



Austin Cole, MD

## Articular Cartilage Restoration- Tibiofemoral Compartment with Meniscus Transplant Post-Operative Protocol

### Phase I - Maximum Protection

#### Weeks 0-6

- Brace 0-30 degrees x 1 week, then 0-90.
  - Recommend locking in extension for sleep for first few weeks.
- Non-weight bearing x 6 weeks
- Initiate quadriceps muscle activation
- Initiate range of motion
  - Week 1: 0-45 degrees flexion
  - Weeks 2-3: 0-90 degrees flexion
  - Weeks 4-6: 0-125 degrees flexion
- CPM use 6 hours a day for 6 weeks
  - No brace use when using CPM
  - Range of motion on CPM consistent with ROM restrictions listed above.

#### Goals

- Reduce inflammation and pain
- Protect surgical repair
- Maintain full knee extension range of motion
- Gradually progress knee range of motion per above restrictions
- Maintain strength and motion of non-operative joints
- Quadricep activation

#### Exercise progression

- Passive/active knee range of motion
- Calf and hamstring stretches
- Quad sets, hamstrings sets, glute sets
- Multi-plane open kinetic chain strengthening (i.e. straight leg raises, avoid patellofemoral provocative exercises)
- Initiate bike with no resistance to facilitate ROM at 4 weeks
- Use of BFR (blood flow restriction) therapy to facilitate strengthening during weight bearing restrictions
- Patellofemoral mobilizations
- Elevation and cryotherapy to assist with swelling reduction

## **Phase II- Progressive Stretching and Early Strengthening**

### **Weeks 6 to 12:**

- Brace 0-90. May open fully once full weight bearing.
- Weight bearing progression.
  - Weeks 7-8: progress to 50% of body weight
  - Weeks 9-10: progress to full weight bearing
- Full range of motion
- Initiate closed chain strengthening with limited range of motion initially
  - Avoid rotational movements for 16 weeks
- Initiate balance and proprioception exercises
- Introduce stationary bike with light resistance
- Gait training

#### **Goals**

- Reduce inflammation and pain
- Protect surgical repair
- Full knee range of motion
- Maintain strength of non-operative joints
- Normalizing gait pattern

#### **Exercise progression**

- Able to gradually increase resistance on bike at 6-8 weeks
- Initiate elliptical at 12 weeks
- Initiate closed chain strengthening in double limb progressing to single limb (after)
- Maintain squat depth at 90 degrees or above
- Step up progression
- Gait training
- Elevation and cryotherapy to assist with swelling reduction

## **Phase III- Progressive Strengthening**

### **Weeks 12 to 24:**

- Discontinue brace
- Full weight bearing
- Advance strengthening exercises
  - Avoid rotational movement x 16 weeks.
- Balance and proprioceptive exercises

#### **Goals**

- Reduce inflammation and pain
- Protect surgical repair
- Full knee range of motion
- Progress limb strength
- Normal gait pattern

#### **Exercise progression**

- Progress closed chain single and double limb strength as able
  - Avoid patellofemoral provocative exercises (lunges, open chain leg extension)

## **Phase IV- Advanced Strengthening, Running Progression, and Plyometric Training**

### **Months 6 to 9:**

- Administer Preliminary functional test at 6 months for MD to review
- Initiate straight line jogging at 6 months if proper biomechanics are demonstrated and symmetry on functional test
- Initiate plyometric training in double limb with gradual progression to single limb
- Advance strengthening program
- Able to return to low-impact recreational activities (walking, biking, elliptical, swimming)

#### **Goals**

- No swelling
- Full range of motion
- Normal gait pattern
- Symmetrical strength and power

#### **Exercise progression**

- Single limb closed chain strengthening
- Proprioception drills
- Basic ladder series
- Linear jogging progression
- Basic plyometric box progression
- Gym strengthening progression

## **Phase V- Return to Sport**

### **Months 9 to 12:**

- Progress plyometric training to single limb, multi-plane, change of direction, and deceleration
- Advance strengthening program
- Administer Return to Sport functional test prior to 12 month follow up appointment with MD for physician to review

#### **Goals**

- No swelling
- Full range of motion
- Normal gait pattern
- Symmetrical strength and power

#### **Exercise progression**

- Advanced ladder series
- Change of direction with running and jumping
- Sport specific field/court drills
- Gym strengthening progression

### **Criteria to be released for return to sport**

- Follow-up examination with the physician
- Pass Return to Sport functional test at >90% (involved vs. uninvolved limb)
- Display symmetry and confidence in high-speed cutting, multi-plane plyometric drills, sprinting and decelerating

### **Anticipated return to sport:**

- 12 months for contact and non-contact athletes