Phase I: Immediate Post-operative (IP) 0-2 weeks

Evaluate:

1. Pain
2. Hemarthrosis
3. Patellar mobility
4. ROM
5. Quadriceps contraction
6. Soft tissue tightness/flexibility.
7. Subjective functional scores (eg LEFS)

Goals:

1. Diminish inflammation, swelling and pain of the knee.
2. Gradually increase PROM (restore full extension)
3. Re-establish quadriceps muscle control.
4. Wean patient off crutches and emphasize normal gait.

Precautions:

1. Watch for infection (constant throbbing pain, systemic signs), DVT
2. No weight bearing with flexion > 90
3. Avoid tibial rotation for 8 wks to protect meniscus

Treatment Summary:

1. Modalities include electrical stimulation for re-education of quadriceps contraction or electrical stimulation for pain relief (IFC, TENS) or edema control (HVPG). Ice and compression (elevation) for pain control should also be used as appropriate.
2. Mobs/MFR: Initiate patellar mobilization for normal patellar mobility, manual retrograde massage (efflurage) for swelling, soft tissue massage for muscle guarding and pain.
3. Range of motion exercises include but not limited to heel slides, heel props, wall slides, prone hangs, ankle pumps. Goal 0-90 NWB 2 wks.
4. Stretching for flexibility of lower extremity musculature includes but not limited to the following musculature hamstrings, gastrocnemius, iliotibial band, hip flexors.
5. Strengthening exercises include but not limited to Quadricep sets, gluteus sets, SLR all directions, SAQ for 0-2 wks. NWB proprioceptive exercises. Lumbopelvic/ "core" stabilization exercises.
6. Gait training: Weight bearing Status: PWB:0-2 wks (up to 50%)
7. Bracing: 0-1 wk: locked in extension for sleeping, 0-2 wks locked in extension for WB activities

Criteria for progression:

1. If greater than 10% bilateral difference in swelling, ROM then rehab focused on specific parameter.
2. Good pain control (< 2-3/10 with all exercise)
3. Performance of SLR without an extension lag.

Phase II: Early Rehabilitative (ER) 2-8 weeks

Evaluate:

1. Pain
2. Hemarthrosis
3. Patellar mobility
4. ROM
5. Quadriceps contraction
6. Soft tissue tightness/flexibility.
7. Subjective functional scores (eg LEFS)

Goals:

1. Diminish inflammation, swelling and pain of the knee.
2. Gradually increase PROM (restore full extension)
3. Re-establish quadriceps muscle control.
4. Wean patient off crutches and emphasize normal gait.

Precautions:

1. Watch for infection (constant throbbing pain, systemic signs), DVT

2. No weight bearing with flexion > 90
3. Avoid tibial rotation for 8 wks to protect meniscus

Treatment Summary:

1. Modalities include electrical stimulation for re-education of quadriceps contraction or electrical stimulation for pain relief (IFC, TENS) or edema control (HVPG). Ice and compression (elevation) for pain control should also be used as appropriate.
2. Mobs/MFR: Initiate patellar mobilization for normal patellar mobility, manual retrograde massage (efflurage) for swelling, soft tissue massage for muscle guarding and pain.
3. Range of motion exercises include but not limited to heel slides, heel props, wall slides, prone hangs, ankle pumps. Goal progress to WFL as tolerated NWB.
4. Stretching for flexibility of lower extremity musculature includes but not limited to the following musculature hamstrings, gastrocnemius, iliotibial band, hip flexors.
5. Strengthening exercises Continue/progress with previous phase. Add CKC exercises heel raises, PWB squats, TKE. Activities with brace for 6 wks and then without brace to tolerance.
6. Gait training: Weight bearing Status: PWB:0-2 wks (up to 50%), 2-6 wks progressive WB and wean off crutches when gait normalizes.
7. Bracing: 0-1 wk: locked in extension for sleeping, 0-2 wks locked in extension for WB activities, 2-6 wks locked 0-90. Discontinue brace after 6 wks

Criteria for progression:

8. If greater than 10% bilateral difference in swelling, ROM then rehab focused on specific parameter.
9. Good pain control (< 2-3/10 with all exercise)
10. Performance of SLR without an extension lag.

Phase III: Progressive Strengthening (PS) 8-12 weeks

Evaluate:

1. Pain
2. Effusion
3. Patellar mobility
4. ROM 0-120
5. Quadriceps contraction
6. Soft tissue tightness/flexibility
7. Subjective functional scores (eg LEFS)

Goals:

1. Obtain a full unrestricted range of motion
2. Develop good muscle control and early proprioceptive skills
3. Restore independent ambulation with normal gait
4. Reduce any persistent effusion
5. Early recognition of complications (motion loss, RSD, patellofemoral changes)
6. To return patient to normal function.

Treatment Summary:

1. Physician/physical therapist will determine when to discontinue the crutches, and brace.
2. Modalities include electrical stimulation for re-education of quadriceps contraction or electrical stimulation for pain relief (IFC, TENS) or edema control (HVPG). Ice and compression (elevation) for pain control should also be used as appropriate.
3. Mobs/MFR: Includes but not limited to patellar mobilization for normal patellar mobility, manual retrograde massage (efflurage) for swelling, soft tissue massage for muscle guarding and pain. May initiate tibiofemoral joint glides to improve knee range of motion.
4. Range of motion exercises include but not limited to heel slides, wall slides, Prone hangs, ankle pumps. Goal full knee ROM.
5. Stretching: same as previous phase.
6. Strengthening exercises include but not limited to multi-angle isometric Quadricep sets, SLR all planes, active/resisted knee extension (90-30). Add resistance to Quadriceps exercise not greater than 10% body weight. Closed chain exercises (CKC) includes but not limited to heel raise, Mini squats, step ups forward/sideways in protected range. Initiate hamstring curls to 90, lunges, multihip and leg press exercises (limit ROM 0-90).
7. Balance training includes weight shifting, progression to single leg balance (upper extremity and lower extremity movement eg ball throws), balance board

8. Aerobic exercise can include leg bike (initially for ROM progressing to aerobic conditioning. Try higher seat adjustment to limit knee flexion ROM).
9. Gait training: FWB and gait training without crutches. Cone/cup walking and lateral step over cone exercises for normalization of gait.

Criteria for progression:

1. No increase in effusion with 20-30 minutes of biking or ambulating.
2. Good pain control (< 2-3/10 with exercises)
3. If greater than 10% bilateral difference in swelling, 0-120 ROM then rehab focused on specific parameter.
4. Patient has normal gait pattern

Phase IV: Advanced Activity (AA) 12 wks – 5 months

Evaluate:

1. Pain
2. Effusion
3. Patellar mobility
4. ROM
5. Muscle control/Manual muscle testing.
6. Gait
7. Soft tissue tightness/flexibility
8. Subjective functional scores (eg LEFS)

Goals:

1. Continue to improve total leg strength
2. Improve endurance capacity of the muscles
3. Improve proprioceptive, balance and neuromuscular control
4. Improve limb confidence and function

Treatment Summary:

1. Modalities PRN as indicated. Ice and compression (elevation) for pain control should also be used as appropriate.
2. Mobs/MFR: Patellorfemoral and Tibiofemoral joint mobs PRN. Initiate perturbation training.
3. Range of motion: Focus on end range of motion exercises.
4. Stretching: same as previous phase.
5. Strengthening exercises: Continue/progress strengthening exercises phase II. Progress to resisted hamstring curls to 90, multihip and leg press exercises, step ups forwards/sideways and backwards, lunges, tubing walks. Advanced strengthening exercises can be added on unstable surfaces (eg squats on BOSU or balance board), lunges per patient tolerance. Emphasize single leg exercises to decrease compensation.
6. Balance training includes single leg balance, balance board, BOSU, reaction ball, star balance (introduce knee torque across the body reaching by week 8-9)
7. Aerobic exercise can include leg bike, pool walking/running, swimming (Avoid whip/frog kick), elliptical, stair machine, and ski machine
8. Gait training: Cone/cup walking exercises for normalization of gait. Backward walking for co-ordination.
9. Gentle plyometric exercises on level surfaces double legged by week 16 if < 20% deficits on isokinetic testing. Progress plyometric and box drills by week 20-24.
10. Running program: Initiate return to running at wk 16. Includes but not restricted to jogging straight line, backpedals, progression to quick starts and stops and increasing speed and distance. Running and agility (and cutting maneuvers) drills only if < 30% deficit on isokinetic testing and/by wk 20.
    a. Sprint-Front
    b. Sprint Retro Run
    c. Side Shuffles – Both Ways
    d. Cariocas – Both Ways
    e. Figure 8's – Both Ways
    f. 45° Angle Cuts – Both Ways
    g. 90% Angle Cuts – Both Way
    h. Cross-Over Steps – Both Ways
11. Sports: Can initiate light sports specific exercises at 20-24 weeks

Criteria for Progression:

1. Balance and proprioception should be within 10% of the uninvolved lower extremity.
2. Full pain free AROM equal to uninvolved LE.

3. Less than 25% difference in quadriceps side to side comparison with isokinetic testing at wk 12
4. Isokinetic values (at 180°) quadriceps bilateral comparison 75%, equal hamstrings bilaterally, quadriceps peak torque/body weight 65% at 180°/sec (males) 55% at 180° (females), hamstrings quadriceps ratio 66% to 75%, hop test (80-90% of uninvolved leg).

Phase V: Return to Sports > 5 mos

Evaluate:

1. Manual muscle testing.
2. Functional tests , Isokinetic Testing.
3. Sports Specific Testing
4. Subjective functional scores (eg LEFS)

Goals:

1. 10-15% difference in Isokinetic testing
2. 85% of uninvolved lower extremity on functional tests (one legged distance hop, one-legged timed hop, % limb symmetry)
3. Proprioceptive test 100% of opposite side
4. Return to sports safely and with confidence

Treatment Summary:

1. Continue stretching exercises.
2. Continue strengthening exercises.
3. Continue neuromuscular control drills
4. Functional Training: Plyometric training (box hops), sports specific drills if < 15% deficits on isokinetic test.
5. Progress sports specific training: running/cutting/agility drills. Gradual return to sports drills.
6. Balance exercises: Continue and progress Phase IV
7. Aerobic exercise can include leg bike, water walking, swimming, walking, stair machine, ski machine.

Criteria for return to Sports/Work (5-6 mos)

1. No pain or effusion with full ROM
2. Isokinetic strength: quadriceps bilateral comparison 80% or greater, hamstrings bilateral comparison of 110%, quadriceps torque/body weight ratio 55% or greater, hamstrings/quadriceps ratio 70% or greater
3. Functional tests 90% of uninvolved LE
4. Proprioceptive test 100% of contralateral side.
5. Light recreational sports at 12 months with clearance from physician.