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Rehabilitation Protocol for ACL Reconstruction

This protocol is intended to guide clinicians and patients through the post-operative course of an ACL reconstruction.

Specific intervention should be based on the needs of the individual and should consider exam findings and clinical decision making. If you have questions, contact the referring physician.

Considerations with concomitant injuries

Be sure to follow the more conservative protocol with regards to range of motion, weight bearing, and rehab progression when there are concomitant injuries (i.e. meniscus repair).

Post-operative considerations

If you develop a fever, intense calf pain, excessive drainage from the incision, uncontrolled pain or any other symptoms you have concerns about you should call your doctor.

PHASE I: IMMEDIATE POST-OP (0-2 WEEKS AFTER SURGERY)

Rehabilitation Goals

- Protect graft
- Reduce swelling, minimize pain
- Restore patellar mobility
- Restore full extension, gradually improve flexion
- Minimize muscle inhibition, re-establish quad control, regain full active extension

Patient education

o Keep your knee straight and elevated when sitting or laying down. Do not rest with a towel placed under the knee

o Do not actively kick your knee out straight; support your surgical side when performing transfers (i.e. sitting to laying down)

o Do not pivot on your surgical side

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Weight Bearing Walking (WBAT)

• Initially brace locked, crutches

• May start walking without crutches as long as there is no increased pain

• May unlock brace once able to perform straight leg raise without lag

• May discontinue use of brace after 6 wks per MD and once adequate quad control is achieved

• When climbing stairs, make sure you are leading with the non-surgical side when going up the stairs, make sure you are leading with the crutches and surgical side when going down the stairs

Intervention Swelling Management

• Ice, compression, elevation (check with MD re: cold therapy)

• Retrograde massage

• Ankle pumps

********Range of motion/Mobility********

• Patellar mobilizations: superior/inferior and medial/lateral

  o **Patellar mobilizations are heavily emphasized in the early post-operative phase following patella tendon autograft**

• Seated assisted knee flexion extension and heel slides with towel

• Low intensity, long duration extension stretches: prone hang, heel prop

• Standing gastroc stretch and soleus stretch

Full extension is obtained by doing the following exercises:

1) Passive knee extension.

• Sit in a chair and place your heel on the edge of a stool or chair.

• Relax the thigh muscles.

• Let the knee sag under its own weight until maximum extension is achieved.

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2) Heel Props:

• Place the heel on a rolled towel making sure the heel is propped high enough to lift the thigh off table.

• Allow the leg to relax into extension. Do this 3-4 times a day for 10 - 15 minutes at a time. See Figure 1

Figure 1: Heel prop using a rolled towel

3) Prone hang exercise.

Lie face down on a table with legs hanging off the edge of the table. Allow legs to sag into full extension.

Figure 2: Prone Hang. Note the knee is off the edge of the table

Bending (Flexion) is obtained by doing the following exercises:

1) Passive knee bend- Sit on the edge of a table and let the knee bend under the influence of gravity.

2) Wall slides (figure 3) are used to further increase bending - Lie on the back with the involved foot on the wall and allow the foot to slide down the wall by bending the knee. Use other leg to apply pressure downward.

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Figure 3: Wall Slide: Allow the knee to gently slide down

3) Heel slides are used to gain final degrees of flexion.

• Pull the heel toward the buttocks, flexing the knee. Hold for 5 seconds.

• Straighten the leg by sliding the heel downward and hold for 5 seconds.

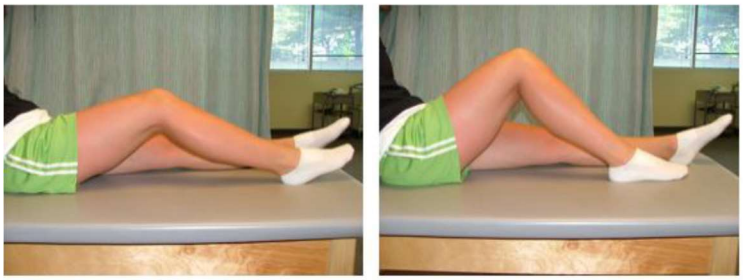

Figure 4: Heel slide - leg is pulled toward the buttocks

PHASE II: INTERMEDIATE POST-OP (3-5 WEEKS AFTER SURGERY)

Rehabilitation Goals

- Continue to protect graft
- Maintain full extension, restore full flexion (contra lateral side)
- Normalize gait

Additional Interventions

*Continue with Phase I interventions

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Range of motion/Mobility AND Strengthening

1. Stationary bicycle
2. Gentle stretching all muscle groups: prone quad stretch, standing quad stretch, kneeling hip flexor stretch Strengthening •
3. Prone hamstring curls •
4. Step ups and step ups with march
5. Partial squat exercise
6. Ball squats, wall slides, mini squats from 0-60 deg
7. Lumbopelvic strengthening: bridge & unilateral bridge, sidelying hip external rotationclamshell, bridges on physioball, bridge on physioball with roll-in, bridge on physioball alternating, hip hike

Balance/proprioception

1. Single leg standing balance (knee slightly flexed) static progressed to dynamic and level progressed to unsteady surface
2. Lateral step-overs
3. Joint position re-training

Develop muscle strength

--Once 100 degrees of flexion (bending) has been achieved you may begin to work on muscular strength:

1) Stationary Bicycle. Use a stationary bicycle two times a day for 10 - 20 minutes to help increase muscular strength, endurance, and maintain range of motion. See Figure 6.

Figure 6: Stationary Bicycle helps to increase strength

2) Swimming is also another exercise that can be done during this phase to develop muscle strength and maintain your range of motion.

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3) Low impact exercise machines such as an elliptical cross-trainer, leg press machine,

leg curl machine, and treadmill can also be used.

Criteria to Progress

1. No swelling (Modified Stroke Test)
2. Flexion ROM within 10 deg contra lateral side
3. Extension ROM equal to contra lateral side

PHASE III: LATE POST-OP (6-8 WEEKS AFTER SURGERY)

Rehabilitation Goals

Continue to protect graft site
- Maintain full ROM
- Safely progress strengthening
- Promote proper movement patterns
- Avoid post exercise pain/swelling
- Avoid activities that produce pain at graft donor site

Additional Interventions

*Continue with Phase I-II interventions

Range of motion/Mobility

1. Rotational Tibial mobilizations if limited ROM
2. Cardio- Elliptical, stair climber, flutter kick swimming, pool jogging

Strengthening

1. Gym equipment: leg press machine, seated hamstring curl machine and hamstring curl machine, hip abductor and adductor machine, hip extension machine, roman chair, seated calf machine
2. Progress intensity (strength) and duration (endurance) of exercises
3. Following exercises to focus on proper control with emphasis on good proximal stability
    a. Squat to chair
    b. Lateral lunges
    c. Romanian deadlift
    d. Single leg progression: partial weight bearing single leg press, slide board lunges: retro and lateral, step ups and step ups with march, lateral step-ups, step downs, single leg squats, single leg wall slides

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e. Knee Exercises for additional exercises and descriptions

Balance/proprioception

1. Progress single limb balance including perturbation training

Criteria to Progress

1. No swelling/pain after exercise
2. Normal gait
3. ROM equal to contra lateral side
4. Joint position sense symmetrical (<5 degree margin of error)
5. Quadriceps index ≥80%; HHD mean preferred (isokinetic testing if available)

PHASE IV: TRANSITIONAL (9-12 WEEKS AFTER SURGERY)

Rehabilitation Goals

• Maintain full ROM

• Safely progress strengthening

• Promote proper movement patterns

• Avoid post exercise pain/swelling

• Avoid activities that produce pain at graft donor site

Additional Interventions

*Continue with Phase I-III interventions

1. Begin sub-max sport specific training in the sagittal plane
2. Bilateral PWB plyometrics progressed to FWB plyometrics

Criteria to Progress

1. No episodes of instability
2. Maintain quad strength
3. 10 repetitions single leg squat proper form through at least 60 deg knee flexion

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4. Drop vertical jump with good control
5. **KOOS-sports questionnaire** >70%
6. **Functional Assessment**
    - Quadriceps index >80%; HHD mean preferred (isokinetic testing if available)
    - Hamstring, glut med, glut max index ≥80%; HHD mean preferred (isokinetic testing for HS if available)
    - Single leg hop test ≥75% compared to contra lateral side (earliest 12 weeks)

PHASE V: EARLY RETURN TO SPORT (3-5 MONTHS AFTER SURGERY)

Rehabilitation Goals

- •Safely progress strengthening
- Safely initiate sport specific training program
- Promote proper movement patterns
- Avoid post exercise pain/swelling
- Avoid activities that produce pain at graft donor site

Additional Interventions

*Continue with Phase II-IV interventions

1. Interval running program
    a. Return to Running Program
2. Progress to plyometric and agility program (with functional brace if prescribed)
    a. Agility and Plyometric Program

Criteria to Progress

1. Clearance from MD and ALL milestone criteria below have been met
2. Completion jog/run program without pain/swelling
3. Functional Assessment
    a. Quad/HS/glut index ≥90%; HHD mean preferred (isokinetic testing if available)
    b. Hamstring/Quad ratio ≥70%; HHD mean preferred (isokinetic testing if available)
    c. ≥85% leg symmetry index on hop and strength test

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4. KOOS-sports questionnaire >90%
5. International Knee Documentation Committee Subjective Knee Form (IKDC 2000) score ≥85%
6. Anterior Cruciate Ligament-Return to Sport after Injury (ACL-RSI) >47

PHASE VI: UNRESTRICTED RETURN TO SPORT (9+ MONTHS AFTER SURGERY)

Rehabilitation Goals

• Continue strengthening and proprioceptive exercises

• Symmetrical performance with sport specific drills

• Safely progress to full sport

Additional Interventions

*Continue with Phase II-V interventions

1. Multi-plane sport specific plyometrics program
2. Multi-plane sport specific agility program
3. Include hard cutting and pivoting depending on the individuals' goals (around 7 months or so)
4. Non-contact practice→ Full practice→ Full play