



UNIVERSITY ORTHOPAEDIC CENTER, PA
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AUTOLOGOUS CHONDROCYTE IMPLANTATION Trochlea Rehabilitation Program

PHASE I - Protection Phase (Weeks 0-6)

Goals:

- Protect healing tissue from load and shear forces
- Decrease pain and effusion
- Restoration of full passive knee extension
- Gradually improve 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 4 in brace

Range of Motion:

- Immediate motion exercise Day 1-2
- Full passive knee extension immediately
- Initiate CPM day 1 for 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 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 3 weeks
- Knee flexion ROM goal is 105° by 4 weeks and 120° by week 6
- Stretch hamstrings, calf, and quadriceps (limited ROM)

Strengthening Program:

- Ankle pump using rubber tubing
- Quad setting
- Straight leg raises (4 directions)
- 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

PHASE II - TRANSITION PHASE (WEEKS 6-12)

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

- Criteria to Progress To Phase II:**
- Full passive knee extension
 - Knee flexion to 115/120°
 - Minimal pain and swelling

- 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 (PRE's), begin with no weight then progress 1 lb./week if no pain or crepitation week 10
 - 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

PHASE III - REMODELING PHASE (WEEKS 13-32)

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

**Criteria to Progress
To Phase III:**

- Full range of motion
- Acceptable strength level
 - Hamstrings within 10% of contralateral leg
 - Quadriceps within 10-20% of contralateral leg
- Balance testing within 30% of contralateral leg
- Able to walk 2 miles or bike for 30 minutes
- 50 lateral step-ups (8" height)

- 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°)
 - 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
 - Progressive walking program
 - Pool exercises for entire lower extremity
 - Straight leg raises into flexion
 - Leg press
 - Wall squats
 - Hip abduction/adduction
 - Front lunges
 - Stretch quadriceps, hamstrings, calf

PHASE IV - MATURATION PHASE (8-15 MONTHS)

Goals: • Gradual return to full unrestricted functional activities

**Criteria to Progress
To Phase IV:**

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

Exercises:

- Continue maintenance program progression 3-4x/week
- Progressive 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 golfing, 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. High impact sports such as tennis, basketball, and baseball are allowed at 12 months.