



## ***Accelerated Rehabilitation Following ACL Allograft Reconstruction***

### **I. PREOPERATIVE PHASE**

#### **Goals**

- Diminish inflammation, swelling, and pain
- Restore normal range of motion (especially knee extension)
- Restore voluntary muscle activation
- Provide patient education to prepare patient for surgery

#### **Brace**

- Elastic wrap or knee sleeve to reduce swelling

#### **Weightbearing**

- As tolerated with or without crutches

#### **Exercises**

- Ankle pumps
- Passive knee extension to zero
- Passive knee flexion to tolerance
- Straight leg raises (3 way, flexion, abduction, adduction)
- Quadriceps setting
- Closed kinetic chain exercises: mini squats, lunges, set-ups

#### **Muscle Stimulation**

- Electrical muscle stimulation to quadriceps during voluntary quadriceps exercises (4 to 6 hours per day)

#### **Neuromuscular/Proprioception Training**

- Eliminate quad avoidance gait
- Retro stepping drills
  - Joint repositioning drills (passive/active repositioning)

#### **Cryotherapy/Elevation**

- Apply ice 20 minutes of every hour
- Elevate leg with knee in full extension (knee must be above heart)



### **Patient Education**

- Review postoperative rehabilitation program
- Review instructional video (optional)
- Select appropriate surgical date

## **II. IMMEDIATE POSTOPERATIVE PHASE (Day 1 to Day 7)**

### **Goals**

- Restore full passive knee extension
- Diminish joint swelling and pain
- Restore patellar mobility
- Gradually improve knee flexion
- Re-establish quadriceps control
- Restore independent ambulation

### **Postoperative Day 1**

#### **Brace**

- Postoperative brace/immobilizer applied to knee, locked in full extension during ambulation

#### **Weightbearing**

- Two crutches, weightbearing as tolerated

#### **Exercises**

- Ankle pumps
- Overpressure into full, passive knee extension
- Active and passive knee flexion (90° by day 5)
- Straight leg raises (flexion, abduction, adduction)
- Quadriceps isometric setting
- Hamstring stretches
- Closed kinetic chain exercises: mini squats, weight shifts

#### **Muscle Stimulation**

- Use muscle stimulation during active muscle exercises (4-6 hours per day)

#### **Ice and Elevation**

- Ice for 20 minutes out of every hour
- Elevate with knee in full extension



### Postoperative Day 2 to 3

#### **Brace**

- Postoperative brace/immobilizer, locked at 0° extension for ambulation and unlocked for sitting, etc.

#### **Weightbearing**

- Two crutches, weightbearing as tolerated

#### **Range of Motion**

- Remove brace to perform range of motion exercises (4-6 times per day)

#### **Exercises**

- Multi-angle isometrics † 90° and 60° (knee extension)
- Knee extension 90°-40°
- Overpressure into extension (knee extension should be at least 0° to slight hyperextension)
- Patellar mobilization
- Ankle pumps
- Straight leg raises (3 directions)
- Mini squats and weight shifts
- Quadriceps isometric setting

#### **Muscle Stimulation**

- Electrical muscle stimulation to quads (6 hours per day)

#### **Ice and Elevation**

- Ice for 20 minutes out of every hour
- Elevate leg with knee in full extension

### Postoperative Day 4 to 7

#### **Brace**

- Postoperative brace/immobilizer, locked at 0° extension for ambulation and unlocked for sitting, etc.

#### **Weightbearing**

- Two crutches weight bearing as tolerated



### **Range of Motion**

- Remove brace to perform range of motion exercises 4-6 times per day, knee flexion 90° by day 5, approximately 100° by day 7

### **Exercises**

- Multi-angle isometrics at 90° and 60° (knee extension)
- Knee extension 90°-40°
- Overpressure into extension (full extension 0° to 5-7° hyperextension)
- Patellar mobilization (5-8 times daily)
- Ankle pumps
- Straight leg raises (3 directions)
- Mini squats and weight shifts
- Standing hamstring curls
- Quadriceps isometric setting
- Proprioception and balance activities

### **Neuromuscular Training/Proprioception**

- OKC passive/active joint repositioning at 90°, 60°
- CKC squats/weight shifts with repositioning

### **Muscle Stimulation**

- Electrical muscle stimulation (continue 6 hours daily)

### **Ice and Elevation**

- Ice for 20 minutes of every hour
- Elevate leg with knee in full extension

### **Criteria to progress to Phase III**

- Quad control (ability to perform good quad set and SLR)
- Full passive knee extension
- PROM 0-90°
- Good patellar mobility
- Minimal joint effusion
- Independent ambulation



### III. EARLY REHABILITATION PHSE (Week 2-4)

#### Goals

- Maintain full passive knee extension (at least 0 to 5-7 hyperextension)
- Gradually increase knee flexion
- Diminish swelling and pain
- Muscle control and activation
- Restore proprioception/neuromuscular control
- Normalize patellar mobility

#### Week Two

##### Brace

- Continue locked brace for ambulation

##### Weightbearing

- As tolerated (goal is to discontinue crutches 10-14 days postop)

##### Passive range of motion

- Self-ROM stretching (4-5 times daily), emphasis on maintaining full, passive range of motion

##### Exercises

- Muscle stimulation to quadriceps exercises
- Isometric quadriceps sets
- Straight leg raises (4 planes)
- Leg press (0-60°)
- Knee extension 90-40°
- Half squats (0-40)
- Weight shifts
- Front and side lunges
- Hamstring curls standing (active ROM)
- Bicycle (if ROM allows)
- Proprioception training
- Overpressure into extension
- Passive range of motion from 0 to 100°
- Patellar mobilization
- Well leg exercises
- Progressive resistance extension program – start with 1 lb., progress 1 lb. per week



### **Proprioception/Neuromuscular Training**

- OKC passive/active joint repositioning 90°, 60°, 30°
- CKC joint repositioning during squats/lunges
- Initiate squats on tilt board

### **Swelling control**

- Ice, compression, elevation

## Week Three

### **Brace**

- Discontinue locked brace (some patients use ROM brace for ambulation)

### **Passive Range of Motion**

- Continue range of motion stretching and overpressure into extension (ROM should be 0-100°/105°)

### **Exercises**

- Continue all exercises as in week two
- Passive range of motion 0-105°
- Bicycle for range of motion stimulus and endurance
- Pool walking program (if incision is closed)
- Eccentric quadriceps program 40-100 (isotonic only)
- Lateral lunges (straight plane)
- Front step downs
- Lateral Step overs (cones)
- Stair Stepper machine
- Progress proprioception drills, neuromuscular control drills
- Continue passive/active reposition drills on sports RAC (CKC, OKC)

### **Criteria to Progress to Phase IV**

- Active range of motion 0-115°
- Quadriceps strength 60% > contralateral side (isometric test at 60° knee flexion)
- Minimal to no full joint effusion
- No joint line or patellofemoral pain



#### IV. PROGRESSIVE STRENGTHENING/NEUROMUSCULAR CONTROL PHASE (WEEK 4-10)

##### Goals

- Restore full knee range of motion (0 to 125%)
- Improve lower extremity strength
- Enhance proprioception, balance, and neuromuscular control
- Improve muscular endurance
- Restore limb confidence and function

##### Brace

- No immobilizer or brace, may use knee sleeve to control swelling/support

##### Range of motion

- Self-ROM 94-5 times daily using the other leg to provide ROM), emphasis on maintaining 0° passive extension
- PROM 0-125° at 4 weeks

##### Week 4

##### Exercises

- Progress isometric strengthening program
- Leg press (0-100°)
- Knee extension 90° to 40°
- Hamstring curls (isotonics)
- Hip abduction and adduction
- Hip flexion and extension
- Lateral step overs
- Lateral lunges (straight plane and multi-plane drills)
- Lateral step ups
- Front step downs
- Wall squats
- Vertical squats
- Standing toe calf raises
- Seated toe calf raises
- Biodex stability system (balance, squats, etc.)
- Proprioception drills
- Bicycle
- Stair Stepper machine
- Pool program (backward running, hip and leg exercises)



### **Proprioception/Neuromuscular Drills**

- Tilt board squats (perturbation)
- Passive/active reposition OKC
- CKC repositioning on tilt board with sports RAC
- CKC lunges with sports RAC

### **Week 6**

#### **Exercises**

- Continue all exercises
- Pool running (forward) and agility drills
- Balance on tilt boards
- Progress to balance and ball throws
- Wall slides/squats

### **Week 8**

#### **Exercises**

- Continue all exercises listed in weeks 4-6
- Leg press sets (single leg) 0-100° and 40-100°
- Plyometric leg press
- Perturbation training
- Isokinetic exercises (90° to 40°) (120° to 240°/second)
- Walking program
- Bicycle for endurance
- Stair Stepper machine for endurance
- Biodex stability system
- Tilt board squatting

### **Week 10**

#### **Isokinetic Test**

- Concentric knee extension/flexion at 180° and 300°/second

#### **Exercises**

- Continue all exercises listed in weeks 6, 8, and 10
- Plyometric training drills
- Continue stretching drills
- Progress strengthening exercises and neuromuscular training





#### Criteria to Progress to Phase V

- AROM 0-125° or greater
- Quad strength 75% of contralateral side, knee extension flexor:extensor ratio 70% to 75%
- No pain or effusion
- Satisfactory clinical exam
- Satisfactory isokinetic test (values at 180°)
  - Quadriceps bilateral comparison 75%
  - Hamstrings equal bilateral
  - Quadriceps peak torque/body weight 65% at 180°/s (males, 55% at 180°/s (females)
  - Hamstrings/quadriceps ratio 66% to 75%
- Hop test (80% of contralateral leg)
- Subjective knee scoring (modified Noyes System) 80 points or better

#### V. **ADVANCED ACTIVITY PHASE (Week 10-16)**

##### Goals

- Normalize lower extremity strength
- Enhance muscular power and endurance
- Improve neuromuscular control
- Perform selected sport-specific drills

##### Exercises

- May initiate running program (weeks 10-12)
- May initiate light sport program (golf)
- Continue all strengthening drills
  - Leg press
  - Wall squats
  - Hip abd/adduction
  - Hip flex/ext
  - Knee extension 90°-40°
  - Hamstring curls
  - Standing toe calf
  - Seated toe calf
  - Step down
  - Lateral step ups
  - Lateral lunges



- Neuromuscular training
  - Lateral step overs cones
  - Lateral lunges
  - Tilt board drills

### Week 14-16

- Progress program
- Continue all drills above
- May initiate lateral agility drills
- Backward running

### **Criteria to Progress to Phase VI**

- Full range of motion
- Isokinetic test that fulfills criteria
- Quadriceps bilateral comparison (80° or greater)
- Hamstring bilateral comparison (110% or greater)
- Quadriceps torque/body weight ratio (55% or greater)
- Hamstrings/quadriceps ratio (70% or greater)
- Proprioceptive test (110% of contralateral leg)
- Functional test (95% or greater of contralateral side)
- Satisfactory clinical exam
- Subjective knee scoring (modified Noyes System) (90 points or better)

## VI. **RETURN TO ACTIVITY PHASE (Month 16-22)**

### **Goals**

- Gradual return to full, unrestricted sports
- Achieve maximal strength and endurance
- Normalize neuromuscular control
- Progress skill training



### **Exercises**

- Continue strengthening exercises
- Continue neuromuscular control drills
- Continue plyometrics drills
- Progress running and agility program
- Progress sport specific training
  - Running/cutting/agility drills
  - Gradual return to sport drills

### **6 Month Followup**

- Isokinetic test
- KT 2000 test
- Functional test

### **12 Month Followup**

- Isokinetic test
- KT 2000 test
- Functional test