



ACL Reconstruction Rehabilitation Protocol

1. Pre-OP Visit:

a. Patient Education

- Outline rehabilitation timeline.
- Discuss:
 - Swelling/effusion control (PRICE).
 - Quadriceps inhibition caused by pain and swelling.
 - Avoidance of patellofemoral pain during activities
 - Protection of the ACL graft.
 - Importance of maintaining full knee extension.

b. Exercises

- Passive extension
- Quad/HS sets
- Active assisted flexion
- Straight leg raises in the immobilizer
- Ankle DF/PF isometrics
- Pelvic tilts/crunches

c. Gait

- Fit with axillary crutches.
- Instruct in proper weight bearing.
- Instruct in ambulating on level surfaces, up and down stairs and safe chair/vehicle transfers.
- Instruct in application and use of an immobilizer or knee brace.
- Family member education as appropriate.

2. Weeks 0-2:

a. Restrictions

- Ambulation with crutches and brace/immobilizer.
- No resisted knee extensions for six weeks.

b. Milestones

- Safe independent use of crutches with near normal gait mechanics.
- Full passive extension and active quadriceps control.
- Supported 2 legged mini squat with correct knee alignment.

c. Exercises

- Motion:
 1. Active assisted motion working towards active as tolerated.
 2. Passive extension.
 3. Prone hangs.
 4. Patellar mobilizations.
 5. Active assisted flexion.
- Strength:
 1. Straight leg raises.
 2. Quad/HS sets.
 3. WBAT mini squats.
 4. Heel raises.
 5. Standing leg curls progressing to the use of weight as tolerated.
- Gait:
 1. Ambulation with crutches and no brace WBAT for re-education.
 2. Immobilizer/brace as appropriate.
- Proprioception:
 1. Weight shifts out of the brace with support.
- Core:
 1. Pelvic tilts.
 2. Crunches.

d. Objective Measures

- PROM.
- AAROM.
- Quality of quadriceps activation.
- Quality of gait with crutches and no brace.
- Degree of effusion.

3. Weeks 2-6:

a. Restrictions

- No resisted knee extensions.
- No running, jumping, cutting, pivoting, or twisting.

b. Milestones

- Straight leg raise without quadriceps lag in supine.
- Stand on affected leg unsupported for 10 seconds without pain or imbalance.
- Single legged calf raise.
- Ambulation with normal gait mechanics.
- Full AROM.
- Double legged squat with good mechanics
- Prone plank with 30 second hold with good form and no pain.
- Active knee extension without lag.

c. Exercises

- Motion:
 1. Bike.
 2. Patellar glides – patellar mobilization.
 3. Active assisted to active flexion and extension.
 4. Prone hangs.
 5. Passive extensions 5-10 minutes every hour.
- Strength:
 1. Instruction in use of leg press and leg curls starting double legged progressing to single legged as tolerated.

2. Squats.
 3. Heel lifts.
 4. Closed kinetic chain step ups, lateral step ups, and step downs as tolerated with no pain and good form.
 5. Resisted hip group strengthening standing with resistance.
 6. Hip group strengthening with band above knees or at ankle to provide resistance to walking forward, walking backwards, side stepping left and right, and “skating” forward and backwards.
- Gait:
 1. Gradually wean from crutches and the brace/immobilizer as directed.
 2. Use of anti-gravity treadmill as needed for gait re-education.
 3. Pool work for ROM and gait re-education if available.
 - Proprioception:
 1. Perturbations starting on solid surfaces progressing to unstable surfaces.
 2. Single legged stance on stable and unstable surfaces.
 3. Single legged stance with ball throws.
 4. Single legged stance with visual changes.
 - Core
 1. Crunches on an exercise ball including diagonals.
 2. Bridging double legged progressing to leg lift and then leg extension as tolerated.
 3. Isometric leg press.
 4. Chair walks and pushes.
 5. Heel bridges on an exercise ball. Progressing to # 6.
 6. Ball hamstring curls.
 7. Back bridge. Progressing to # 8.
 8. Back bridge single arm dumbbell fly.
 9. Prone planks.
 - Conditioning
 1. Biking for aerobic fitness and muscular endurance as ROM and pain allow.
 2. Water exercises as able and directed.
 3. Outline use of health club equipment as appropriate.

d. Objective measures:

- AAROM
- AROM
- Active extension lag
- Passive Extension

e. Other:

- MD visit with x-ray prior to physical therapy appointment at 6 weeks.

4. Weeks 6-12:

a. Restrictions

- No running, jumping, cutting, pivoting, or twisting.
- Avoid painful activities or exercises.
- Avoid patellofemoral pain.

b. Milestones:

- Unilateral bridge on affected leg 5 reps with 10 second holds.
- No pain or antalgia with jogging (12 weeks).
- Single legged leg press to fatigue at 100% body weight > 90% of uninjured (12 weeks).
- Y balance test anterior reach asymmetry less than 5 cm.

c. Exercises:

- Motion:
 1. End range flexion and extension as needed.
- Strength:
 1. Open kinetic chain short arc quadriceps 90-45 degrees.
 2. Outline use of weight equipment if not done previously.
 3. Body control strength training.
- Gait:
 1. Return to jogging at 3 months may use pool and/or anti-gravity treadmill to assist with return and normalization of mechanics.
 2. Emphasize no jogging on a painful or swollen knee.

- Proprioception:
 1. Perturbation training.
 2. Single legged stance balance work on unstable surfaces.
 3. Single legged stance balance work on unstable surfaces while playing catch or dribbling a ball.

 - Core:
 1. Prone plank progression with arm and/or leg lifts.
 2. Side planks.
 3. Continue to increase difficulty of bridges.
 - Patient needs to incorporate the concept of training in all three planes of motion when training their core hips and lower extremity.
 - Once control is mastered in a single plane then multiple planes of motion can be incorporated.
 - Lunge example:
 1. Sagittal plane lunge with body weight.
 2. Sagittal plane lunge with two dumbbells.
 3. Sagittal plane lunge with a dumbbell in one hand.
 4. Lunge with medicine ball twist.
- d. Objective measures:
- AROM.
 - Single legged leg press to fatigue at 100% body weight.
 - Y balance test anterior reach asymmetry less than 5 cm.
- e. Outcome tool:
- LEFS
- f. Other:
- MD visit at 3-4 months post-op

5. Weeks 12-16: Later Phase of Rehabilitation

- a. Restrictions:
- No jogging on a painful or swollen knee.
 - Avoid painful activities.
 - Avoid patellofemoral pain.
 - Avoid cutting, pivoting, or twisting.
- b. Milestones:

- Step down off a six inch surface with good control and alignment
- Unilateral bridge on affected leg 5 reps with 10 second holds.
- Maintain ROM symmetrical to contralateral leg
- Y balance test no asymmetries less than 3 cm in any direction.

c. Exercises:

- Strength and Muscle Performance:
 1. Balance with perturbations.
 2. Multiple plane strengthening as outlined previously.
 3. Single legged squats with good form and control.
- Proprioception/ jumping/ running:
 1. Low level agility drills including ladder.
 2. Double and single leg activities progressing to jump turns (90 to 180 degrees)
 3. Tucks jumps
 4. Initiate running progression
 - Start with run/ walk with day in between if full range of motion, minimal pain, 6 inch heel touch with good mechanics x 5, and hop downs with good mechanics
- Core:
 1. Quadrupled bird dog adding tubing for resistance as able.
 2. Exercise ball walk outs.
 3. Involve multiple planes when able.
 4. Address stability in all three planes of motion.
 5. Address sports specific concerns.
 6. Medicine ball:
 - i. Over-head smash
 - ii. Half kneeling chop.
 - iii. Side throws.

d. Objective Measures:

- AROM
- PROM
- Single legged leg press to fatigue at 100% body weight equal to the uninvolved side if needed.
- Heel touches
- Hop Downs

e. Outcome Tool:

- LEFS

6. Weeks 16-20:

a. Restrictions:

- No jogging on a painful or swollen knee.
- Avoid painful activities.
- Avoid patellofemoral pain.

b. Milestones:

- Step down off a six inch surface with good control and alignment
- Unilateral bridge on affected leg 5 reps with 10 second holds.
- No pain or antalgia with jogging if not met at 12 weeks.
- Single legged leg press to fatigue at 100% body weight > 90% of the uninvolved if not met at 12 weeks.
- Y balance test no asymmetries less than 3 cm in any direction.

c. Exercises:

- Strength:
 1. Open kinetic chain short arc quadriceps 90-10 degrees.
 2. Multiple plane strengthening as outlined previously.
 3. Single legged squats with good form and control.
- Proprioception:
 5. Low level agility drills including ladder.
 6. Promote foot speed and changes of direction.
- Core:
 1. Quadrupled bird dog adding tubing for resistance as able.
 2. Exercise ball walk outs.
 3. Involve multiple planes when able.
 4. Address stability in all three planes of motion.
 5. Address sports specific concerns.
 6. Medicine ball:
 - i. Over-head smash
 - ii. Half kneeling chop.
 - iii. Side throws.

- Jumping:
 1. Two legged hopping advancing to single legged as able with focus on proper mechanics.
 2. Jump rope.
 3. Side to side double legged hops progressing to single legged.
 4. Forwards and backwards.
 5. Diagonals.
 6. Increasing volume and effort as able with proper mechanics.

d. Objective Measures:

- AROM
- Single legged leg press to fatigue at 100% body weight equal to the uninvolved side if needed.
- Squat screen.
- Hurdle step screen.
- Lunge screen.
- Y balance test.

e. Outcome Tool:

- LEFS

f. Other:

- Physical Therapy visit at 18 weeks.

7. Weeks 24-36:

a. Restrictions:

- Gradual return to full participation in sports if cleared to do so
- No return to sport before 9 months post-op

b. Milestones:

- 90% on the functional testing.
- Y balance no asymmetries greater than 3 cm in any direction.

c. Exercises:

- Emphasize that clearance to return to sport does not equate 100% recovery.
- Review and advance program as appropriate.

d. Objective measures:

- AROM
- Thigh Circumference measured 15 cm above the medial joint line.
- Squat screen.
- Hurdle step screen.
- Lunge screen.
- Functional jump tests- ***if movement screen satisfactory***
 1. 1-Leg Vertical Jump.
 2. 1-Leg Hop in place (stationary hop)
- Y balance test.

e. Other:

- MD visit prior to return to sports