



# Post Operative Total Knee Replacement Protocol

Brian White, MD

[www.western-ortho.com](http://www.western-ortho.com)

*The intent of this protocol is to provide guidelines for progression of rehabilitation. It is not intended to serve as a substitute for clinical decision making. Progression through each phase of rehabilitation is based on clinical criteria and time frames as appropriate. These guidelines should be administered under the supervision of a physical therapist.*

## Terms and Definitions:

**ROM** – *Range of Motion*

This defines the amount of mobility in your knee

**PROM** – *Passive Range of Motion*

Mobility exercises remain completely passive without the use of muscles to move your knee

**AAROM** – *Active Assisted (or partner assisted) ROM*

Range of motion with the assistance of a partner or your other leg and minimal use of the muscles of the surgical leg.

**AROM** - *Active Range of Motion*

Range of motion using the muscles of the surgical leg

**POSTD** – *Post-Operative Day*

**NWB** – *Non Weight Bearing*

This means that you should keep all weight off of your leg.

**TTWB** – *Toe Touch Weight Bearing*

This means that you may place a small amount of weight on your leg for balance purposes.

**PWB** – *Partial Weight Bearing*

This means that you may place some weight on your leg. The amount may be defined by your doctor

**WBAT** – *Weight Bearing as Tolerated*

This means that you may place weight on your leg, but to your tolerance. If your leg can not accept your full weight, crutches are advised.

**DVT** – *Deep Vein Thrombosis*

This is a blood clot that can form in a deep vein.

**Proprioception**

This is a term to describe joint sense or your ability to feel how bent or extended your knee is without looking at it.

**Neuromuscular re-education**

This is the term used to train your muscles to fire in patterns that mimic function, such as balancing while standing.

**Open Chain Exercise**

An exercise position in which your leg can be moved about you, such as kicking. Your foot is not on the ground or a platform for these types of exercises

**Closed Chain Exercise**

An exercise position in which your foot is on the ground or a platform, such as a squat or leg press.

## Prehab (Presurgical Phase)

### Goals:

- Reduce Swelling
- Achieve optimal ROM in preparation for surgery
- Straight Leg Raise without lag
- Reduce load on knee to achieve optimal condition for surgery

### Exercise Regimen

- Use the following exercise regimens from Phase 1 in order to prepare the knee for surgery
  - Pain and Swelling
  - ROM - *manual therapy has been shown to significantly improve ROM in knees with osteoarthritis*
  - Strength
  - Teach Post-op Protocol Exercises

## Phase 1 - Protection Phase (post-op weeks 1-7)

### Goals:

- Reduce swelling and pain
- Restore mobility
  - Restore Full Extension in 2 weeks
  - Gain 90° Flexion in 1 week
  - Gain 120° Flexion in 3 weeks
  - Full possible knee mobility in 6 weeks
- Restore patellar mobility
- Restore normal gait within limits set by surgeon
- Restore Active extension and normal quad recruitment
- Promote normal proprioceptive and neuromuscular control

### Pain and Swelling

- PRICE – Protection, Rest, Ice, Compression, Elevation
  - Use these items together to reduce pain and swelling
  - At minimum, 5-6 times per day for 20-30 minute sessions
  - There is no maximum!
- Wall Slides
- Modalities as indicated - Ultrasound, Electric Stimulation, Iontophoreses
- Ankle Pumps – for swelling and DVT prevention

## Range of Motion

- Passive Range of Motion
  - Wall Slides
  - Seated Passive flexion-extension
  - Table slides
  - Low Load Prolonged Stretches
    - Coffee table hang – for extension
    - Seated prolonged flexion hold
  - CPM – a constant passive motion machine (CPM) may be prescribed for 6-8 weeks and should be used 4-6 hours per day.
- Active Assist Rang of Motion
  - Stationary Bike without resistance (begin post-op week 3)
- Patellar Mobilizations
- Manual therapy as indicated
- Quad and Hamstring Stretching as indicated
- Hydrotherapy
  - Aquajogging and ROM exercises are permitted *when incisions have healed (~2weeks)*

## Gait (walking)

- WBAT is typically prescribed after surgery though an assistive device (walker or crutches) will be necessary.
- Weaning from crutches or walker (begin when cleared to weight-bear):
  - Begin with weight shifting exercises
  - Begin walking with more weight on leg using crutches or walker
  - Single crutch or cane walking
    - This will reduce weight on your surgical leg by 25%
    - Be sure to place the crutch under the *opposite* arm
  - Walk small distanced in home without crutches and take crutches with you for longer distances
- Hydrotherapy – water walking (*permitted when incisions are healed*)
  - Walk in water at shoulder level
  - Advance to walking at waist level

## Strength

- Quadriceps (Quads)
  - Quad Sets – isometric quad contractions
    - NMES (Neuromuscular Electric Stimulation) as indicated
    - Biofeedback as indicated
  - Straight Leg Raising (SLR)
- Hamstring Sets – Isometric Hamstring contractions
- Calf Muscles – Heel-Toe Raises
- Open-Chain hip exercises
  - Abduction
  - Adduction

### Proprioception and Neuromuscular Re-education

- Begin open chain proprioception exercises
- Light co-contraction exercises

## **Phase 2 – Initial Strengthening - (Post-Operative weeks 5-10)**

### **Criteria to advancement to Phase 2**

- Minimal Swelling
- Full passive extension
- Full active extension
- Full passive flexion
- Lower extremity strength to allow for standing and walking short distances with minimal deviations without crutches

### **Goals**

- Eliminate Swelling
- Full active and passive ROM
- Increase leg strength to allow for:
  - Normal gait
  - Walking long distances
  - Stair ascending/descending
  - Double knee bends to 90° without compensations

### Swelling

- Continue PRICE'ing with residual
- Modalities as indicated - Ultrasound, Electric Stimulation, Iontophoreses
- Avoid excessive strengthening and walking with moderate, residual swelling

### Range of Motion

- Patellar mobilizations and manual therapy as indicated
- Quad and Hamstring stretching as indicated
- Low Load Prolonged Stretches
  - Coffee table hang – for extension
  - Seated prolonged flexion hold

### Strength

- Closed Chain Strength progression (Glutes and Quads)
  - Leg press with light weight and high repetitions
  - Mini Squats, 1/3 knee bends
  - Double knee bends to 90°
  - Light plyometrics on shuttle (if tolerated)

- Hamstring Specific Exercises
  - Carpet Drags
  - Hamstring Curls
  - Physio-ball bridging knee bends
- Calf Muscles
- Hip exercises
  - Side Steps with thera-band
  - Adduction
- Cardio
  - Begin stationary bike with resistance
  - Elliptical trainer
  - Treadmill walking with incline
  - Swimming (breast stroke is not recommended)

#### Proprioception, Balance and Neuromuscular Re-education

- Begin double leg stability exercises on balance board
- Single leg balance on stable/semi unstable (foam) surface
- Single leg balance on balance board
- Variations of balance exercises with perturbation training
- Variations of balance exercises during alternate activity (i.e. ball tossing)

### Phase 3 – Advanced Strengthening (post-operative weeks 10- sport test completion)

#### **Criteria for advancement to Phase 3**

- No residual swelling present
- Full Active and Passive ROM
- Ascending and Descending stairs with involved leg without pain or compensation
- At least 1 minute of double knee bends without compensations

*Persons who do not participate in higher level activities may not need to advance to phase 3. Activities that require advanced strengthening include: running, bounding sports, cutting sports and jumping sports, such as, skiing and snowboarding, golf, basketball, tennis and racquetball, soccer, football and hockey.*

#### **Goals:**

- Restore multi-directional strength and agility
- Restore ability to absorb impact on leg (plyometric strength)
- Pass sport test

#### Strength, Agility, Balance and Stability Training

- Increase time on double knee bends with resistance

- Increase time on single knee bends. Add resistance as tolerated
- Forward backward jog exercises with sport cord
- Lateral Agility exercise
- Advanced perturbation, balance and stability exercises
- Continue with cardio training

## Phase 4 – Return to Sport (passing of sport test – 6 months)

### Criterion for advancement to phase 4

- Pass modified/adjusted sport test

### Strength and Agility

- Light Agility Drills
  - o Chop-Downs
  - o Back Pedals
  - o W-Cuts
  - o Z-Cuts
  - o Cariocas
  - o Cutting Drills
  - o Sport Specific Drills
- Adjust Strength and Cardio Regimen to demands of sport
- Begin following sports at specified times or **according to the discretion of surgeon and/or physical therapist**
  - o Mountain biking 4-5 months
  - o Golf – 5 months
  - o Doubles tennis – 6 months
  - o Skiing and snowboarding (if you know how) – 6 months