

Rehabilitation Protocol: Autologous Chondrocyte Implantation (ACI)/DeNovo NT/Biocartilage Implantation (Femoral Condyle)

Phase I (Weeks 0-12)

- **Weightbearing:**
 - Weeks 0-2: Non-weightbearing
 - Weeks 2-4: Partial weightbearing (30-40 lbs)
 - Weeks 4-6: Continue with partial weightbearing (progress to use of one crutch at weeks 6-8)
 - Weeks 6-12: Progress to full weightbearing with discontinuation of crutch use
- **Bracing:**
 - Weeks 0-2: Hinged knee brace locked in extension– remove for CPM and rehab with PT
 - Weeks 2-4: Gradually open brace at 20° intervals as quad control is obtained
 - D/C brace when patient can perform straight leg raise without an extension lag
- **Range of Motion** – Continuous Passive Motion (CPM) Machine for 6-8 hours per day for 6 weeks
 - Set CPM to 1 cycle per minute – set initially at 0-30°
 - Increase flexion 5-10° per day until full flexion is achieved
 - Should be at 90° by week 4 and 120° by week 6
 - PROM/AAROM and stretching under guidance of PT
- **Therapeutic Exercises**
 - Weeks 0-2: Straight leg raise/Quad sets, Hamstring isometrics
 - Perform exercises in the brace if quad control is inadequate
 - Weeks 2-6: Begin progressive isometric closed chain exercises** (**see comments**)
 - At week 6 can start weight shifting activities with operative leg in extension
 - Weeks 6-10: Progress bilateral closed chain strengthening, begin open chain knee strengthening
 - Weeks 10-12: Begin closed chain exercises using resistance (less than patient's body weight), progress to unilateral closed chain exercises
 - At week 10 can begin balance exercises and stationary bike with light resistance

Phase II (Weeks 12-24)

- **Weightbearing:** Full weightbearing with a normal gait pattern
- **Range of Motion** – Advance to full/painless ROM
- **Therapeutic Exercises**
 - Advance bilateral and unilateral closed chain exercises
 - Emphasis on concentric/eccentric control
 - Stationary bike/Treadmill/Stairmaster/Elliptical
 - Progress balance/proprioception exercises
 - Start sport cord lateral drills

Phase III (Months 6-9)

- **Weightbearing:** Full weightbearing with a normal gait pattern
- **Range of Motion** – Advance to full/painless ROM
- **Therapeutic Exercises**
 - Advance strength training
 - Start light plyometric exercises
 - Start jogging and sport-specific training at 6 months

Phase IV (Months 9-18)

- **Weightbearing:** Full weightbearing with a normal gait pattern
- **Range of Motion** – Full/Painless ROM
- **Therapeutic Exercises**
 - Continue closed chain strengthening exercises and proprioception activities
 - Emphasize single leg loading
 - Sport-specific rehabilitation – running/agility training at 9 months
 - Return to impact athletics – 16 months (if pain free)
- Maintenance program for strength and endurance

Comments:

****Weeks 2-6 – need to respect the repair site: if anterior lesion avoid loading in full extension, if posterior lesion avoid loading in flexion > 45°****