

# KNEE MICROFRACTURE CLINICAL PRACTICE GUIDELINE



## Rehabilitation Precautions

General	<ul style="list-style-type: none"> <li>• WB status varies based on lesion location, size and physician</li> <li>• It is very important to know the location and size of the lesion <ul style="list-style-type: none"> <li>○ Small lesion &lt;2cm<sup>2</sup></li> <li>○ Large lesion &gt;2cm<sup>2</sup></li> </ul> </li> <li>• All progression is based on soft tissue healing</li> </ul>
Brace	<ul style="list-style-type: none"> <li>• <b>Femoral condyle (FC):</b> No brace, may use elastic wrap to control swelling •</li> <li>• <b>Patellofemoral (PF):</b> Brace locked in 0o extension; may progress opening of brace Weeks 6-8</li> </ul>
Weight-bearing	<ul style="list-style-type: none"> <li>• <b>Femoral Condyle</b> <ul style="list-style-type: none"> <li>○ Small FC lesions (&lt;2.0 cm<sup>2</sup>): <ul style="list-style-type: none"> <li>■ Weeks 1-4: NWB</li> <li>■ Weeks 4-6: Wean off crutches to FWB</li> </ul> </li> <li>○ Large FC lesions (&gt;2.0 cm<sup>2</sup>): <ul style="list-style-type: none"> <li>■ Weeks 1-6: NWB</li> <li>■ Weeks 6-8: Wean off crutches to FWB</li> </ul> </li> </ul> </li> <li>• <b>Patellofemoral lesions</b> <ul style="list-style-type: none"> <li>○ Immediate TTWB of approximately 25% body weight with brace locked in full extension</li> <li>○ Week 2: progress to 50% WB - brace locked in full extension</li> <li>○ Week 3: progress to 75% WB - brace locked in full extension</li> <li>○ Week 4: progress to full WB - brace locked in full extension</li> <li>○ Weeks 6-8: progress opening of brace to D/C of brace</li> </ul> </li> </ul>
ROM	<ul style="list-style-type: none"> <li>• Immediate motion exercise Day 1</li> <li>• Full passive knee extension immediately</li> <li>• CPM 6 weeks for large FC &amp; PF lesions; 3 weeks for small FC lesions <ul style="list-style-type: none"> <li>○ Initiate CPM day 1 for total of 8-12 hours/day (0°-60°; if PF &gt;6.0 cm, 0°-40°)</li> <li>○ Progress CPM ROM as tolerated 5°-10° per day</li> <li>○ CPM for total of 6-8 hours/day for up to 6 weeks</li> </ul> </li> <li>• Patellar mobilization (4-6 times per day)</li> <li>• Range of motion exercises throughout the day</li> <li>• Passive knee flexion ROM at least 2-3 times daily</li> <li>• Progress passive knee ROM as tolerated, NO FORCED FLEXION BEYOND 90°</li> <li>• ROM goals: (<i>PF lesions may be limited due to location and size</i>) ○ <ul style="list-style-type: none"> <li>○ Week 1: 0°-90°</li> <li>○ Week 2: 0°-105°</li> <li>○ Week 3: 0°-115°</li> <li>○ Week 4: 0°-125°</li> <li>○ Week 8: Full (equal) ROM</li> </ul> </li> <li>• • Stretch hamstrings and calf</li> </ul>

## Phase I: Proliferation (Weeks 0-6)

Goals	<ul style="list-style-type: none"> <li>• Protect healing tissue from load and shear forces</li> <li>• Decrease pain and effusion</li> <li>• Restoration of full passive knee extension</li> <li>• Gradually restore knee flexion</li> <li>• Regain quadriceps control</li> </ul>
Brace	<ul style="list-style-type: none"> <li>• See above guidelines</li> </ul>
Weightbearing	<ul style="list-style-type: none"> <li>• See above guidelines</li> </ul>
ROM	<ul style="list-style-type: none"> <li>• See above guidelines</li> </ul>
Strengthening Program	<ul style="list-style-type: none"> <li>• Ankle pumps</li> <li>• Quadriceps setting</li> <li>• Multi-angle isometrics</li> <li>• Active knee extension 90°-40° for <b>FC</b> lesions (no resistance)</li> <li>• <u>NO</u> active NWB knee extension exercises for <b>PF</b> lesions</li> <li>• Straight leg raises (4 directions)</li> <li>• Initiate weight shifting exercises with knee in extension Week 1-2 for <b>PF</b> lesions, Week 4 for small</li> <li>• <b>FC</b> lesions, Week 6-8 for larger <b>FC</b> lesions</li> <li>• Partial weight bearing leg press 0°-60° Weeks 4-6 for small <b>FC</b> lesions and <b>PF</b> lesions, progress to 0°-90° Weeks 6-8</li> <li>• Toe calf raises week 4-6 for small <b>FC</b> and <b>PF</b> lesions</li> <li>• May begin use of pool for gait training and exercises Week 3-4 (when incisions fully healed)</li> <li>• May begin stationary bike week 4, low resistance with appropriate seat height</li> </ul>
Functional Activities	<ul style="list-style-type: none"> <li>• Gradual return to daily activities</li> <li>• If symptoms occur, reduce activities to reduce pain and inflammation</li> <li>• Swelling control: Ice, elevation, compression, and modalities as needed</li> </ul>
Criteria to Progress	<ul style="list-style-type: none"> <li>• Full passive knee extension</li> <li>• Knee flexion to 125°</li> <li>• Minimal pain and swelling</li> <li>• Voluntary quadriceps activity</li> </ul>

## Phase II: Transition Phase (Weeks 6-12)

Goals	<ul style="list-style-type: none"> <li>• Gradually improve quadriceps strength/endurance</li> <li>• Gradual increase in functional activities</li> </ul>
Weightbearing	<ul style="list-style-type: none"> <li>• See above guidelines</li> </ul>
ROM	<ul style="list-style-type: none"> <li>• Gradual increase in ROM</li> <li>• Maintain full passive knee extension</li> <li>• Progress to full knee flexion by week 8 (refer to above ROM guidelines)</li> <li>• Continue patellar mobilization and soft tissue mobilization as needed</li> <li>• Continue stretching program</li> </ul>

Strengthening Exercises	<ul style="list-style-type: none"> <li>Progress WB exercises</li> <li>Initiate partial weight bearing leg press for large <b>FC</b> lesions Week 8</li> <li>Mini-squats 0°-45° Week 8-10</li> <li>Toe-calf raises week 6-8 for <b>FC</b> lesions</li> <li>Progress balance and proprioception drills</li> <li>Initiate front lunges, wall squats, front and lateral step-ups Week 6-8 for small <b>FC</b> and <b>PF</b> lesions, Week 8-10 for large <b>FC</b> lesions</li> <li>For <b>FC</b> lesions, progress non-WB knee extension, 1lb/wk</li> <li>Continue stationary bicycle, low resistance (gradually increase time)</li> <li>Continue use of pool for gait training and exercise</li> </ul>
Functional Activities	<ul style="list-style-type: none"> <li>As pain and swelling diminish, the patient may gradually increase functional activities</li> <li>Gradually increase standing and walking</li> </ul>
Criteria to Progress	<ul style="list-style-type: none"> <li>Full ROM</li> <li>SLR with no extensor lag</li> <li>10 repeated single leg step downs with good form and no reactive effusion or exacerbation of symptoms</li> <li>10 repeated single leg knee bends with good form and no reactive effusion or exacerbation of symptoms</li> <li>Star Excursion Balance Test 20-30% of contralateral extremity with good form and no reactive effusion or exacerbation of symptoms (see references)</li> <li>Timed balance testing within 30% of contralateral extremity</li> <li>Able to bike for 30 minutes without exacerbation of symptoms or reactive effusion</li> </ul>

### Phase III: Remodeling (Weeks 12-16)

Goals	<ul style="list-style-type: none"> <li>Improve muscular strength and endurance</li> <li>Increase functional activities</li> </ul>
ROM	<ul style="list-style-type: none"> <li>Patient should exhibit full flexion</li> </ul>
Exercise Program	<ul style="list-style-type: none"> <li>Leg press (0°-90°)</li> <li>Bilateral squats (0°-60°)</li> <li>Unilateral step-ups progressing from 5 to 20 cm</li> <li>Forward lunges</li> <li>Walking program week 10-12</li> <li>NWB extension <ul style="list-style-type: none"> <li><b>FC</b> lesions: Progress NWB extension (0°-90°)</li> <li><b>PF</b> lesions: Begin NWB extension (90°-40°) or avoid lesion articulation • Continue progressing balance and proprioception</li> </ul> </li> <li>Bicycle</li> <li>Stairmaster</li> <li>Swimming</li> <li>Nordic-Track/elliptical</li> </ul>
Functional Activities	<ul style="list-style-type: none"> <li>Increase walking (distance, cadence, incline, etc.)</li> </ul>
Conditioning Program	<ul style="list-style-type: none"> <li>Initiate at weeks 12-16</li> <li>Bicycle: low resistance, increase time</li> <li>Progressive walking program</li> <li>Pool exercises for entire lower extremity</li> <li>Leg press</li> <li>Wall squats</li> </ul>

	<ul style="list-style-type: none"> <li>• Hip strengthening (abduction/adduction)</li> <li>• Front lunges</li> <li>• Step-ups</li> <li>• Stretch quadriceps, hamstrings, calf</li> </ul>
Criteria to Progress	<ul style="list-style-type: none"> <li>• Full non-painful ROM</li> <li>• 20 repeated single leg step downs with good form and no reactive effusion or exacerbation of symptoms</li> <li>• 20 repeated single leg knee partial squat with good form and no reactive effusion or exacerbation of symptoms</li> <li>• Star Excursion Balance Test 85-90% of contralateral extremity</li> <li>• Timed balance and/or stability within 85%-90% of contralateral extremity</li> <li>• No reactive pain, inflammation, or swelling with activities</li> </ul>

## Phase IV: Maturation Phase (Weeks 16-26)

Goals	<ul style="list-style-type: none"> <li>• Gradual return to full unrestricted functional activities</li> <li>• Single leg hop test within 75%-80% of contralateral extremity in order to progress to jogging activities</li> <li>• 10 single leg hops with good form</li> <li>• All activities should be with good form and have no reactive pain, inflammation, or effusion with exercises</li> </ul>
Exercise Program	<ul style="list-style-type: none"> <li>• Impact loading program should be individualized to the patient's needs</li> <li>• Continue conditioning program progression 3-4 times per wk</li> <li>• Progress resistance as tolerated</li> <li>• NWB extension <ul style="list-style-type: none"> <li>◦ <b>PF</b> lesions: Add 1lb every 2 weeks beginning Week 20 if no pain or crepitus. Perform from 90°-40° or avoid angle where lesion articulates. Must monitor symptoms!</li> </ul> </li> <li>• Emphasis on entire lower extremity strength and flexibility</li> <li>• Weeks 16-18 initiate PWB/aquatic plyometric and hopping activities</li> <li>• Weeks 18-20 progress double and single leg hopping (e.g., hop downs from a small step, double and single leg hops in place, quick hops front/back/side, etc.) as long as there is no reactive pain, inflammation, or effusion – see impact guidelines below for progression of activities</li> <li>• Progress agility and balance drills</li> </ul>
Functional Activities	<ul style="list-style-type: none"> <li>• Patient may return to various sport activities as progression in rehabilitation and cartilage healing allows. (Be sure to communicate with surgeon.)</li> <li>• Low-impact sports, such as swimming, skating, rollerblading, and cycling, are permitted at <ul style="list-style-type: none"> <li>◦ <u>2 months</u> - small FC and PF lesions</li> <li>◦ <u>3 months</u> - large FC lesions</li> </ul> </li> <li>• Higher-impact sports such as jogging, running, and aerobics may be performed at: <ul style="list-style-type: none"> <li>◦ <u>4-5 months</u> - small lesions</li> <li>◦ <u>6 months</u> - large lesions</li> </ul> </li> <li>• High-impact sports such as tennis, basketball, football and baseball are allowed at: <ul style="list-style-type: none"> <li>◦ <u>6-8 months</u> - small lesions</li> <li>◦ <u>9-12 months</u> - large lesions</li> </ul> </li> </ul>
Goals to Return to Sport	<ul style="list-style-type: none"> <li>• Physician clearance</li> <li>• Symmetry with functional testing (3 single-leg cross-over hopping, etc.)</li> <li>• No reactive pain, inflammation, effusion, or instability with sport-specific activity</li> </ul>

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