



DR. SAFRAN'S THERAPY PROTOCOL
For
ARTHROSCOPIC ACL RECONSTRUCTION

I. EARLY POST OPERATIVE (0 - 6 weeks)

A. Brace

- 1) Patients are locked at 0° for first week, except for ROM and/or CPM.
- 2) Open only for self administered PROM from 0° to 90° as tolerated.
- 3) After first week unlock brace for ROM activities
- 4) Full ROM allowed after Week 1
- 5) Keep brace locked for WB activities until good quadriceps control as assessed by PT.
- 6) If gait is normal, discontinue brace – usually at 3 (allograft) to 4 weeks (autograft)

B. Ambulation

- 1) WBAT with crutches
- 2) This may change depending per Dr. Safran, depending on acute inflammatory response
- 3) When patient comfortable ambulating with brace only for full WB, may discontinue crutches (usually 7-10 days for allograft, 14 days for autograft)

C. Electrical Stimulation is to be used until the patient can generate a quad set of good tone

D. Patellar mobilization is taught to the patient 1 - 3 days post-operatively including: inferior, superior, and medial glides, as well as patellar tilts. Emphasize grade 1 and 2 mobilization techniques to avoid further inflammation of the knee.

E. Cryocuff or ice is applied immediately post-operatively over the sterile dressing. The brace is the applied over the cryocuff. the cryocuff should be drained and refilled with cold water every hour while in the hospital, then used for 20 -30 minutes every 2 -3 hours at home.

F. Exercises

1. All exercises during the first 3-4 weeks are done in the brace.
2. Exercises initiated immediately include:
 - a. Ankle pumps
 - b. Self administered PROM as tolerated by the patient
 - c. Hamstring Sets
 - d. Quad sets in full extension
 - e. Straight leg raises with the brace locked in full extension.
 - i. If difficulty doing SLR, try side lying abduction, then rotating onto the back, keeping leg elevated
 - f. Heel slides



3. On POD # 7 begin:
 - a. Active prone leg curls
 - b. Prone hamstring sets
 - c. Active Hip Exercises:
 - i) Prone extension
 - ii) Sidelying ABduction
 - iii) Sidelying ADduction
 - d. Passive knee extension to 0° in prone position. The quad should be silent.
 - e. Active knee extension 90° to 60° in seated position
 - i) Patient must be made aware of the proper angle locations. If not, must use Kin-Com with proximal pad placement to ensure safe angles are maintained.
 - f. Quad sets in full extension. Utilize electrical stimulation and/or biofeedback if the patient demonstrates difficulty in initiating quad set.
 - g. Stretch hamstrings and calves.
 - h. Straight leg raise without brace if less than 5 - 10° extensor lag.
 - i. May unlock brace at night at sleep.

4. On POD # 15 add:
 - a. Resisted leg curls in prone position protecting knee from hyperextension.
 - i) Angles should be between 0° & 60° w/ force curve near extension.
 - b. Quadriceps isometrics every 15° in the range of 90° to 60°.
 - c. Resisted gastroc/soleus exercise using rubber tubing. Progress to bilateral WB toe raises as tolerated then to single leg toe raises as tolerated.
 - d. Add resistance to hip exercise. Place weight proximal to knee for ABduction and ADduction.
 - e. May stop using brace at night while sleep.
 - f. Stationary cycle - when inflammation low
 - i) Initially work partial cycle w/ seat relatively low to increase ROM.

5. On POD # 21 add:
 - a. Partial squats 0° to 30° of knee flexion. Joint must be painfree. Perform bilateral and progress to unilateral as tolerated.
 - b. Leg Press activity with rubber tubing 0° to 90°.
 - c. Add light resistance to short arc quadriceps exercises in the range of 90° to 60°. Emphasis should be on low resistance/high repetition within the patient's tolerance.
 - d. Pool activities
 - i) AROM 0° to 90° with buoyancy assisting extension
 - ii) Flutter kicking performed w/ knee flexed & motion occurring at hips
 - iii) Walking in chest deep water forward and backward. Progress from chest deep to waist deep water.
 - iv) Hip exercises



II. INTERMEDIATE POST OPERATIVE PERIOD (7 - 12 Weeks)

- A. Post-operative rehabilitation brace should be discontinued by now
- B. Continue use of crutches WBAT if walk with a limp.
- C. Exercise:
 - 1. Weeks 7 - 8
 - a. AROM with goal to increase flexion and gain full extension
 - i) Stretch into flexion
 - ii) Hamstring / calf stretching
 - iii) Continue passive knee extension in prone position
 - b. Continue with straight leg raises in full extension if no lag. Slowly progress to weighted straight leg raises.
 - c. Active knee extension from 90° to 0°. Avoid pain and crepitation. No resistance applied in the range of 0° to 45°.
 - d. Progress exercise on leg press / hack squat machine as tolerated with emphasis on high repetition / low resistance in the range of 0° to 90°. Squats and Press should not be performed lower than 90° knee flexion.
 - e. Increase ROM for bilateral partial squats from 30° to 45° of knee flexion. Progress to unilateral squats / step-ups as tolerated.
 - f. Stationary cycle
 - i) Initially work partial cycle with seat set relatively low to increase motion.
 - ii) Once sufficient motion is present, increase seat height and work on low load/high speed for endurance. May pedal unilaterally to work hamstring using toe clips.
 - g. Continue with previous exercises progressing to weight machines as tolerated.
 - i) Resisted leg curl. Avoid knee hyperextension.
 - ii) Resisted hip extension.
 - iii) Resisted Hip ABduction.
 - iv) Resisted short arc quads in the range of 90° to 60°.
 - h. Begin Hip and Quadriceps stretching



2. 9 - 12 weeks
 - a. Should have achieved full extension by the end of the 8th week. Dr. Safran should be notified if the patient presents with loss of knee extension, decreased patellar mobility, and a quadriceps lag. Passive stretching should be considered at this time.
 - b. 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.
 - c. Continue with exercises as above progressing as tolerated emphasizing high repetition / low resistance weights
 - d. Increase seat height to protect patello-femoral joint while pedaling the bike. Increase intensity and duration of pedalling as tolerated.
 - e. Progress multiple angle quadriceps isometrics up to 45°.
 - f. Step-ups. Begin with a 2" block and progress as tolerated.
 - g. 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). Use of K.A.T. may be helpful.
 - h. Isometric and Isotonic training for hamstrings.

III. LATE POST OPERATIVE PHASE (4 - 6 Month)

- A. Full knee flexion should be achieved by the 13th week. Use passive stretching techniques to gain flexion if needed.
- B. Exercises:
 1. 13 - 16th weeks (4th month)
 - a. Progress above exercises as tolerated including:
 - i) Stationary cycle
 - a) Pedal 15 - 30 minutes to develop local muscular and cardiovascular endurance.
 - b) Unilateral pedalling to emphasize hamstrings
 - ii) Exercises on weight machines
 - a) Emphasis still on high repetition / low weight. Perform sets of up to 100 repetitions to fatigue muscle.
 - b) Machines may include:
 - (i) Leg press / hack squat 0° to 90°
 - (ii) Leg curl
 - (iii) Hip ABduction
 - (iv) Hip ADduction
 - (v) Hip flexion
 - (vi) Hip extension



- iii) Progressively increase walking to tolerance on treadmill or level ground
- iv) Begin Jogging
 - a) Weeks 13 and 14:
 - i) Up and Down straightaway, no curves
 - ii) Stop at end and turn around
 - iii) Gentle and easy at first
 - iv) Increase speed and reps gradually
 - v) Take day off between each workout to see how knee responds
 - vi) If pain or swelling develops - back off!!
 - vii) Ice after jogging
 - b) Weeks 15 and 16
 - i) Begin running around track, including gentle curves, in both directions
 - ii) Progress speed, intensity and duration
- v) Add:
 - a) Short arc quads 30° to 0° with light weight/high repetitions to eliminate lag. Ensure that this does not irritate patello-femoral joint.
 - b) Flexibility exercises for lower extremity prn
 - c) Multiple angle isometrics approaching full extension starting submaximal progressing to maximal effort
 - d) Weighted step-ups in the range of 0° to 30°.
 - e) Stairmaster as tolerated. Begin with able to walk on level and stairs normally. Short steps and avoid hyperextension.

2. 17th to 20th week (5th month)

- a. Continue exercises as described above.
- b. Progress Running Program
 - i) Weeks 17 and 18
 - a) Begin figure of 8's on straightaway, using entire length, with slow gentle turns
 - b) Progressively shorten length of figure of 8 to half the length of the track, then to quarter length
 - ii) Weeks 19 and 20 start
 - a) Carioca's
 - b) Shuttle runs
 - c) More aggressive running and cutting drills
- c. ADD:
 - i) Full strengthening exercises if tolerated by patello-femoral joint
 - ii) 1/4 squats with weights. Keep tibia perpendicular to floor.
 - iii) Isometric and Isotonic training for quadriceps
 - iv) Progress proprioceptive activities to include balance activities on foam mat, mini tramp, and other uneven terrain or fitter.

IV. RECONDITIONING AND RETURN TO SPORTS

A. Exercise

1. Continue to progress above exercises as tolerated.
2. Functional strengthening exercises
 - a. Progress from slow speed to fast speed concentric / eccentric activities including:
 - i) Mini-tramp
 - ii) Jumping rope
 - iii) Jumping
3. Progress proprioceptive activities and progress to foam and other uneven terrain and/or fitter.
4. Gradual return to sport
 - a. Begin progression when torque, work and endurance testing is less than 20% deficit.
 - b. Progression must be gradual, progressive and sport specific.
5. Bracing is not necessary unless return to high ACL stress sport or contact sport less than 1 year

V. MAINTENANCE

- ##### **A. Exercise 2 to 3 times per week to maintain muscle function**

Stop brace 2 - 6 weeks

Stop crutches as long as don't have a limp (1-4 weeks), no extensor lag, flexion contracture less than 5°, and good quad contraction