

## PHYSICAL THERAPY PROTOCOL FOR ACL RECONSTRUCTION

### Early Post-operative phase (0-6 weeks)

#### -Exercises: Start on Post-operative day one (1):

***Note: If meniscus repaired, patient will have a brace. The brace will be locked in full extension during weight bearing for the first six (6) weeks.***

***Precautions for meniscal repairs: Limit flexion to 90 degrees for the first 4 weeks post-op. Gradually increase knee flexion after week 4. Do not force stretching in flexion until week 6, and then gentle force only. No closed chain exercises until week 6.***

- 1) Ambulation is WBAT with crutches. This may change depending on acute inflammatory response (per Dr. Nissen).
- 2) Electrical Stimulation may be used until the patient demonstrates a strong isometric quad contraction.
- 3) Use of ice machine at home for 20-30 minute sessions.
- 4) Exercises initiated immediately post-op include:
  - **Patella Mobilization:** Move your knee cap towards the inner side of your leg and hold for 5 seconds. Move your knee cap toward the outer side of your leg, hold for 5 seconds. Repeat this sequence for a total of 3 sets of 10 repetitions.
  - **Bridging Exercises:** Roll a towel and put it under your heel with nothing under your knee. Work on pushing your knee straight down towards the floor. Hold this position for 10 counts. You may assist this by resting your hand on your thigh, near the knee to keep your leg straight. Relax after 10 counts, and then repeat 10 times. This exercise should be done hourly while awake.
  - **Quad Sets with leg in full extension:** Tighten your thigh muscles, hold for 5 counts. Relax. Repeat for 3 sets of 10 repetitions. When you tighten your thigh muscles, it will feel like your knee is straightening (that is OK).
  - **Heel Slides:** Lock the brace so that it will not flex (bend) more than 90 degrees. Sit with legs straight out in front of you. Slowly slide your heel towards your buttock as far as is comfortable (***but limit to no further than 90 degrees of flexion for four (4) weeks if meniscus repaired***). Hold for 5 counts. Relax and straighten your leg. Repeat 10 times. You can assist by using a towel around your foot to pull the leg up. These exercises must be done non-weight bearing.
  - **Ankle Pumps:** To encourage blood flow in your legs, and prevent blood clots (DVT), move your ankles up and down at least 10 times hourly.
  - **Straight Leg Raise:** Lift leg off the ground about 24 inches and hold for 10 seconds. Relax. Repeat for a minimum of 3 sets of 10 repetitions.

**-When to Call the Office: (707) 645-7210**

Call our office if any of the following occurs:

- 1) Increased swelling in the thigh or calf.
- 2) Pain in the thigh or calf.
- 3) Change of color or temperature in the operative leg.
- 4) Pain in the operative leg, progressively worsening despite proper use of medication.
- 5) Fever greater than 101.5 degrees.
- 6) Lack of full knee extension past the first week.

**-On post-operative day seven (7) begin:**

- 1) Active prone leg curls
- 2) Prone hamstring sets
- 3) Active hip exercises – knee flexed to 60 degrees. May add light resistance as tolerated (weight proximal to the knee).
  - prone extension
  - side lying abduction
  - side lying adduction
- 4) Passive knee extension to 0 degrees in prone position. The quadriceps should be relaxed. Full extension should be achieved by post-op day seven (7) optimally.
- 5) No open chain exercises except straight leg raises.
- 7) Quad sets in full extension. Utilize electrical stim and/or biofeedback if the patient demonstrates difficulty initiating quad sets.
- 8) Stretch hamstrings and calves.
- 9) Straight leg raise in knee extension. Use biofeedback to optimize quadriceps activity.
- 10) Stationary cycle (only if no inflammatory response). Initially work with seat set at regular height to increase motion. ***Do not go past 90 degrees flexion, or increase resistance with meniscal repairs.*** May remove brace for cycling.
- 11) May unlock brace at night to sleep. If full extension not achieved by 2 weeks post-op, Dr. Nissen should be notified.

**-On post-operative day fifteen (15) begin:**

- 1) Resisted leg curls in prone position protecting knee from hyperextension. Knee ROM should be between 0 and 90 degrees.
- 2) Resisted gastroc/soleus exercise using rubber tubing. Progress to bilateral weight bearing toe raises as tolerated, then single toe raises as tolerated.

**-On Post-operative day twenty-one (21) begin:**

- 1) Partial squats 0 degrees to 30 degrees of knee flexion. (Perform bilateral and progress to unilateral as tolerated).
- 2) Leg Press (closed chain exercises) 0 degrees to 90 degrees.  
**Note: Delay closed chain exercises for 6 weeks after meniscal repair.**
- 3) Add light resistance to short arc quadriceps exercises in the range of 90 to 60 degrees. Emphasis should be on low resistance/high repetition within patient's tolerance.
- 4) Pool activities:
  - AROM 0 to 90 degrees with buoyancy assisting extension.

- Flutter kicking performed with knee flexed and motion occurring at hips.
- Walking in chest deep water forward and backward. Progress from chest deep water to waist deep water.
- Hip exercises.

### **Intermediate Post-operative period (7-12 weeks):**

Continue use of crutches and WBAT if patient walking with a limp. Emphasis should be on gait training to establish normal patterns.

#### **-Weeks 7-8:**

- 1) AROM with goal to increase flexion and gain full extension.
  - stretching into knee flexion
  - hamstring/calf stretching
  - continue passive knee extension in prone position
- 2) Continue with straight leg raises in full extension *if no lag*. Slowly progress to weighted straight leg raises.
- 3) Active knee extension from 90 to 0 degrees. Avoid pain and crepitation. No resistance Applied in the range of 0 to 45 degrees.
- 4) Progress exercise on leg press/squat machine as tolerated with emphasis on high repetition/low resistance in the range of 0 to 90 degrees. Squats and press should *not* be performed deeper than 90 degrees of knee flexion.
- 5) Increase ROM for bilateral partial squats from 30 to 45 degrees of knee flexion. Progress to unilateral squats/step-ups as tolerated.
- 6) *Step-ups step downs start* – start with 2 inch blocks and progress as tolerated.
- 7) *Stationary Cycle* – once sufficient motion is present, increase seat height and work on low load/high speed for endurance. May pedal unilateral to work hamstring using toe clips.
- 8) Continue with previous exercises progressing to weight machines as tolerated.
  - Resisted leg curl. Avoid knee hyperextension.
  - Resisted hip extension.
  - Resisted hip abduction.
  - Resisted short arc quads in the range of 90 to 60 degrees.
  - Stairmaster as tolerated. Begin when able to walk on level and stairs normally. Take short steps and avoid hyperextension.
  - Elliptical machine if patient has good quad control.
- 9) Begin hip and quadriceps stretching.

**Note: If full extension is not equal to contra-lateral knee at 8 weeks post-op, notify Dr. Nissen at (707)645-7210.**

#### **-Weeks 9-12:**

- 1) Should have achieved full flexion by the end of the 8<sup>th</sup> week. Dr. Nissen should be notified if the patient presents with loss of knee extension, decreased patellar mobility, a quadriceps extensor lag, or lack of full flexion. Passive stretching should be considered at this time.
- 2) Crutches and other assistive devices should be discontinued by now if the noted criteria are met. Utilize treadmill for gait training as needed. May use mirror for visual feedback.
- 3) Continue with exercises as above. Progress as tolerated. Emphasize high repetition/low resistance weights.

- 4) Increase cycle seat height to protect patella-femoral joint while pedaling the bike. Increase intensity and duration of pedaling as tolerated.
- 5) Progress multiple angle quadriceps isometrics up to 45 degrees.
- 6) Balance activities. Initiate with unilateral standing on flexed knee with eyes open. Progress to foam mat, BAPS board and/or decrease visual input (close eyes).
- 7) Isometric and isotonic training for hamstrings.

### **Late Post-operative Phase: (4-6 months):**

#### **-Weeks 13-16:**

Progress above exercises as tolerated including:

- 1) *Stationary cycle*: pedal 30+ minutes to develop local muscular and cardiovascular endurance. Unilateral pedaling to emphasize hamstrings.
- 2) *Exercise on weight machines*: Emphasis is still on high repetition/low weight. Perform sets of up to 100 repetitions to fatigue muscles. May push up weights to “bulk-up” muscle as long as inflammation is low and minimal effusion.  
-machines may include:
  - Leg press/ hack squat 0-90 degrees
  - Leg curls
  - Hip abduction
  - Hip adduction
  - Hip flexion
  - Hip extension
- 3) Progressively increase walking to tolerance on treadmill or level ground.

#### **-Week 13-14:**

- 1) Continue above exercises.
- 2) *Begin jogging*. Start with up and down straight-aways. Walk curves or stop at end and turn around. Gentle and easy at first, increase speed and reps gradually. Take a day off between each workout to see how the knee responds. If pain or swelling develops – back off! Ice after jogging.

#### **-Week 15-16:**

- 1) Continue exercises
- 2) Begin running around track, include gentle curves in both directions. Progress speed, intensity and duration as tolerated.

#### **ADD:**

- short arc quads 30-0 degrees with light weight/high repetitions to eliminate lag as long as this does not irritate patella-femoral joint.
- flexibility exercises for lower extremity as needed.
- multiple angle isometrics approaching full extension starting sub-maximal, and progressing slowly to maximal effort.
- weighted step-ups in the range of 0-30 degrees.

#### **-Week 17-19:**

- 1) Continue exercises
- 2) Progress running program. Begin figures of eight on straight-away using entire length, with slow gentle turns. Progressively shorten length of figure of eights to half the length of the track, and then shorten to a quarter length of the track.

**-Week 19-20:**

- 1) Carioca's
- 2) Shuttle runs (forward, back and side shuffle)
- 3) Progress to more aggressive running and cutting drills.

**ADD:**

- Full strengthening exercises if tolerated by the patella-femoral joint.
- Quarter squats with weights. Keep tibia perpendicular to the floor.
- Isometric and isotonic training for quadriceps.
- Progress proprioceptive activities to include balance activities on foam mat, mini trampoline, and other uneven terrain.

**Reconditioning and Return to Sports (Months 5-6):**

**Exercises:**

- 1) Continue to progress exercises as tolerated.
- 2) Functional strengthening exercises, progress from slow speed to fast speed,
- 3) Concentric/Eccentric activities including mini-trampoline and jumping rope.
- 4) Progress proprioceptive activities and progress to foam and other uneven terrain. Begin this when torque, work and endurance testing is less than 20% of normal. Progression must be gradual and sport specific.

**Gradual Return to Sports:**

- 1) Bracing is not necessary unless return to high ACL stress sport, or contact sport in less than 1 year post reconstruction.
- 2) Biking (no clips): OK at 6 weeks post-op. (discuss fall risks with patient).
- 3) Biking (with clips): OK at 4-5 months post-op. (the action of unclipping foot places high torque on ACL and meniscus repairs).
- 4) Cutting sports: (soccer, football, ultimate Frisbee, basketball, etc). OK at 6-8 months post-op depending on strength, pain, effusion, progress with reconditioning and proprioception. Check with surgeon before progressing with this step.

**Maintenance:**

- 1) Exercise 2 to 3 times per week to maintain muscle function.

**BRACE GUIDELINES:**

- 1) Stop bracing at 4-6 weeks (full 6 weeks for meniscal repair). May discontinue crutches at 2-4 weeks post-op as long as there is:
  - no limp
  - no extensor lag
  - flexion contracture less than 5 degrees
  - good quad contraction
- 2) Use brace and crutches the full 6 weeks for meniscal repair.