Microfracture Protocol for Femoral Condyle

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.

**Goals:**

- Reduce Swelling
- Achieve maximal ROM
- 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
- Strength
- Gait may be limited to PWB depending on pain and excessive swelling

**Goals:**

- Reduce swelling and pain
- Restore mobility
  
  Restore Full Extension in 2 weeks
  Gain 120° Flexion in 10 days
  Full 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
  o Wall Slides
  o Seated Passive flexion-extension
  o Table slides
  o Low Load Prolonged Stretches

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

  Prehab (Presurgical Phase)

  Coffee table hang - for extension
  Seated prolonged flexion hold
  o 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 Range of Motion
  o Stationary Bike without resistance (begin post-op week 3)
• Patellar Mobilizations
• Manual therapy as indicated
• Quad and Hamstring Stretching as indicated
• Hydrotherapy
  o Aquajogging and ROM exercises are permitted when incisions have
    healed (~2weeks)
Gait (walking)

- NWB or TTWB weight bearing status will be recommended for the first 6-8 weeks.
- Weaning from crutches (begin when cleared to weight-bear):
  - Begin with weight shifting exercises
  - Begin walking with more weight on leg using crutches
  - Single crutch 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
  - 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

Criteria to advancement to Phase 2

- Minimal Swelling
- Full passive extension
- Full active extension
- Full passive flexion
- Lower extremity strength to allow for standing 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 bend without compensations
  - Single knee bend to 70° 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°
  - Single Knee Bends - advance to 70° as tolerated
  - Light plyometrics on shuttle
- Hamstring Specific Exercises
  - Carpet Drags
  - Hamstring Curls
  - Physio-ball bridging knee bends
• Calf Muscles
• Hip exercises

**Phase 2 - Initial Strengthening - (Post-Operative weeks 6-12)**
  - Side Steps with theraband
  - 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)

**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
  - Single knee bends to 70° flexion 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
  - 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
Jump-land training
Advanced perturbation, balance and stability exercises
Continue with cardio training

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

**Criterion for advancement to phase 4**

Pass sport test
Strength and Agility
- Agility Drills
  - Chop-Downs
  - Back Pedals
  - W-Cuts
  - Z-Cuts
  - Cariocas
  - Cutting Drills
  - Sport Specific Drills
- Adjust Strength and Cardio Regimen to demands of sport
- Team Training Progression
  - Begin training with team at 50% participation level
  - Advance to 100% participation
  - Athlete may begin competition at 6 months post-op, or at the discretion of surgeon and physical therapist
- Begin following sports at specified times or according to the discretion of surgeon and/or physical therapist
  - Running - 4-5 months
  - Mountain biking 4-5 months
  - Golf - 5 months
  - Soccer, football, te
  - Skiing and snowboarding - 6 months

**Phase 4 - Return to Sport (passing of sport test - 6 months)**