ATHLETIC ORTHOPEDICS & KNEE CENTER
FOOT • ANKLE • HAND • PAIN • SHOULDER • SPINE

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Therapist:_____
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ACCELERATED REHABILITATION FOLLOWING ACL-PTG RECONSTRUCTION

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

Weight Bearing – 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, step-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 on Sports RAC
  - Passive/active reposition at 90, 60, 30 degrees
  - CKC squat/lunge repositioning on screen

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

IMMEDIATE POST-OPERATIVE 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 – EZ Wrap brace/Immobilizer applied to knee, locked in full extension during ambulation of Protonics

Weight Bearing – Two crutches, weight bearing as tolerated

Exercises:

- Ankle pumps
- Overpressure into full, passive knee extension
- Active and Passive knee flexion (90 degree 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)

Continuous Passive Motion – As needed, 0 to 45/50 degrees (as tolerated and as directed by physician)

Ice and Evaluation – Ice 20 minutes out of every our and elevate with knee in full extension

Postoperative Day 2 to 3

Brace – EZ Wrap brace/Immobilizer, locked at zero degrees extension for ambulation and unlocked for sitting, etc.

Weight Bearing – Two crutches, weight bearing as tolerated

Range of Motion – Remove brace perform range of motion exercises 4 to 6 times a day

Exercises:

- Multi-angle isometrics at 90 and 60 degrees (knee extension)
- Knee Extension 90-40 degrees
- Overpressure into extension (knee extension should be at least 0 degrees 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)

Continuous Passive Motion – 0 to 90 degrees, as needed

Ice and Evaluation – Ice 20 minutes out of every hour and elevate leg with knee in full extension

Postoperative Day 4 to 7

Brace – EZ Wrap brace/Immobilizer, locked at zero degrees extension for ambulation and unlocked for sitting, etc.

Weight Bearing – 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 degrees by day 5, approximately 100 degrees by day 7

Exercises:

- Multi-angle isometrics at 90 and 60 degrees (knee extension)
- Knee Extension 90-40 degrees
- Overpressure into extension (full extension 0 degrees 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 degrees
CKC squats/weight shifts with repositioning on sports RAC

Muscle Stimulation – Electrical muscle stimulation (continue 6 hours daily)

Continue Passive Motion – 0 to 90 degrees, as needed

Ice and Elevation – Ice 20 minutes of every hour and elevate leg with knee full extension

EARLY REHABILIATION PHASE (Week 2-4)

Criteria to Progress to Phase II

1) Quad Control (ability to perform good quad set and SLR)
2) Full passive knee extension
3) PROM 0-90 degrees
4) Good patellar mobility
5) Minimal joint effusion
6) Independent ambulation

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

Weight Bearing – As tolerated (goal is to discontinue crutches 10-14 days post op)

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

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

Exercises:

- Muscle stimulation to quadriceps exercises
- Isometric quadriceps sets
- Straight Leg raises (4 planes)
- Leg Press (0-60 degrees)
- Knee extension 90-40 degrees
- 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 degrees
- 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 degrees
- CKC joint repositioning during squats/lunges
- Initiate squats on tilt board use sports RAC with repositioning

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 degrees)

Exercises:

- Continue all exercises as in week two
- Passive Range of Motion 0-105 degrees
- 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)

PROGRESSIVE STRENGTHENING/NEUROMUSCULAR CONTROL PHASE (Week 4-10)

Criteria to Enter Phase III

1) Active Range of Motion 0-115 degrees
2) Quadriceps strength 60 % > contralateral side (isometric test at 60 degree knee flexion)

3) Unchanged KT Test bilateral values (+1 or less)
4) Minimal to no full joint effusion
5) No joint line or patellofemoral pain

Goals:

- Restore full knee range of motion (0 to 125 degrees)
- 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 (4-5 times daily using the other leg to provide ROM), emphasis on maintaining zero degrees passive extension
- PROM 0-125 degrees at 4 weeks

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

Week 4

Exercises:

- Progress isometric strengthening program
- Leg Press (0-100 degrees)
- Knee extension 90 to 40 degrees
- 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

KT 2000 Test – 20 and 30 lb. anterior and posterior test

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

KT 2000 Test – 20 and 30 lb. anterior and posterior test

Exercises:

- Continue all exercises listed in Weeks 4-6
- Leg Press Sets (single leg) 0-100 degrees and 40-100 degrees
- Plyometric Leg Press
- Perturbation Training
- Isokinetic exercises (90 to 40 degrees) (120 to 240 degrees/second)
- Walking Program
- Bicycle for endurance
- Stair Stepper Machine for endurance
- Biodex stability system
- Sports RAC Neuromuscular training on tilt board and Biodex stability

Week 10

KT 2000 Test – 20 and 30 lb. and Manual Maximum Test

Isokinetic Test – Concentric Knee Extension/Flexion at 180 and 300 degrees/second

Exercises:

- Continue all exercises listed in Weeks 6, 8 and 10
- Plyometric Training Drills

- Continue Stretching Drills
- Progress strengthening exercises and neuromuscular training

ADVANCED ACTIVITY PHASE (Week 10-16)

Criteria to Enter Phase IV

1) AROM 0-125 degrees or greater
2) Quad strength 75% of contralateral side, knee extension flexor:extensor ratio 70% to 75%
3) No change in KT values (Comparable with contralateral side, within 2 mm)
4) No pain or effusion
5) Satisfactory clinical exam
6) Satisfactory isokinetic test (values at 180 degrees)
   Quadriceps bilateral comparison 75%
   Hamstrings equal bilateral
   Quadriceps peak torque/body weight 65% at 180^{o}/s (males) 55% at 180^{o}/s (females)
   Hamstrings/quadriceps ratio 66% to 75%
7) Hop Test (80% of contralateral leg)
8) Subjective knee scoring (modified Noyes System) 80 points or better

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
    - Sports RAC repositioning on tilt board

Week 14-16

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

RETURN TO ACTIVITY PHASE (Week 16-22)

Criteria to Enter Phase V

1) Full Range of Motion
2) Unchanged KT 2000 Test (within 2.5 mm of opposite side)
3) Isokinetic Test that fulfills criteria
4) Quadriceps bilateral comparison (80% or greater)
5) Hamstring bilateral comparison (110% or greater)
6) Quadriceps torque/body weight ratio (55% or greater)
7) Hamstrings/Quadriceps ratio (70% or greater)
8) Proprioceptive Test (100% of contralateral leg)
9) Functional Test (85% or greater of contralateral side)
10) Satisfactory clinical exam
11) Subjective knee scoring (modified Noyes System) (90 points or better)

Goals:

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

Tests – KT 2000, Isokinetic, and Functional Tests before return

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 FOLLOW-UP

Isokinetic test
KT 2000 test
Functional test

12 MONTH FOLLOW-UP

Isokinetic test
KT 2000 test
Functional test