



PHYSICAL THERAPY PROTOCOLS

AUTOLOGOUS CHONDROCYTE IMPLANTATION Femoral Condyle Rehabilitation Guidelines

I. PROTECTION PHASE (0-6 WEEKS)

Goals:	<i>Protection of healing tissue from load and shear forces</i> <i>Decrease pain and effusion</i> <i>Restoration of full passive knee extension</i> <i>Gradual improvement of knee flexion</i> <i>Regaining quadriceps control</i>
Brace:	Locked at 0 degrees during weight bearing activities Sleep in locked brace for 2-4 weeks
Weight Bearing:	Non-weight bearing 1-2 weeks (physician direction) Toe touch WB (approx. 20-30 lbs.) Weeks 2-3 Partial WB (approx. 25% body weight) at Weeks 4-5
Swelling/ Inflammation Control:	Cryotherapy (Polar Care or ice pack) Elevation & ankle pumps
Range of Motion:	Immediate motion exercise Full passive knee extension immediately Initiate CPM if ordered Day 1 for 8-12 hrs./day (0-40) <i>For 2-3 weeks – progress ROM 5-10 degrees/day</i> May continue CPM 6-8 hrs./day for 6-8 weeks Patellar and soft tissue mobilization (4-6x/day) Passive knee flexion ROM 2-3 times daily Passive knee flexion ROM goal is 90 degrees Week 1-2 Passive knee flexion ROM goal is 105 degrees by Weeks 3-4 120 degrees by Weeks 5-6 Stretch hamstrings, calf
Strengthening Program:	Ankle pump using rubber tubing Quad setting Multi-angle isometrics (co-contractions Q/H) Active knee extension 90-40 degrees <i>No resistance</i> Straight leg raises (4 directions)

Stationary bicycle when ROM allows
Biofeedback and electrical muscle stimulation, PRN
Isometric leg press at Week 4 (multi-angle)
May begin pool for gait training & exercises Week 4

Functional Activities: Gradual return to daily activities
If symptoms occur, reduce activities to reduce pain and inflammation
Extended standing should be avoided

II. TRANSITION PHASE (6-12 WEEKS)

Goals:
Gradually increase ROM
Gradually improve quadriceps strength/endurance
Gradually increase in functional activities

Criteria to Progress to Phase II:

- 1. Full passive knee extension*
- 2. Knee flexion to 120 degrees*
- 3. Minimal pain and swelling*
- 4. Voluntary quadriceps activity*

Brace: Discontinue brace at 6 weeks
Consider unloading brace

Weight Bearing: Progress WB as tolerated
50% body weight with crutches by 6 weeks
Progress to FWB at 8-9 weeks
Discontinue crutches at 10-12 weeks

Range of Motion: Gradual increase in ROM
Maintain full passive knee extension
Progress knee flexion to 125-135 degrees
Continue patellar mobilization and soft tissue mobilization, as needed
Continue stretching program

Strengthening Exercises: Initiate weight shifts Week 6
Initiate mini-squats 0-45 degrees
Closed kinetic chain exercises (leg press)
Toe-calf raises Weeks 10-12
Open kinetic chain knee extension, increase 1lb/wk
Stationary bicycle (gradually increase time)
Treadmill walking program
Balance and proprioception drills
Initiate front and lateral step-ups
Continue use of biofeedback and EMS, PRN
Continue use of pool for gait training and exercise

Functional Activities: As pain & swelling diminish, may gradually increase functional activities
Gradually increase standing and walking

III. MATURATION PHASE (12-26 WEEKS)

Goals: *Improve muscular strength and endurance*
Increase functional activities

Criteria to Progress to Phase III:

1. Full ROM
2. Acceptable strength level
 - a. Hamstrings w/in 10-20% contralateral leg
 - b. Quadriceps w/in 20-30% of contralateral leg
3. Balance testing within 30% of contralateral leg
4. Able to walk 1-2 miles or bike for 30 minutes

Range of Motion: Patient should exhibit 125-135 degrees flexion – no restrictions

Exercises: Leg Press (0-90 degrees)
Bilateral squats (0-60 degrees)
Unilateral step-ups progressing from 2" to 8"
Forward lunges
Walking program on treadmill
Open kinetic chain knee extension (0-90 degrees)
Bicycle
Stairmaster
Swimming
Elliptical/Nordic Trak

Functional Activities: As patient improves, increase walking (distance, cadence, etc.)

Maintenance Program: Initiate at Weeks 16-20
Bicycle – low resistance, increase time
Progressive walking program
Pool exercises for entire lower extremity
Straight leg raises
Leg press
Wall squats
Hip abduction/adduction
Front lunges, step ups
Stretch quadriceps, hamstrings, calf

IV. RETURN TO ACTIVITY PHASE (26-52 WEEKS)

Goals: *Gradual return to full unrestricted functional activities*

Criteria to Progress to Phase IV:

1. Full non-painful ROM
2. Strength within 80-90% of contralateral extremity
3. Balance and/or stability within 75% of contralateral extremity
4. No pain, inflammation or swelling

Exercises: Continue maintenance program progression 3-4x/wk
Progress resistance as tolerated
Emphasis on entire lower extremity strength & flex.
Progress agility and balance drills
Impact loading program should be specialized to the patient's demands
Progress sport program depending on patient variables

Functional Activities: Patient may return to various sport activities as progression in rehabilitation and cartilage healing allows. Generally, low-impact sports such as skating, rollerblading and cycling are permitted at about 6-8 months. Higher impact sports such as jogging, running and aerobics may be performed at 8-9 months for small lesions, or 9-12 months for larger lesions. High impact sports such as tennis, basketball and baseball are allowed at 12-18 months.