

ACL-R – Return to Sport Handout

Criteria to begin return to running (linear movements): (~3 months post-op)

1. Full knee ROM
2. No pain or edema/effusion of knee
3. Normal gait
4. Minimal to no accessory varus/valgus of knee with exercises
5. Good jumping and landing mechanics - “soft landing” with good eccentric control
6. Limb symmetry index >70%
 - a. Quadriceps strength
 - b. Hamstrings strength
 - c. Single limb hop for distance - single hop & triple hop
 - d. Single limb vertical hop

$$LSI = \frac{\text{Involved LE}}{\text{Uninvolved LE}} \times 100 = \% \text{ symmetry}$$

Criteria to begin sports-specific activities: (~4-6 months post-op)

1. Full knee ROM
2. No pain or edema/effusion of knee
3. Minimal to no accessory varus/valgus of knee with exercises
4. Good jumping and landing mechanics - “soft landing” with good eccentric control
5. Running with normal gait and without delayed pain or swelling of knee
6. Involved LE Hamstring to Quadriceps strength ratio - near 1:1
7. Limb symmetry index >80%
 - a. Quadriceps strength
 - b. Hamstrings strength
 - c. Single limb hop for distance - single hop & triple hop
 - d. Single limb vertical hop

Criteria for return to team play:

1. Consider limb symmetry index >90%
2. Consider implementing individual drills tailored to patient’s sport and position in supervised setting prior to release to team play
3. Recommend progression from small sided drills, full practice drills, return to match as a substitute, return to match in previous role

ACL-R - Return to Sports Objective Measurements Data Sheet

Date:				
Quadriceps strength (lbs)	L = R = LSI =	L = R = LSI =	L = R = LSI =	L = R = LSI =
Hamstring strength (lbs)	L = R = LSI =	L = R = LSI =	L = R = LSI =	L = R = LSI =
Ham:Quad Ratio				
Quad strength:BW Ratio				
Single Hop for distance (cm)	L = R = LSI =	L = R = LSI =	L = R = LSI =	L = R = LSI =
Triple Hop for distance (cm)	L = R = LSI =	L = R = LSI =	L = R = LSI =	L = R = LSI =
Vertical Hop (cm)	L = R = LSI =	L = R = LSI =	L = R = LSI =	L = R = LSI =

Subjective Findings:

ACL-R – Objective Testing Instructions

Quadriceps Strength Testing – via MicroFET dynamometer

1. With patient sitting, position handheld dynamometer to 2 finger widths proximal to lateral malleolus on anterior aspect of tibia and knee positioned at 60 degrees flexion (position of average max peak force of quad muscle group per isokinetic testing studies)
2. Instruct patient to gradually build up maximal effort into the dynamometer over 2 seconds, then hold maximal contraction for 3 seconds
3. Repeat trial and take the average force production (recommend consistent units – lbs)

Hamstrings Strength Testing – via MicroFET dynamometer

1. With patient sitting, position handheld dynamometer to 2 finger widths proximal to lateral malleolus on posterior aspect of leg and knee positioned at 60 degrees flexion (position of average max peak force of hamstring muscle group per isokinetic testing studies)
2. Instruct patient to gradually build up maximal effort into the dynamometer over 2 seconds, then hold maximal contraction for 3 seconds
3. Repeat trial and take the average force production (recommend consistent units – lbs)

Single Limb Hop for Distance – Single Hop:

1. Starting at designated line, patient balance on one leg and hop forward as far as possible and land on the same leg.
2. Patient must maintain balance on the landing (i.e. hold for 2 seconds)
3. Measure distance hopped in centimeters (from toe of starting position to toe of ending position)

Single Limb Hop for Distance – Triple Hop:

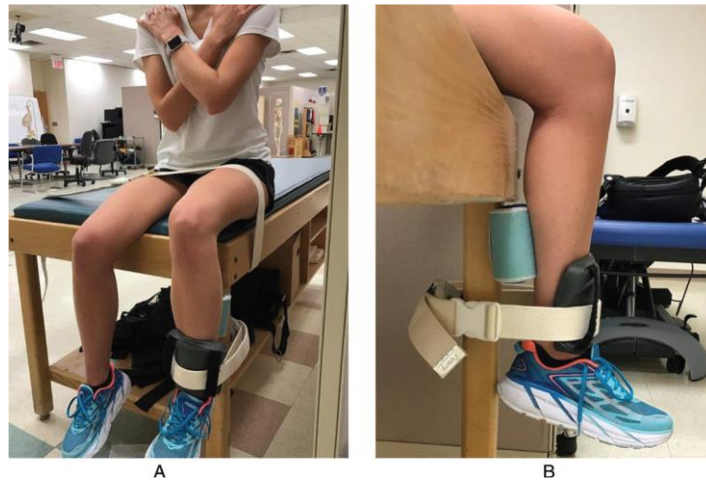
1. Starting at designated line, patient balance on one leg and hop forward as far as possible for 3 consecutive hops without stopping and land on the same leg.
2. Patient must maintain balance on the landing (i.e. hold for 2 seconds)
3. Measure distance hopped in centimeters (from toe of starting position to toe of ending position)

Single Limb Vertical Hop:

1. Patient will balance on one leg. Using the same arm as the testing leg, the patient will jump and reach vertically as far as possible.
2. Height to the tip of the patient's finger will be measured (centimeters)
3. Difference from original standing height and the peak hopping height can be determined.
4. Consider Vertec Vertical Jump Trainer for ease of reliability and objective findings

Alternative valid & reliable procedure for handheld dynamometry testing:

Lesnak J, et al. Validity of hand-held dynamometry in measuring quadriceps strength and rate of torque development. IJSPT. 2019;14(2):180-187.



Reproduced Biodex positioning with handheld dynamometer

- Sitting at edge of table with knee flexed to about 90 degrees
- Small wedge/bolster under posterior aspect of distal thigh (minimizing posterior thigh discomfort)
- Strap (standard gait belt) used to stabilize thighs to table
- Foam pad across anterior shin that is consistent height of dynamometer
 - Center of dynamometer about 5cm proximal to lateral malleolus
- Strap (standard gait belt) looped through pad and around the dynamometer to hold the dynamometer in place behind leg of table
 - Kicking into pad has been shown less painful than kicking into dynamometer and minimizes risk of reduced peak torque values from pain inhibition
- Cushion between posterior leg (calf) and leg of table to take up slack of gait belt and maintain about 90 degrees of knee flexion
- Tighten gait belt above ankle
- “Zero” or reset the dynamometer
- Arms crossed to minimize unintentional assist/contractions that may skew the data
- Instruction the same - take 2 seconds to gradually increase torque produced, then hold max effort for 3 seconds
 - Can repeat trials and take the average - if repeating trials the recommended wait time is 1 minute between trials

Findings - Biodex vs Handheld Dynamometer per this setup:

- Peak Torque - correlation coefficient: $r = .894$, $p = .03$ (excellent validity with Biodex)

Considerations - Peak torque is less at 90 degrees of knee flexion compared to 60 degrees of knee flexion, however reliability with reproducing the same test and result may be optimized using 90 degrees of knee flexion. The purpose is still to determine limb symmetry index.