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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
 - o Pain and Swelling
 - o ROM
 - o Strength
 - o 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, Iontophoresis
- 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):
 - o Begin with weight shifting exercises
 - o Begin walking with more weight on leg using crutches
 - o Single crutch walking
 - This will reduce weight on your surgical leg by 25%
 - Be sure to place the crutch under the *opposite* arm
 - o Walk small distanced in home without crutches and take crutches with you for longer distances
- Hydrotherapy - water walking
 - o Walk in water at shoulder level
 - o Advance to walking at waist level

Strength

- Quadriceps (Quads)
 - o Quad Sets - isometric quad contractions
 - NMES (Neuromuscular Electric Stimulation) as indicated
 - Biofeedback as indicated
 - o Straight Leg Raising (SLR)
- Hamstring Sets - Isometric Hamstring contractions
- Calf Muscles - Heel-Toe Raises
- Open-Chain hip exercises
 - o Abduction
 - o 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:
 - o Normal gait
 - o Walking long distances
 - o Stair ascending/descending
 - o Double knee bend without compensations
 - o 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
 - o Coffee table hang - for extension
 - o Seated prolonged flexion hold

Strength

- Closed Chain Strength progression (Glutes and Quads)
 - o Leg press with light weight and high repetitions
 - o Mini Squats, 1/3 knee bends
 - o Double knee bends to 90°
 - o Single Knee Bends - advance to 70 as tolerated
 - o Light plyometrics on shuttle
- Hamstring Specific Exercises
 - o Carpet Drags
 - o Hamstring Curls
 - o Physio-ball bridging knee bends

- Calf Muscles
- Hip exercises

Phase 2 - Initial Strengthening - (Post-Operative weeks 6-12)

- o Side Steps with thera-band
- o Adduction
- Cardio
 - o Begin stationary bike with resistance
 - o Eliptical trainer
 - o Treadmill walking with incline
 - o 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
 - 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
- Team Training Progression
 - o Begin training with team at 50% participation level
 - o Advance to 100% participation o

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
 - oRunning - 4-5 months
 - oMountain biking 4-5 months
 - oGolf - 5 months
 - oSoccer, football, tennis
 - oSkiing and snowboarding - 6 months

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