

## REHABILITATION FOLLOWING ACL RECONSTRUCTION WITH HAMSTRING

### I. IMMEDIATE POST-OPERATIVE PHASE

#### POD 1

Brace - Brace locked at zero degrees extension for ambulation (may lock at 0 to apply brace, then once brace strapped on, unlock and push to -10 so that full extension may be passively achieved)

Weight Bearing - Two crutches as tolerated (likely less than 50 %)

Range of Motion - Full passive extension (0-90 degrees)

Exercises

- \* Ankle pumps
- \* Passive knee extension to zero
- \* Straight leg raise (flexion)
- \* Hip Abd/Adduction
- \* Knee Extension 90-40 degrees
- \* Quad sets
- \* Hamstring stretch

Muscle Stimulation - Muscle stimulation to quads (4-6 hours per day) during active exercises & ADL's

CPM - Zero to 90 degrees

Ice and Evaluation - Ice 20 minutes out of every hour and elevate with knee in extension

#### POD 2 to 7

Brace - Brace locked at zero degrees extension for ambulation

Weight Bearing - Two crutches as tolerated

Range of Motion - Patient out of brace 4-5 times daily to perform self ROM 0-90/100 degrees

Exercises

- \* Intermittent ROM exercises (0-90 degrees)
- \* Patellar mobilization
- \* Ankle pumps
- \* Straight leg raises (4 directions)
- \* Standing weight shifts and mini squats [(0-30) ROM]
- \* Knee extension 90-40 degrees
- \* Continue quad sets

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

CPM - Zero to 90 degrees

Ice and Elevation - Ice 20 minutes out of every hour and elevate with knee in extension

**II. MAXIMUM PROTECTION PHASE (Week 2-8)**

Goals: Absolute control of external forces and protect graft  
Nourish articular cartilage  
Decrease swelling  
Prevent quad atrophy

**A: Week Two**

Brace - Brace locked at zero degrees for ambulation only, unlocked for self ROM (4-5 times daily)

Weight Bearing - As tolerated (goal to discontinue crutches 7-10 days post op)

Range of Motion - Self ROM (4-5 times daily), emphasis on maintaining zero degrees passive extension

KT 2000 Test - (15 lb. anterior-posterior test only)

Exercises

- \* Multi-angle isometrics at 90, 60, 30 degrees
- \* Leg raises (4 planes)
- \* Hamstring curls (isometrics)
- \* Knee extension 90-40 degrees
- \* Mini squats (0-40) and weight shifts
- \* Lunges
- \* Leg Press (0-60)
- \* PROM/AAROM 0-105 degrees
- \* Patellar mobilization
- \* Hamstring and calf stretching
- \* Proprioception training
- \* Well leg exercises
- \* PRE Program - start with 1 lb., progress 1 lb. per week

Swelling control - Ice, compression, elevation

**B: Week Four**

Brace - Brace locked at zero degrees for ambulation only, unlocked for self ROM (4-5 times daily)

Range of Motion - Self ROM (4-5 times daily), emphasis on maintaining zero degrees passive extension

Exercises

- \* Same as week two
- \* PROM 0-125 degrees
- \* Bicycle for ROM stimulus and endurance
- \* Pool walking program, swimming
- \* Initiate eccentric quads 40-100 (isotonic only)

- \* Leg press (0-60)
- \* Emphasize CKC exercise
- \* Stairmaster
- \* Nordic Track

KT 2000 Test - (Week 4, 20 lb. anterior and posterior test)

**Phase Two:** Continued

**C: Week Six**

Brace - Discontinue use of drop locked brace

Exercises

- \* Same as week four
- \* Hamstring Curls (light resistance)
- \* Pool Program
- \* AROM 0-115 degrees
- \* PROM 0-125 degrees
- \* Emphasize closed chain exercises
- \* Bicycle/Stairmaster etc.

KT 2000 Test - (Week 6, 20 lb. and 30 lb. anterior and posterior test)

**D: Week Eight**

Brace - Consider use of functional brace

Exercises - Continue PRE program

KT 2000 Test - (Week 8, 20 lb. and 30 lb. anterior and posterior test)

**III. MODERATE PROTECTION PHASE (Week 10-16)**

Goals: Maximal strengthening for quads/lower extremity  
Protect patellofemoral joint

**A: Week 10**

Exercises

- \* Knee extension (90-40 degrees)
- \* Leg press (0-60)
- \* Mini squats (0-45)
- \* Lateral step ups
- \* Hamstring curls
- \* Hip Abd/Add
- \* Toe/calf raises
- \* Bicycle
- \* Stairmaster
- \* Wall Squats
- \* Lunges
- \* Pool running

- \* Proprioceptive training
- \* Continue PRE progression (no weight restriction)

**B: Week 12-14**

Exercise - Continue all above exercises

Testing - Isokinetic Test (180/300 degrees/sec, Full ROM, 10/15 reps)  
KT 2000 Test - Total Displacement at 15 lb., 20 lb. and 30 lb., Manual

Maximal Test

Maintain/Begin running (if patient fulfills criteria)

**IV. LIGHT ACTIVITY PHASE (Month 4-5)**

Criteria to Enter Phase IV

79%

- \* AROM 0-125 degrees >
- \* Quad strength 70% of contralateral side, knee flexor/extensor rated 70-79%
- \* No change in KT scores (+2 or less)
- \* Minimal/no effusion
- \* Satisfactory clinical exam

Goals: Development of strength, power, endurance  
Begin gradual return to functional activities

**A: Week 20-21**

Exercises

- \* Emphasize eccentric quad work
- \* Continue closed chain exercises, step-ups, mini-squats, leg press
- \* Continue knee extension 90-40 degrees
- \* Hip abduction/adduction
- \* Initiate plyometric program
- \* Initiate running program
- \* Initiate agility program
- \* Sport specific training and drills
- \* Hamstring curls and stretches
- \* Calf raises
- \* Bicycle for endurance
- \* Pool running (forward/backward)
- \* Walking program
- \* Stairmaster
- \* High speed isokinetics

Testing - Isokinetic Test (180/300 degrees/sec, Full ROM, 10/15 reps)  
KT 2000 Test - Total Displacement at 15 lb., 20 lb. and 30 lb., Manual

Maximal Test

Criteria for Running

Isokinetic Test - 85% > of opposite leg (quads), 90% > of opposite leg (hamstring)

55% females) Isokinetic Test - Quad torque/body weight (180 degrees/sec) (60-65% males)(50-

KT 2000 Test - Unchanged  
No Pain/Swelling  
Satisfactory clinical exam

Functional Drills

- \* Straight line running
- \* Jog to run
- \* Walk to run

**V. RETURN TO ACTIVITY PHASE (Month 6 - 7)**

Goals: Achieve maximal strength & endurance  
Return to sport activities

\* Continue strengthening program for one year from surgery

4 Quads

Knee Extensions  
Wall Squats  
Leg Press  
Step Ups

4 Endurance

Bicycle  
Stairmaster  
Nordic Trac  
Swimming  
\*Pick One

4 Strength

Hamstring Curls  
Calf Raises  
Hip Abduction  
Hip Adduction

4 Stability

High Speed Hamstrings  
High Speed Hip Flexion/Extension  
Balance Drills  
Backward running