ROCKFORD ORTHOPEDIC

Autologous Chondrocyte Implantation (Carticel®)

Post-op Precautions:
The patient will ambulate non-weight bearing on the affected LE with crutches and a hinged brace for 4 weeks. Brace is to be worn at all times until initiating Physical Therapy. Pt will still be required to sleep with the brace on for 4 – 6 weeks. Pain may limit advancement of exercise or exercises may need to be modified for specific patients.

Phase I (1 – 5 days post-op)
- Wound care: Observe for signs of infection
- Gait: NWB
- Modalities: prn for pain and inflammation (ice, IFC)
- Brace: Hinged brace locked in full extension (worn for sleeping)
- ROM: 0 – 30 degrees maximum
    - o Passive positional stretches for extension and flexion
    - o CPM if prescribed by physician
    - o Ankle AROM

Phase II (5 days – 4 weeks post-op)
- Wound care: Observe for signs of infection and begin scar management techniques when incision is closed
- Gait:
    - o First 4 weeks NWB; check with physician regarding site of repair
- Brace: Hinged brace locked in 0 ext in weight bearing activities on at all times. Brace may be removed in PT clinic for non-weight bearing exercises
- ROM:
    - o Goal for Femoral condyle:
        - 90 degrees by weeks 1 – 2
        - 105 degrees by week 3
    - o Goal for Patellofemoral
        - 90 degrees by 2 – 3 weeks
        - 105 degrees by 3 – 4 weeks
    - o Half revolutions on stationary bike
    - o Increase / maintain patellar mobility with emphasis on superior glide
    - o Hamstring, gastrocnemius, soleus, and hip flexor stretches
- Strengthening:
    - o Femoral condyle
        - 0 – 2 weeks: Quad sets, 4 way SLR, hamstring isometrics (exercise in brace if poor quad control), AROM 90 – 40 degrees (LAQ type)
        - 2 – 6 weeks: Bilat. Closed chain strengthening but avoid weight bearing on graft. Discuss site of graft with physician.
    - o Patellofemoral:
        - 0 – 4 weeks: Quad sets, 4 way SLR, hamstring isometrics (exercise in brace if poor quad control). No open chain extension AROM (i.e. SAQ, LAQ etc.). Add wt shifting at weeks 2 – 3 with brace locked in full ext

- Modalities:
  - o NMES to quads if unable to perform quad sets and extensor lag with SLR
  - o IFC and ice for pain and edema prn
  - o sEMG neuromuscular re-education for quad sets
- Conditioning
  - o Upper Body Cycle
  - o Stationary bike with the well leg

Phase III (4 – 10 weeks post-op)

- Wound care: Continue scar mobs
- Gait:
  - o Femoral Condyle: 50% weight bearing with crutches at 6 weeks; progress to full weight bearing 8 –9 weeks; D/C crutches
  - o Patellofemoral: Progress to full weight bearing by 6 – 8 weeks; DC crutches
- Brace: Wean from post-op brace starting at week 6 and D/C at 10 weeks
- ROM goals:
  - o Emphasize full extension
    - Femoral Condyle: 115 degrees by week 4; 120 – 125 degrees by week 6; 125 – 135 by week 8; full ROM by week 12
    - Patellofemoral: 105 degrees by week 4; 120 degrees by week 6, 125 – 135 by week 8; full flexion by week 12
  - o Patellar mobility
- Strengthening:
  - o Continue Phase II
  - o Femoral condyle:
    - Progress bilat. closed chain exercise
    - Mini squats 0 – 45 degrees
    - Leg press 0 – 45 degrees
    - Forward and lateral step-ups starting at 2 inches and gradually advancing
    - Add Treadmill walking; progress speed in the forward direction to fast walk then add retro
  - o Patellofemoral:
    - Initiate closed chain isometrics
    - Start weight shifting in full extension when FWB
- Modalities:
  - o Continue E-stim for re-ed or edema
  - o sEMG to continue (for balance of VL to VMO or overall contraction)
  - o Continue ice and IFC prn
- Conditioning:
  - o Stationary bike
  - o UBC
  - o Pool if available
  - o Treadmill forward and retro (walking speed only)
- Gait: Normalize gait pattern on level surfaces and progress to step-over-step pattern on stairs.

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Phase IV (10 + weeks post-op)

- Wound care: Continue scar mobs
- Gait: Full WB
- ROM: Full ROM by week 12
- Strengthening:
    - o Femoral condyle:
        - Increase weights and reps of previous exercises and increase ROM of strengthening machines
        - Standing squats 0 – 60 degrees
        - Leg press 0 – 90 degrees
        - Stepper / Elliptical / Ski machine
        - Initiate balance and proprioceptive activities
        - 12 weeks increase to jog on treadmill
    - o Trochlea/ Patellar:
        - Open Chain Hamstring strengthening 0 – 30 degrees
        - Open chain extensions may begin at 10 weeks with 0 to light resistance.
        - Add Treadmill walking; progress speed in the forward direction to fast walk then add retro.
        - Initiate balance and proprioceptive activities
- Modalities: continue prn
- Testing: Functional tests 30 – 25% deficit

12 – 24 weeks post-op

Femoral Condyle: At this stage many patients will be able to transition to a maintenance program where they will continue to increase strength and balance. Plyometric activities may begin at 18 weeks. ROM on closed chain exercises can also increase. Functional testing < 25% non-athletes, < 20% athletes

Trochlea/ Patella: 13 weeks initiate single leg closed chain strengthening. Increase to incline walk. Jogging may start.

24 – 52 weeks post-op

Sport specific training can be initiated. Running and cutting drills on a field or court may also start with the confirmation of the physician. Single leg loading should be emphasized. Patient variables and type of sport will be a determining factor on the advancement of some phases of the protocol.

Adapted from:
1) Reinold MM, Wilk KE et al. Rehabilitation Guidelines: Autologous Chondrocyte Implantation using Carticel. Genzyme Corporation; Cambridge MA. 5/2006
2) Cole BJ. Autologous Chondrocyte Implantation (femoral condyle only) Rehabilitation Protocol. 2003
3) Cole BJ. Autologous Chondrocyte Implantation (trochlea/ Patella) Rehabilitation Protocol. 2003
4) Reinold MM, Wilk KE et al. Current Concepts in the Rehabilitation Following Articular Cartilage Repair Procedures in the Knee. J Orthop Sports Physical Therapy 2006;36:774-794