ACL Reconstruction Rehabilitation
Allograft
Kyle F. Chun, MD

[ ] Meniscus Repair (If checked, WBAT in brace in full extension, ROM 0-90 x 6 wks; WBAT 0-90, ROM 0-120 weeks 7-12; WBAT/ROMAT 12+ weeks, no squats/loaded flexion past 90 until week 18)

[ ] Radial Meniscus Repair (If checked, NWB/ROM 0-90 x 6 wks; WBAT 0-90, ROM 0-120 weeks 7-12; WBAT/ROMAT 12+ weeks, no squats/loaded flexion past 90 until week 18)

Preoperative
Goals:
1. Full Active Range of Motion (Flexion and Extension)
2. Restore Quadriceps Strength
3. 0 – Minimal swelling
4. Normalized Walking (gait) pattern
5. Patient independent in HEP and postoperative instruction

Treatment:
1. Modalities to reduce inflammation and pain
2. Compression garment/bandaging PRN
3. ROM, Stretching, Grade2-3 joint mob involved knee, PF mobilization
4. General LE stretching for ankle and hip
5. Progress from PROM to A/A ROM to AROM
6. Quad Sets, SLR, SAQ progressed to LAQ, Leg Press minimal resistance (then progress), wall squats, Stationary Bike when patient has enough ROM
7. Other Exercises: Bridging, Resisted plantar and dorsi flexion, SLR, hip abduction, hip flexion, adductor squeezing, heel slides, hamstring sets, resisted knee flexion
8. Gait train progressing normalized gait with assistive device(s), progressing to without an assistive device and a normalized gait pattern and fair balance
Phase I: Range of motion (weeks 1 – 3)

Goals:
1. Regain ROM (0-120)
2. Normal gait
3. Minimize/eliminate inflammation, allow incisions to heal
4. Limit muscle atrophy

Precautions:
1. Weight bearing: as tolerated with crutches and brace in full extension
2. ROM: passive and active as tolerated
3. Brace: locked in extension while weight bearing, unlock or remove during rest. Sleep with brace. Unlock brace during weight bearing after adequate quad control has been obtained.

WEIGHTBEARING/CRUTCHES/GAIT

- Use brace locked in full extension during weight bearing with crutches until patient able to do straight leg raise without extension lag
- Crutches: progress as tolerated
  - FWB in brace locked in extension using crutches
  - FWB with crutches with brace unlocked
  - FWB with crutches without brace
  - Wean crutches as tolerated
- Walk with a smooth, even paced heel-toe lift off gait: DO NOT LIMP. Do not walk on toes or with a bent knee. Establishing a normal gait early is important.

ROM

- Flexion as tolerated
- Regain/maintain full knee extension.
- At the end of 3 weeks: ROM goal is 120° - full ROM with full extension
- May use ice, and compression during this phase to address soft tissue swelling and effusion as needed

HOME EXERCISE

- ROM: Patellar mobilizations, stationary bike, other methods of ROM to attain full extension (compared contralaterally) and 120° of flexion. Stretches need to be done 5x/day.
• STRENGTHENING: 30-40 repetitions, 1-2 times daily: quad sets along with Progressive Resistance Exercises (PREs) (3-way straight leg raises and prone knee flexion)
• MODALITIES: Ice: post exercise

**Progression Criteria:**
• Gain and maintain full extension (do not force hyperextension)
• Minimum flexion to 100 degrees (preferably to 120)
• Decrease post-operative swelling, obtain complete wound healing
• Progress toward independent walking
• Initiate strengthening program

**Phase II: Strength (weeks 3 – 6)**

**Goals:**
1. Full ROM (0-130 degrees)
2. Normal gait
3. Regain quadriceps strength

**Precautions:**
1. Weight bearing: as tolerated
2. ROM: passive and active as tolerated
3. Brace: discontinued
4. Avoid Open Kinetic Chain (OKC) resisted knee exercises

**WEIGHTBEARING**
- Full WB without crutches, smooth normal gait pattern, no limping
- Can begin backwards walking on a treadmill once FWB without the brace and crutches

**ROM**
- Continue with Phase I exercises as needed
- Continue flexion as tolerated and attain/maintain full extension

**STRENGTHENING (Closed Chain)**
- Add Closed Kinetic Chain (CKC) exercises: Partial squats, Leg Press, Wall Squats, Calf Raises, step ups (progress to step downs), stationary bike, stool scoots
• Begin core and hip abductor strengthening and incorporate into HEP

CONDITIONING
• 3x/week for 20 minutes on an exercise bike with normal, smooth pedaling

Progression Criteria:
• ROM: full hyperextension and 130° of flexion
• Confident, smooth gait pattern
• Begin functional strengthening

Phase III: Power (weeks 6 – 12)
Goals:
1. Obtain consistent core/pelvic/hip abductor control
2. Maintain quadriceps strength
3. Demonstrate adequate landing/squatting mechanics

Precautions:
1. No running/jogging
2. No lateral or pivoting movements
3. Avoid quick deceleration motions

WEIGHTBEARING
• Independent with a heel toe gait pattern, equal strides, no limping.

ROM
• Full ROM in flexion and extension; continue ROM exercises in Phase I and Phase II as needed. (These can be discontinued when ROM is equal on both sides).

STRENGTHENING
• Advance closed chain activities as function dictates
• Continue focus on core and hip abductor strengthening, add progressive double-leg squat mechanics for hip stabilizer strengthening

CONDITIONING
• 3x/week for 20 minutes on an exercise bike with normal pedaling
• Initiate elliptical training at 8 weeks if adequate strength is present

BALANCE
• Begin single leg balance progression (static, dynamic, reactive)
• Proprioception: progress from level planes, incline and mini tramp surfaces

MODALITIES
• Ice after exercises (20-30 minutes)

Functional Training Stage 1: (beginning at 12 weeks depending on function)
• Initiate landing progression:
  o Unsupported Landing 2 legs 12-14 weeks
  o Unsupported landing 1 leg at 14-16 weeks

Progression Criteria:
• >80% quadriceps circumference
• Walk up and down stairs using both legs easily
• Must be able to land with flexed knees and no valgus deviation at the knee
• Must be able to do double-leg squats to 90 degrees of knee flexion maintaining appropriate pelvic tilt and hip abduction, avoiding valgus at the knee

Phase IV: Function (weeks 12-24)
Goals:
1. Regain equal limb strength
2. Flat to uneven ground running
3. Complete functional training
Precautions:
1. Do not institute running program until AFTER 16 weeks
2. No functional testing before 5 months
3. Progress through functional training IN ORDER

EXERCISES
• Exercise daily to maintain ROM and advance strength and function to return to regular activities
  o ROM- daily
  o Strengthening- 3x/week

Running Week
• Running Program: start basic running program at 16 weeks status post when leg strength, full knee ROM and no-trace swelling are present. Emphasis on gait: normal with full knee extension.

Functional Testing: Greater than 5 months
• Outcomes Testing: Single leg hop to determine function. Patient should have completed stage 1 of functional training. Perform between status post weeks 12 to 16. This must be completed prior to progressing the patient to functional training and sport specific training

Functional Training: (5 - 6 months or greater depending on function)
Start only after stage 1 in phase III is complete. Complete each stage prior to proceeding.
• Stage 2: start with both feet and progress to involved leg
  o Unsupported linear
  o Unsupported hopping in a box pattern
  o Diagonal hopping
  o Straight line hopping – 4 hops forward, then backward
  o Zigzag hopping
• Stage 3: Hopping and running
  o Single leg hop
  o Landings – jump off 2” height forward, backward and to each side – weight evenly distributed
  o Resisted jogging – elastic band at waist – jog backwards, then forwards; progress to forward shuffles, carioca.
• Stage 4: Progress to Running Agility Program (3x/week)

Sport Specific Functional Activities
• Initiate after the completion of Functional Training Stage 3

MODALITIES:
• Ice after exercises (20-30 minutes)
Return to sport criteria:

- Full ROM
- Achieve normal activities on uneven surfaces
- Obtain at least 85% single leg hop test scores compared to the uninjured limb
- Able to demonstrate all functions of their sport at full speed with full balance and proprioception, and no evidence of compensation or pain