



For Sports Medicine & Orthopaedics

Because Life Happens In Motion

Anterior Cruciate Ligament Reconstruction Protocol

This protocol is a general ACL protocol and is not inclusive of all possible exercises and precautions. Also, some surgeons may have specific or different preferences during the rehabilitation process, relative to the type of graft used.

If multiple surgical repairs have been done, refer to the surgeon's instructions on which protocol to follow.

Autogenic Graft Incorporation or Ligamentization

Autografts are thought to be strongest immediately after implantation.

With ligamentization, grafts undergo a biological transformation in four phases:

1. **Necrosis** of the graft occurs within the first 3 weeks after surgery. As early as the first week, replacement cells begin to repopulate the graft.
2. New **collagen formation** occurs as stress is placed on the graft. Therefore, early ROM is critical. During this phase the graft is nourished by synovial fluid and the bone blood supply.
3. **Revascularization** begins within 6-8 weeks, continuing until approximately week 16.
4. **Maturation** consists of continued cell proliferation and collagen replacement, which may take up to 3 years.

Precautions & Clinical "Pearls" For Each Technique

Bone-Patellar Tendon-Bone (BPTB) Autograft

- Potential increased incidence of anterior knee pain and quad dysfunction.
- Treat with modalities and/ or patellar taping as indicated.
- Minimal increased risk of patellar fracture
- Early open-chain exercises in terminal knee extension (40-0°) may result in increased ant. knee laxity.

Hamstring Autograft

- 0-1 week: WBAT with crutches, brace locked in ext (including during sleep).
- 1-2 weeks: WBAT with crutches, brace unlocked for ambulation.
- 2-3 weeks: FWB with 1 crutch (if needed), brace unlocked for ambulation, and good gait pattern.
- Early open-chain exercises in terminal knee extension (40-0) may result in increased ant. knee laxity.
- Potential increased risk of hamstring strains during rehabilitation process.
- The harvest site may adhere to surrounding tissue if full ext. is not easily achieved and maintained.

Allograft

- 0-1 week: TTWB with crutches, brace locked.
- 1-2 weeks: WBAT with crutches, brace opened slowly to patient's pain-free PROM. ROM is not to exceed 120° during the first 2 weeks.
- 2-3 weeks: FWB with 1 crutch (if needed), brace unlocked for ambulation, and good gait pattern.
- No "forced" flexion past 125° through week 12; after week 12 ROM should soon be WNL, (if it hasn't already been achieved by that point).
- Early open-chain exercises in terminal knee extension (40°-0°) may result in increased ant. knee laxity.
- Healing still occurs after accepted return to sport times of 4-6 months.

ACL Reconstruction Protocol

PT Name: _____

DOS: _____

Week 1: _____

Ther-ex:

- Quad Sets with NMES (no cushion)
- Heel Slides
- Ankle Pumps
- Heel Prop
- Long Sitting Hamstring Stretch (avoid with Hamstring Graft)
- Bike (rocking to 90°)
- Patellar Mobs (if needed)

Modalities

- For pain/inflammation as needed and continue as long as necessary

PROM: 0-90°

Week 2: _____

Ther-ex:

- Same as above, plus...
- Stationary bike, full revolutions, for warm up, (as long as no ROM restrictions from MD)
- Mini-squats 0-45° (for co-contraction)
- Heel Raises or PF with T-Band
- Weight shift, side to side and fwd/bwk
- SLR x 4 ways: progress with light resistance when no ext lag is present
- heel slides to 110°

PROM: 0-110°

Week 3: _____

Ther-ex:

- Same as above, plus...
- Isometric knee extension at 90°, 60°, 45°
- Heel & toe raises
- Active knee extension (90-40°)
- Wall sits (0-45°)
- Balance board, both feet on board
- Hamstring curls (0-90°): as tol
- Practice ambulation, focusing on heel strike and toe off (a straight cane may be helpful)

PROM: 0-120°

Week 4: _____

Ther-ex:

- Same as above, plus...
- Single leg stance
- Leg press (70-10°)

PROM: 0-120°

Week 5-6: _____

Ther-ex:

- Same as above, plus...
- Active knee extension with resistance (90-30°)
- Balance board, don't allow any edges to touch ground
- Step-ups (front & lateral)
- Side Stepping with resistive band
- Resistive hamstring curl at 6 weeks
- Endurance training

PROM: 0-135°

Week 7-9: _____

Ther-ex:

- Continue progressing previous exercises
- Fitter (short stride, low resistance)
- Landing training exercises; focus on eccentric control
- Theraband kicks (rhythmic stab) on each leg; keep speed relatively low, controlled, & pn-free
- Lunges (at 8+ weeks)
- Squats with involved LE on unstable surface (ex: involved on foam pad, uninvolved on step, so feet are equal distances from the ground)
- Side stepping over cones with resistance
- PNF UE tubing exercises while doing a single leg stance on involved LE
- Include walking in HEP, building up to 20 min, in preparation for running at 12 wks.

PROM: full

Week 10-12: _____

The following progression may not be appropriate for all pts.

Ther-ex:

Advance ther-ex based on pt's current status, ability, and return to work/sport needs.

Walk/Run Program

Begin at week 12, or MD preference.

This is to be performed 3x wk & only in a straight direction.

Week 12

Jog ¼ mile

Walk 1/8 mile

Backward walk 20 yds.

Week 13-26: _____

The following progression may not be appropriate for all pts.

Advanced Strengthening- Circuit Training

-3 step circuit progression

-Begin each circuit with 2 sets of 10-12 reps, progressing to 4 sets

-When pt is able to complete 1 circuit, progress to the next

-To be done 1-2x in the clinic, & 1-2x for HEP, not to exceed 3x a week.

Circuit 1

-Bike to warm up

-6 inch step-ups

-Body weight squats, touching buttocks to low mat table (no hands)

-Lunges

-Big Tires: controlled diagonal jumps

Functional Testing

Use the following tests to determine if the pt is ready for running/jogging, and return to activity.

1. At 12 weeks a single leg squat test can be performed to see if pt is ready to begin jogging. If the pt is able to perform the squat in a steady fashion, without LOB or a Trendelenberg dip as compared to uninjured side he or she is ready to jog.

2. To assess functional status just prior to return to sport as directed by physician, have the pt do the following;

-Single Hop for Distance

-Triple Hop for Distance

-10 Second Timed Hop

The pt should perform 1 practice rep and 2 measured reps for each LE. The measured reps are averaged & the 2 sides can be compared on a percentage basis.

-Single Leg Max Rep on knee extension machine and leg press machine on each LE. A percentage of strength (involved to uninjured) will then be calculated.

Passing criteria for return to sport: Strength greater than or equal to 90% of uninjured side for all functional assessments mentioned above.

-Double leg hops (emphasize soft landing)

-Single leg stance with ball toss on trampoline

Circuit 2

-Bike to warm up

-8-12 inch step-ups

-Body weight squats at 1 per sec.

-Lunges with weight

-Heel raises with weight

-Monster walks: side stepping in squat position

-Single leg hops (emphasize soft landing)

-Side shuffle step with ball toss on trampoline

Circuit 3

-Bike to warm up

-High step-ups (18-20 inches) Ex use Low mat

-Body weight squats or box jumps

-Lunges with weight

-Heel raises with weight

-Monster walks

Jog ¼-1 mile (progress speed: ½, ¾, full)

Walk 1/8 mile

Backwards run 20 yds.

MD to specify progression past this point.

Week 27: _____

Ther-ex:

Interval Training

-20, 40, 60, 100 yd sprints, accelerating gradually throughout the distance

-Walk 1/8 mile between intervals

-Backward run 20 yds after each interval