

KNEE MICROFRACTURE CLINICAL PRACTICE GUIDELINE

Disclaimer

- Progression is time and criterion-based, depending on soft tissue healing, patient demographics, and clinician evaluation.
- For questions, contact Dr. Sujan Gogu's clinic.

Rehabilitation Precautions	Details
General	<ul style="list-style-type: none"> • Weight-bearing status depends on lesion location, size, and physician's recommendation • Lesion Sizes: <ul style="list-style-type: none"> ✓ Small: <2 cm² ✓ Large: >2 cm² • Progression is based on soft tissue healing.
Brace	<ul style="list-style-type: none"> • Femoral Condyle (FC): No brace needed; elastic wrap may be used for swelling control. • Patellofemoral (PF): Use brace locked in 0° extension; gradually open brace Weeks 6-8.
Weight-bearing	<ul style="list-style-type: none"> • Femoral Condyle Lesions: Small Lesions (<2 cm²): <ul style="list-style-type: none"> • Weeks 1-4: Non-weight bearing (NWB) • Weeks 4-6: Transition from crutches to full weight bearing (FWB) Large Lesions (>2 cm²): <ul style="list-style-type: none"> • Weeks 1-6: NWB • Weeks 6-8: Transition from crutches to FWB • Patellofemoral Lesions: <ul style="list-style-type: none"> • Immediate: Toe-touch weight bearing (TTWB) ~25% body weight with brace locked in full extension • Week 2: Increase to 50% WB with brace in full extension

	<ul style="list-style-type: none"> • Week 3: Increase to 75% WB with brace in full extension • Week 4: Full WB with brace in full extension • Weeks 6-8: Begin opening the brace, aiming for brace discontinuation (D/C)
<p>Range of Motion (ROM)</p>	<ul style="list-style-type: none"> • Start motion exercises on Day 1 • Achieve full passive knee extension immediately <p>Use Continuous Passive Motion (CPM) machine:</p> <ul style="list-style-type: none"> • 6 weeks: Large FC & PF lesions; Small FC lesions: 3 weeks • For 8-12 hours/day: Begin CPM on Day 1 (0°-60°; if PF >6.0 cm, 0°-40°) • Increase CPM ROM by 5°-10° per day • Continue CPM for 6-8 hours/day up to 6 weeks • 4-6 times per day: Patellar mobilization • Perform ROM exercises multiple times daily • At least 2-3 times daily: Passive knee flexion ROM • Progress passive knee ROM as tolerated; avoid forced flexion beyond 90° <p>ROM Goals:</p> <ul style="list-style-type: none"> • Week 1: 0°-90° • Week 2: 0°-105° • Week 3: 0°-115° • Week 4: 0°-125° • Week 8: Full (equal) ROM • Stretch hamstrings and calf muscles regularly

Phase I: Proliferation (Weeks 0-6)

<p>Phase I: Proliferation (Weeks 0-6)</p>	<p>Details</p>
<p>Goals</p>	<ul style="list-style-type: none"> • Safeguard healing tissue from load and shear stress

Phase I: Proliferation (Weeks 0-6)	Details
	<ul style="list-style-type: none"> • Manage pain and swelling • Achieve full passive knee extension • Gradually restore knee flexion • Reestablish quadriceps function
Brace	<ul style="list-style-type: none"> • Follow the prescribed brace guidelines from earlier recommendations
Weightbearing	<ul style="list-style-type: none"> • Adhere to the specified weightbearing guidelines provided previously
Range of Motion (ROM)	<ul style="list-style-type: none"> • Comply with the outlined ROM guidelines
Strengthening Program	<ul style="list-style-type: none"> • Ankle Pumps • Quadriceps Setting • Multi-angle Isometrics • Active Knee Extension: 90°-40° for femoral condyle (FC) lesions (without resistance) • Avoid Active NWB Knee Extension: For patellofemoral (PF) lesions • Straight Leg Raises: In four directions • Weight Shifting Exercises: <ul style="list-style-type: none"> ➤ Start with knee in extension ➤ Week 1-2 for PF lesions ➤ Week 4 for small FC lesions ➤ Week 6-8 for larger FC lesions • Partial Weight Bearing Leg Press: 0°-60° Weeks 4-6 for small FC and PF lesions; progress to 0°-90° Weeks 6-8 • Toe Calf Raises: Week 4-6 for small FC and PF lesions • Pool Exercises: Initiate gait training and exercises Week 3-4 (post-incision healing)

Phase I: Proliferation (Weeks 0-6)	Details
	<ul style="list-style-type: none"> • Stationary Bike: Begin Week 4 with low resistance and proper seat adjustment
Functional Activities	<ul style="list-style-type: none"> • Gradually resume daily activities • Reduce activity levels if symptoms arise to manage pain and swelling • Swelling Management: Apply ice, elevate, use compression, and other modalities as needed
Criteria to Progress to Next Phase	<ul style="list-style-type: none"> • Achieve full passive knee extension • Attain knee flexion to 125° • Experience minimal pain and swelling • Demonstrate voluntary quadriceps activation

Phase I: Transition Phase (Weeks 6-12)

Phase I: Transition Phase (Weeks 6-12)	Details
Goals	<ul style="list-style-type: none"> • Gradually enhance quadriceps strength and endurance • Incrementally increase engagement in functional activities
Weightbearing	<ul style="list-style-type: none"> • Follow the previously outlined weightbearing guidelines
Range of Motion (ROM)	<ul style="list-style-type: none"> • Gradually extend range of motion • Ensure full passive knee extension • Aim for full knee flexion by week 8 (refer to previous ROM guidelines) • Continue patellar and soft tissue mobilization as necessary • Maintain stretching program
Strengthening	<ul style="list-style-type: none"> • Advance weightbearing exercises

Phase I: Transition Phase (Weeks 6-12)	Details
Exercises	<ul style="list-style-type: none"> • Partial Weight Bearing Leg Press: Start for large FC lesions Week 8 • Mini-Squats: <ul style="list-style-type: none"> ➤ 0°-45° from Week 8-10 • Toe-Calf Raises: <ul style="list-style-type: none"> ➤ Week 6-8 for FC lesions ➤ Enhance balance and proprioception drills • Front Lunges, Wall Squats, Front and Lateral Step-Ups: <ul style="list-style-type: none"> ➤ Week 6-8 for small FC and PF lesions ➤ Week 8-10 for large FC lesions • Non-Weight Bearing Knee Extension: <ul style="list-style-type: none"> ➤ Progress for FC lesions, increase by 1lb per week ➤ Continue stationary bike with low resistance, gradually extending duration ➤ Persist with pool exercises for gait training and general exercise
Functional Activities	<ul style="list-style-type: none"> • As pain and swelling decrease, progressively enhance functional activities • Gradually increase duration of standing and walking
Criteria to Progress to Next Phase	<ul style="list-style-type: none"> • Achieve full range of motion • Perform straight leg raises without extensor lag • Complete 10 single leg step downs with proper form and no reactive swelling or symptom aggravation • Perform 10 single leg knee bends with proper form and no reactive swelling or symptom aggravation • Star Excursion Balance Test: 20-30% of the contralateral leg with proper form and no reactive swelling or symptom aggravation

Phase I: Transition Phase (Weeks 6-12)	Details
	<ul style="list-style-type: none"> • Timed balance testing within 30% of the contralateral leg • Bike for 30 minutes without symptom exacerbation or reactive swelling

Phase III: Remodeling (Weeks 12-16) formatted as a table:

Phase III: Remodeling (Weeks 12-16)	Details
Goals	<ul style="list-style-type: none"> • Enhance muscular strength and endurance • Increase engagement in functional activities
Range of Motion (ROM)	<ul style="list-style-type: none"> • Achieve and maintain full knee flexion
Exercise Program	<ul style="list-style-type: none"> • Leg Press: Range of motion 0°-90° • Bilateral Squats: Range of motion 0°-60° • Unilateral Step-Ups: Progress from 5 to 20 cm • Forward Lunges: Incorporate into routine • Walking Program: Increase distance, cadence, and incline from week 10-12 • Non-Weight Bearing (NWB) Extension: <ul style="list-style-type: none"> ➤ FC Lesions: Progress NWB extension from 0°-90° ➤ PF Lesions: Begin NWB extension from 90°-40° or avoid articulating the lesion ➤ Continue advancing balance and proprioception exercises • Bicycle: Low resistance, gradually increase duration • Stairmaster: Incorporate into routine • Swimming: Include in exercise regimen

Phase III: Remodeling (Weeks 12-16)	Details
	<ul style="list-style-type: none"> • NordicTrack/Elliptical: Gradually integrate
Functional Activities	<ul style="list-style-type: none"> • Increase walking distance, cadence, and incline
Conditioning Program	<ul style="list-style-type: none"> • Bicycle: Low resistance, increase time • Progressive Walking Program: Extend duration and intensity • Pool Exercises: For entire lower extremity • Leg Press: Continue with progression • Wall Squats: Incorporate into routine • Hip Strengthening: Focus on abduction and adduction • Front Lunges: Include in exercise regimen • Step-Ups: Progress as tolerated • Stretching: Quadriceps, hamstrings, and calves
Criteria to Progress to Next Phase	<ul style="list-style-type: none"> • Full range of motion without pain • 20 single leg step downs with good form, no swelling or symptom aggravation • 20 single leg partial squats with good form, no swelling or symptom aggravation • Star Excursion Balance Test: 85-90% of the contralateral leg • Timed balance and/or stability tests within 85-90% of the contralateral leg • No pain, inflammation, or swelling with activities

Phase IV: Maturation Phase (Weeks 16-26)

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Goals	<ul style="list-style-type: none"> • Gradual return to unrestricted functional activities • Achieve 75%-80% of contralateral leg strength in single leg hop test to start jogging • Perform 10 single leg hops with good form • Ensure all activities are done with proper form and without reactive pain, inflammation, or swelling
Exercise Program	<ul style="list-style-type: none"> • Individualize impact loading program based on patient's needs • Continue conditioning program 3-4 times per week • Increase resistance as tolerated • Non-Weight Bearing (NWB) Extension: <ul style="list-style-type: none"> ➤ PF Lesions: Increase by 1 lb every 2 weeks starting Week 20 if no pain or crepitus. ➤ Perform from 90°-40° or avoid the angle where the lesion articulates. ➤ Monitor symptoms closely! ➤ Focus on strengthening and flexibility of the entire lower extremity • Weeks 16-18: Initiate partial weight bearing (PWB) and aquatic plyometric and hopping exercises • Weeks 18-20: <ul style="list-style-type: none"> ➤ Advance to double and single leg hopping (e.g., hop downs from a small step, in-place hops, quick front/back/side hops) as long as there is no pain, inflammation, or swelling. ➤ Follow impact guidelines for activity progression ➤ Enhance agility and balance drills
Functional Activities	<ul style="list-style-type: none"> • Return to sport activities as rehabilitation and cartilage healing permit. Consult with surgeon

Phase IV: Maturation Phase (Weeks 16-26)	Details
	<ul style="list-style-type: none"> • Low-impact sports <ul style="list-style-type: none"> ➤ (e.g., swimming, skating, rollerblading, cycling) allowed ➤ 2 months for small FC and PF lesions ➤ 3 months for large FC lesions • Higher-impact sports <ul style="list-style-type: none"> ➤ (e.g., jogging, running, aerobics) allowed ➤ 4-5 months for small lesions ➤ 6 months for large lesions • High-impact sports <ul style="list-style-type: none"> ➤ (e.g., tennis, basketball, football, baseball) allowed ➤ 6-8 months for small lesions ➤ 9-12 months for large lesions
Criteria to Return to Sport	<ul style="list-style-type: none"> • Obtain physician clearance • Demonstrate symmetry in functional tests (e.g., single-leg cross-over hopping) • No reactive pain, inflammation, swelling, or instability during sport-specific activities