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Notes:

Manual: Scar mobilization^{1,2,9,10,15,22}
Patellar mobilization^{1,2,9,10,15,22}

Modalities: Continue PRN

CV Exercise: Swimming, pool jog, elliptical, walking treadmill, biking^{6,29,41}

Criterion for Progression:

- 1) *Minimal to no effusion/edema*
- 2) *ROM equal to opposite LE*
- 3) *Ambulate on level surfaces with normal gait*

Phase III – Tissue Remodeling/Hypertrophy Phase (12-24 weeks)

- Goals:**
- 1) Normalize eccentric quad control
 - 2) Strength progression
 - 3) Initiate low impact exercise progression to promote articular cartilage nutrition
 - 4) Begin sport specific agility drills

ROM: PRN

Exercise: Advanced Strength/Proprioception/Balance
Full squat to 100 degrees
Single limb Squat
Begin low impact exercise progression^{6,29,41}

CV Exercise: Elliptical
Outdoor walking/hiking
Trampoline jog/jump rope^{6,29,41}

Criterion for Progression:

- 1) *No pain or edema/effusion*
- 2) *Full ROM*
- 3) *20 reps to 60 degrees single limb squat with eccentric control and good lower extremity alignment*
- 4) *Quad strength >80% of uninvolved LE (10RM single leg press or isokinetically if available)*

Phase IV – Sport Specific Training (6 months +) -if desired by pt and cleared by MD

- Goals:**
- 1) Begin sport specific drills
 - 2) Normalize neuromuscular control
 - 3) Normalize jumping/landing mechanics if indicated
 - 4) Prepare for return to sport

Exercise: Advance agility progression
Begin plyometric progression
Jogging progression/sport-specific training

Criterion for Return to Sport: (Recommend combination testing of strength, agility, and power according to available resources/clinic setting)

- 1) No pain or swelling
- 2) Hop Tests – Single Hop, X-Hop, Triple Hop, Timed Hop $\geq 85\%$ uninvolved
- 3) Single leg squat to 60 degrees knee flexion with good control for 3 minutes
- 4) Quad strength > 90% of uninvolved (10RM leg press or isokinetic testing)
- 5) IKDC (MCID 6.3@ 6mo; 16.7 @ 12 mo)

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Weight Bearing

- NWB x _____ wks
- TDWB x _____ wks/days
- PWB _____% x _____ wks
- WBAT
- Brace Locked in Ext x _____ wks

ROM

- Full ROM
- Locked full ext x _____ wks
- Locked at _____° x _____ wks
- ROM limits
- _____° to _____° x _____ wks
- _____° to _____° x _____ wks
- _____° to _____° x _____ wks
- _____° to _____° x _____ wks

CPM

- _____° to _____° x _____ wks
- 30-70° ↑ 10°/d @ dir
- None

Recommended Clinical Guidelines

WB: TDWB x 8 weeks^{6,13}

ROM: CPM or AROM 4-8 hours/day x 6-8 weeks^{6,30,40}

Precautions

No impact x 12 weeks¹⁴

Microfracture(Tibofemoral Joint)

Phase I – Tissue Protection/Healing Phase (0-8 weeks)

- Goals:**
- 1) Reduce pain and effusion
 - 2) Facilitate new cartilage formation
 - 3) Minimize scar adhesion formation
 - 4) Improve knee ROM
 - 5) Facilitate quadriceps activation

ROM: PROM/AAROM/AROM^{6,30,40}
Bike: Rocking to full revolution as ROM allows

Exercise: Quad Isometrics²¹
SLR – 4 way (flex/abd/ext/add)^{5,20,26,31}
Clamshells³¹
Hamstring isometrics
SAQ/LAQ^{12,25,38}

Manual: Patella Mobilizations^{1,9,10,15,22,}
Patellar tendon Mobilizations^{1,9,10,15,22,}
Extension with Overpressure^{9,10,22,24}

Modalities: Functional Electrical Stimulation³³⁻³⁵
Biofeedback⁴²
Cryotherapy^{3,4,19,28,43}

CV Exercise: Pool exercises (Aquajogging/swimming) pending wound/ incision healing

Criterion for Progression:

- 1) **Voluntary quadriceps isometric contraction**
- 2) **No extensor lag with SLR**
- 3) **Good patellar mobility**
- 4) **Knee ROM full knee extension equaling opposite LE to functional knee flexion**
- 5) **Minimal joint effusion**

Phase II – Tissue Proliferation Phase/Progression Phase (9-12 weeks)

- Goals:**
- 1) Pain and edema control
 - 2) Maximize knee ROM
 - 3) Strength progression – develop functional quad control
 - 4) Achieve normal gait

ROM: PROM/AAROM/AROM^{6,30,40}
Bike for ROM

Exercise: Gait retraining/Cone walking²⁴
Squats /Leg Press (60-0 degrees)^{10,12,22,25,27,36,38}
Closed chain Terminal Knee Extension (stand)
Calf raises
Weight Shifting/Balance/ Perturbation Training^{7,8,27}
Bridging progression
Step ups, Step Downs, Lateral Step Downs^{8,9,10,12,25,38}