulation. The cameras on the treadmill provide the patient feedback as to the mechanics of gait, allowing the therapist to encourage heel strike with knee extension, and knee flexion during the swing phase for proper foot clearance. Early normalization of gait mechanics will reduce the chances of developing gait abnormalities down the road and facilitate a speedier transition off of an assistive device.

Modalities:

- Moist heat to extra-articular soft tissue to allow relaxation.
- Cold pack to knee joint for swelling and pain reduction
- Neuromuscular electric stimulation (NMES) to improve quadriceps activation.

Phase III Outpatient Rehabilitation - Return to Activity (Weeks 4-8)

GOALS

- To improve knee active range of motion to 0-130 degrees.
- To improve overall strength of the involved lower extremity to greater than or equal to 4/5.
- To independently ambulate in the community without assistive device, including ambulation up/down 10 steps in a reciprocal gait pattern.
- Return to work

TREATMENT PLAN:

Therapeutic Exercise:

- Progress all closed chain exercises to full weight bearing, with weights added as tolerated.
- Include eccentric quadriceps exercises.
- Initiate isokinetic exercise to challenge the quadriceps and hamstrings throughout the range of motion. Work in concentric and eccentric modes.
- Utilize the **AlterG Anti-Gravity Treadmill®** in reverse mode to emphasize active open chain knee flexion and closed chain knee extension for propulsion.

Gait Training:

- Use the **AlterG Anti-Gravity Treadmill®** to improve temporo-spatial aspects of gait, such as equalizing step length, stance time, cadence, etc. Progress patient to full weightbearing as tolerated.
- Gait training on stairs to engage the knee through 0-110 degrees of motion - the amount needed to ambulate on stairs without compensations. Focus on eccentric quad control and stabilization in stance phase.

Therapeutic Activities:

- Train the patient within the activities needed to perform home and work duties as applicable. Enforce proper body mechanics to minimize impact on the joints and efficiently utilize muscle energy. Prepare patient for return to work/life activities.

CONSIDERATIONS:

- The longevity of the prosthesis is dependent on the amount of impact placed through it during its lifetime. If you are encountering an athlete, you may need to facilitate them to move to lower impact sports, such as swimming, biking, doubles tennis. Running should be avoided unless they have access to aquatic therapy or an **AlterG Anti-Gravity Treadmill®**.

ALTERG PROGRESSION TABLE

Week	Weight %	Speed (mph)	Time (min)	In-cline	Frequency
1-2	60	2-2.5	10	0	2-4 days/week
2-4	70	2.5-3.5	15-20	0	2-4 days/week
4-6	80-100	3-3.5	20-25	0-3%	2-4 days/week
6-10	100	3.5-5	30	0-5%	2-4 days/week
10-14	100	4-7	30	0-5%	2 days/week