



AUTOLOGOUS CHONDROCYTE IMPLANTATION

Trochlea Rehabilitation Guidelines

PHASE I - PROTECTION PHASE (WEEKS 0-6)

- Goals:
- Protection of healing tissue from load and shear forces
 - Decrease pain and effusion
 - Restoration of full passive knee extension
 - Gradual improvement of knee flexion
 - Regaining quadriceps control
- Brace:
- Locked at 0° during ambulation and weight-bearing activities
 - Sleep in locked brace for 4 weeks
- Weight-Bearing:
- Immediate toe-touch weight-bearing 25% body weight with brace locked in full extension
 - 50% body weight week 2 in brace
 - 75% body weight week 3-4 in brace
- Range of Motion:
- Immediate motion exercise Day 1-2
 - Full passive knee extension immediately
 - Initiate CPM day 1 for total of 8-12 hours/day (0-60°; if lesion > 6cm² 0-40°) for first 2-3 weeks
 - Progress CPM ROM as tolerated 5-10° per day
 - May continue use of CPM for total of 6-8 hours per day for 6 weeks
 - Patellar mobilization (4-6x per day)
 - Motion exercises throughout the day
 - Passive knee flexion ROM 2-3 times daily
 - Knee flexion ROM goal is 90° by 2-3 weeks
 - Knee flexion ROM goal is 105° by 3-4 weeks and 120° by week 6
 - Stretch hamstrings, calf
- Strengthening Program:
- Ankle pump using rubber tubing
 - Quad setting
 - Straight leg raises (4 directions)
 - Toe-calf raises week 2
 - Stationary bicycle when ROM allows

- Biofeedback and electrical muscle stimulation, as needed
 - Isometric leg press at week 4 (multi-angle)
 - Initiate weight shifts week 4
 - May begin pool therapy for gait training and exercise week 4
- Functional Activities:
- Gradual return to daily activities
 - If symptoms occur, reduce activities to reduce pain and inflammation
 - Extended standing should be avoided
- Swelling Control:
- Ice, elevation, compression, and edema modalities as needed to decrease swelling
- Criteria to Progress To Phase II:
- Full passive knee extension
 - Knee flexion to 115/120°
 - Minimal pain and swelling
 - Voluntary quadriceps activity

PHASE II - TRANSITION PHASE (WEEKS 6-12)

- Goals:
- Gradually increase ROM
 - Gradually improve quadriceps strength/endurance
 - Gradual increase in functional activities
- Brace:
- Discontinue brace at 6 weeks
- Weight-Bearing:
- Progress weight-bearing as tolerated
 - Progress to full weight-bearing at 6-8 weeks
 - Discontinue crutches at 6-8 weeks
- Range of Motion:
- Gradual increase in ROM
 - Maintain full passive knee extension
 - Progress knee flexion to 120-125° by week 8
 - Continue patellar mobilization and soft tissue mobilization, as needed
 - Continue stretching program
- Strengthening Exercises:
- Closed kinetic chain exercises (leg press 0-60°) week 8
 - Initiate mini-squats 0-45° week 8
 - Toe-calf raises
 - Open kinetic chain knee extension without resistance
 - Begin knee extension 0-30° then progress to deeper angles

- Stationary bicycle (gradually increase time)
 - Stairmaster at week 12
 - Balance and proprioception drills
 - Initiate front and lateral step-ups
 - Continue use of biofeedback and electrical muscle stimulation, as needed
- Functional Activities:
- As pain and swelling (symptoms) diminish, the patient may gradually increase functional activities
 - Gradually increase standing and walking
- Criteria to Progress To Phase III:
- Full range of motion
 - Acceptable strength level
 - Hamstrings within 10-20% of contralateral leg
 - Quadriceps within 20-30% of contralateral leg
 - Balance testing within 30% of contralateral leg
 - Able to walk 1-2 miles or bike for 30 minutes

PHASE III: REMODELING PHASE (WEEKS 13-32)

- Goals:
- Improve muscular strength and endurance
 - Increase functional activities
- Range of Motion:
- Patient should exhibit 125-135° flexion
- Exercise Program:
- Leg press (0-60°; progress to 0-90°)
 - Bilateral squats (0-60°)
 - Unilateral step-ups progressing from 2" to 6"
 - Forward lunges
 - Walking program on treadmill
 - Open kinetic chain knee extension (90-40°) – progress 1 pound every 10-14 days if no pain or crepitation – must monitor symptoms
 - Bicycle
 - Stairmaster
 - Swimming
 - Nordic-Trak/Elliptical
- Functional Activities:
- As patient improves, increase walking (distance, cadence, incline, etc.)
 - Light running can be initiated toward end of phase based on physician decision
- Maintenance Program:
- Initiate at week 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

Criteria to Progress
to Phase IV:

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

PHASE IV - MATURATION PHASE (8-15 MONTHS)

Goals:

- Gradual return to full unrestricted functional activities

Exercises:

- Continue maintenance program progression 3-4x/week
- Progress resistance as tolerated
- Emphasis on entire lower extremity strength & flexibility
- Progress agility and balance drills
- Progress walking program as tolerated
- Impact loading program should be specialized to the patient's demands
- No jumping or plyometric exercise until 12 months
- Progress sport programs 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 swimming, skating, rollerblading, and cycling are permitted at about 6 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, football and baseball are allowed at 12-18 months.