

## 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 > 6cm<sup>2</sup> 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



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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.