

Rehabilitation Following Microfracture Procedure

I. PHASE I – EARLY PROTECTION PHASE (Weeks 0-4)

Goals:

- Protect healing tissue from load and shear forces
- Decrease pain and effusion
- Restoration of full passive knee extension
- Gradually restore knee flexion
- Regain quadriceps control

Brace:

- No brace. May use elastic wrap to control swelling.

Weight-bearing:

- Non weight bearing

Range of motion:

- Immediate motion exercise day 1
- Full passive knee extension immediately
- Initiate CPM day 1 for total of 8-12 hours/day (0-60°; if patellofemoral lesion 6.0 cm², 0-40°)
- Progress CPM ROM as tolerated 5-10° per day
- May continue CPM for total of 6-9 hours per day for up to 6 weeks
- Patellar mobilization (4-6 times per day)
- Motion exercises throughout the day
- Passive knee flexion ROM at least 2-3 times daily
- Progress passive knee range of motion as tolerated, no restrictions
- Minimum range of motion goals 0-90° week 1, 0-115° week 3, and 0-125° week 4
- Stretch hamstrings and calf

Strengthening Program:

- Ankle pump using rubber tubing
- Quad setting
- Multi-angle isometrics (co-contractions Q/H)
- Active knee extension 90-40° for femoral condyle lesions (no resistance), avoid for patellofemoral patients



- Straight leg raises (4 directions)
- Stationary bicycle when ROM allows – low resistance
- Electrical muscle stimulation and/or biofeedback during quadriceps exercises
- Initiate weight shifting exercises with knee in extension week 1-2 for patellofemoral lesions and small femoral condyle lesions, week 3 for larger femoral condyle lesions
- Leg press 0-60° week 3 for small femoral condyle lesions and patellofemoral lesions, progress to 0-90° week 4
- Toe calf raises week 4 for small femoral condyle and patellofemoral lesions
- May begin use of pool for gait training and exercises week 3-4 (when incision is fully healed)
- May begin stationary bike week 3-4, low resistance
- NO active knee extension exercises for patellofemoral lesions

Functional Activities:

- Gradual return to daily activities
- If symptoms occur, reduce activities to reduce pain and inflammation

Swelling Control:

- Ice, elevation, compression, and edema modalities as needed to decrease swelling

Criteria to Progress to Phase II:

- Full passive knee extension
- Knee flexion to 125°
- Minimal pain and swelling
- Voluntary quadriceps activity

II. **PHASE II – TRANSITION PHASE (Weeks 4-8)**

Goals:

- Gradually improve quadriceps strength/endurance
- Gradual increase in functional activities

Weight-Bearing:

- Non weight bearing until week 6, then gradual weight bearing as tolerated

Range of Motion:

- Gradual increase in ROM
- Maintain full passive knee extension
- Progress knee flexion to 135°+ by week 8
- Continue patellar mobilization and soft tissue mobilization, as needed
- Continue stretching program

Strengthening exercises:

- Progress closed kinetic chain exercises
- Initiate leg press for large femoral condyle lesions week 6
- Mini-squats 0-45° week 7
- Toe-calf raises week 8 for femoral condyle lesions
- Progress balance and proprioception drills
- Initiate front lunges, wall squats, front and lateral step-ups week 5 for small femoral condyle and patellofemoral lesions, week 8 for large femoral condyle lesions
- For femoral condyle lesions, progress open kinetic chain knee extension, 1 lb./week
- For patellofemoral lesion, may begin open kinetic chain knee extension without resistance in a range of motion that does not allow for articulation of the lesion
- Continue stationary bicycle, low resistance (gradually increase time)
- Continue use of electrical muscle stimulation and or biofeedback as needed
- Continue use of pool for gait training and exercising

Functional Activities:

- As pain and swelling (symptoms) diminish, the patient may gradually increase functional activities.
- Gradually increase standing and walking

Criteria to Progress to Phase III:

- Full range of motion
- Acceptable strength level
 - Hamstrings within 20% of contralateral leg
 - Quadriceps within 30% of contralateral leg
- Balance testing within 30% of contralateral leg
- Able to bike for 30 minutes

III. **PHASE III: REMODELING PHASE (Weeks 8-16)**

Goals:

- Improve muscular strength and endurance
- Increase functional activities

Range of Motion:

- Patient should exhibit 125-135°+ flexion

Exercise Program:

- Leg press (0-90°)
- Bilateral squats (0-60°)
- Unilateral step-ups progressing from 2" to 8"



- Forward lunges
- Walking program week 10
- Progress open kinetic chain extension (0-90°), for patellofemoral lesions, may begin week 12, perform from 90-40° or avoid angle where lesion articulates – Progress 1 pound every 2 weeks beginning week 20 if no pain or crepitation – must monitor symptoms
- Continue progressing balance and proprioception
- Bicycle
- Stairmaster
- Swimming
- Nordic-Trak/Elliptical

Functional Activities:

- As patient improves, increase walking (distance, cadence, incline, etc.)

Maintenance Program:

- Initiate at week 12-16
- Bicycle – low resistance, increase time
- Progressive walking program
- Pool exercises for entire lower extremity
- Straight leg raises
- Leg press
- Wall squats
- Hip abduction / adduction
- Front lunges
- Step-ups
- Stretch quadriceps, hamstrings, calf

Criteria to Progress to Phase IV:

- Full non-painful ROM
- Strength within 80-90% of contralateral extremity
- Balance and/or stability within 75-80% of contralateral extremity
- No pain, inflammation, or swelling

IV. **PHASE IV – MATURATION PHASE (Weeks 16-26)**

Goals:

- Gradual return to full unrestricted functional activities



Exercises:

- Continue maintenance program progression 3-4x/week
- Progress resistance as tolerated
- Emphasis on entire lower extremity strength and flexibility
- Progress agility and balance drills
- Impact loading program should be specialized to the patient's demands
- Progress sport programs depending on patient variables

Functional Activities:

- Patient may return to various sport activities as progression in rehabilitation and cartilage healing allows. Generally, low-impact sports such as swimming, skating, rollerblading, and cycling are permitted at about 2 months for small femoral condyle and patellofemoral lesions and at 3 months for large femoral condyle lesions. Higher impact sports such as jogging, running, and aerobics may be performed at 4 months for small lesions or 5 months for large lesions. High impact sports such as tennis, basketball, football, and baseball are allowed at 6-8 months.