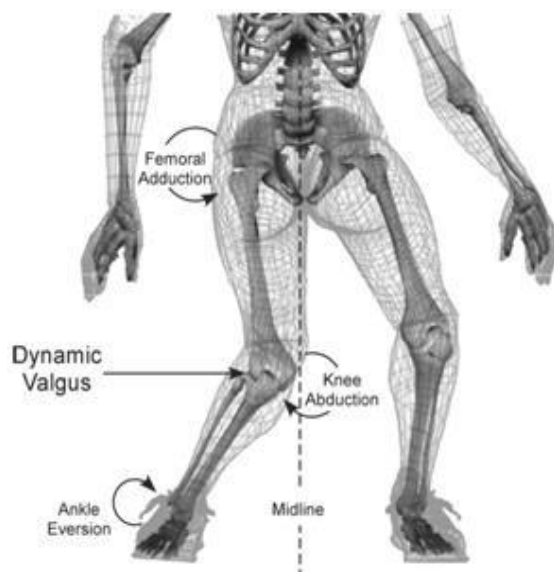


# Anterior Cruciate Ligament Reconstruction

- Guidelines for Rehabilitation -

Updated January 2019



# Contents

Introduction	1
Contacts	2
Phase 1	3
Phase 2	5
Phase 3	6
Phase 4	7
Appendices	
Lower Extremity Functional Scale (LEFS)	8
ACL – Return to Sport after Injury (ACLRSI)	10
Hope Tests	12
Y-Balance Test	13
Measuring Strength	14
Video Links	15
Return to Running	17
Record Sheet	18
References	19

## Introduction

Anterior Cruciate Ligament reconstruction surgery is carried out in various sites across NHSGGC as a day surgery procedure with patients discharged following assessment by the orthopaedic inpatient physiotherapists.

These guidelines are for outpatient rehabilitation to commence within 3-6 days following surgery and may continue for up to 6-12 months following surgery depending on patient progress and individual goals.

Treatment should be based on **individual needs** and **appropriate clinical decision making** regarding the progression of the patient's post-operative course. The actual post-surgical physiotherapy management must be based on the physical examination, individual progress and the presence of complications. **Please review the patient's operation note to clarify any specific instructions.** Some patients will not meet the early targets due to pain/swelling/other underlying conditions in the knee or other extenuating circumstances.

Orthopaedic outpatient clinic review is carried out by local surgical protocol and individual clinical need.

## Contacts

## **In case of any clinical concerns please contact:**

- Norma Goodfellow / Rosemarie Quinn (GRI)
- Alistair MacFie / Christine O'Donnell (VACH)
- Martijn Kaan / Steve Bain (WACH/GGH)
- Katie Black (RAH)
- Bruce Coyle (Inverclyde)

## **LOCAL CLASSES and CONTACTS**

### **West Glasgow ACH – Yorkhill (Catriona Dunwoodie)**

Monday 1500 – 1630

Thursday 0800 - 1000

### **Gartnavel General Hospital (Becky Dunphy)**

Tuesday 0830 - 1030

Friday 0830 - 1030

### **Glasgow Royal Infirmary (Rosemarie Quinn and Jayne Ford Anderson)**

Monday 1300 - 1400

Thursday 1300 - 1400

### **Stobhill Hospital (Kirtsy Stevens)**

Monday 1600 – 1530

Tuesday 1330 - 1430

### **Royal Alexandra Hospital (Katie Black)**

Thursday 1700 - 1800

### **Inverclyde Royal Hospital (Hassine Hamraras)**

Monday 1045 – 1145

Wednesday 1045 - 1145

# Phase 1

Day 1 onwards, see patient information booklet given on discharge

**NB. Progression of the exercises will be dictated by the patient's level of pain and swelling.**

- Continue with ice/compression/elevation until effusion resolves.
- Continue ROM exercises until full knee extension is achievable with ease.
- Continue using walking aid(s) until full extension and quadriceps control on the operated leg is achieved and there is no evidence of a limp.
- The wound dressing can be removed at ~ 7-10 days post surgery.
- If you have any concerns regarding the wound/suspected infection request that the patient contacts the orthopaedic department/A&E.

<b>Goals of Phase</b>	Monitor wound  Commence ROM and strengthening exercises  Achieve terminal extension  Gait re-education  Proprioceptive exercises  Set patient specific Goals
<b>Includes</b>	Knee ROM  Prone Stretch  Long sitting Calf Stretch  <b>Quadriceps</b> <ul style="list-style-type: none"><li>• Static quads in long sitting</li><li>• Knee bracing in standing</li><li>• Straight Leg Raise</li></ul> <b>Hip Strength</b> Abduction in supine, progress to side lying  Hip Extensors - Prone lying, passive knee flexion to 90 <sup>0</sup> , extend hip (use assistance of other leg when initiating bending and straightening of the knee)

<p><b>Progress to</b></p> <p><b>Progress to</b></p>	<p><b>Increase quads strength</b> e.g. terminal extension with theraband mini squats 0-50°</p> <p><b>Calf strength</b> – bilateral heel raises</p> <p><b>Calf Flexibility</b> - Standing calf stretch</p> <p><b>Proprioception:</b> Weight transference: 1) Forward/lateral in standing 2) Unilateral stand as able with full knee extension 3) Single leg stance</p> <p><b>CV:</b> static bike</p>
<p><b>Aims &amp; Outcome Measures for progression to phase 2</b></p>	<p>Terminal extension achieved</p> <p>Normal Gait pattern unaided</p> <p>No worsening effusion</p> <p>Baseline <a href="#">LEFS</a> (Lower Extremity Functional Score) at 2 weeks</p>

## Phase 2

4-12 weeks approx

Treatment should be based on individual needs and appropriate clinical decision making regarding the progression of the patient's post-operative course.

<b>Goals of Phase</b>	<p>Progress strength and conditioning</p> <p>Commence return to running programme</p> <p>Commence basic agility</p>
<b>Includes</b>	<p><b>Develop Full ROM/Flexibility</b></p> <ul style="list-style-type: none"> <li>• Calf</li> <li>• Quads</li> <li>• Hamstring</li> <li>• Hip Flexors</li> <li>• Ab/adductors</li> </ul> <p><b>Strength</b> Progress from bilateral → unilateral e.g. calf raise, squat, step up, posterior chain/bridge variations, lunge</p> <p><b>Proprioception</b></p> <p><b>CV</b> Cycling, cross trainer, pool, walk/jog programme(see appendix)</p>
<b>Progress to</b>	<p><b>Return to Running Criteria – See Appendix</b></p> <p><b>Agility (no pivoting) – see appendix</b></p> <p><b>Early Plyometric – e.g. skipping / landing drills</b></p> <p><a href="#">For examples – see Appendices</a></p>
<b>Aims &amp; Outcome</b> <b>Measures for progression to phase 3</b>	<ul style="list-style-type: none"> <li>• Full ROM flexion &amp; Extension</li> <li>• Managing <a href="#">Return to running programme</a> pain free and controlled effusion</li> <li>• <a href="#">Single Hop test</a> 80% <a href="#">Limb Symmetry Index (LSI)</a></li> <li>• <a href="#">Strength</a> 80% LSI (Single leg sit to stand / leg press)</li> <li>• <a href="#">Single Leg Bridge</a> 80% LSI</li> </ul>
<b>Measures of Improvement</b>	<p>Complete:</p> <ul style="list-style-type: none"> <li>• <a href="#">Y-Balance</a></li> <li>• <a href="#">LEFS</a> 6 weeks and 12 weeks</li> </ul>

## Phase 3

### 3-6 months approx - Dynamic Training

Treatment should be based on individual needs and appropriate clinical decision making regarding the progression of the patient's post-operative course.

<b>Goals of Phase</b>	Progress strength & conditioning Progress Agility Continue Running Programme Jumping drills
<b>Includes</b>	<b>Ongoing strength training</b> <b>Double leg/multi-directional jumps</b> <b>hopping</b> <b>Progress CV/Endurance training</b> <b>Progress agility</b> <a href="#">For examples – see Appendices</a>
<b>Progress to</b>	<b>Prepare for sports specific training</b>
<b>Aims &amp; Outcome Measures for progression to Phase 4</b>	<ul style="list-style-type: none"><li>• Pain &amp; effusion free continuous running relative to patient goals</li><li>• <a href="#">Hop test battery</a> 90% LSI</li><li>• <a href="#">Strength</a> 90% LSI (Single leg Sit To Stand / leg press)</li><li>• <a href="#">Single Leg Bridge</a> 90% LSI</li></ul>
<b>Measures of Improvement</b>	Complete: <ul style="list-style-type: none"><li>• <a href="#">Y-Balance</a></li><li>• <a href="#">LEFS</a> 20 weeks</li></ul>



## Phase 4

### >6 months approx - Sports specific Training

Treatment should be based on individual needs and appropriate clinical decision making regarding the progression of the patient's post-operative course.

<b>Goals</b>	Introduce sports specific movements in a controlled environment
<b>Includes</b>	<b>Progress to advanced agility / sports specific drills</b>  <b>Ongoing strength and CV</b>  <u>For examples – see Appendices</u>
<b>Aims</b>	<a href="#">Hop test</a> 90-100% LSI <a href="#">Strength</a> 90-100% LSI (Single leg STS / leg press) <a href="#">Single leg bridge</a> 90-100% LSI <a href="#">ACL-RSI</a> if indicated <b>SET GOALS ACHIEVED</b>

# Appendices

# Lower Extremity Functional Scale

[Physiopedia Link](#)

Date: July 8, 2020

*Patient Label*

We are interested in knowing whether you are having any difficulty at all with the activities listed below *because of your lower limb problem* for which you are currently seeking attention. Please provide an answer for *each* activity.

Today, do you or would you have any difficulty at all with:	Extreme difficulty or unable to perform activity	Quite a bit of difficulty	Moderate difficulty	A little bit of difficulty	No difficulty
1. Any of your usual work, housework or school activities.	0	1	2	3	4
2. Your usual hobbies, recreational or sporting activities.	0	1	2	3	4
3. Getting into or out of the bath.	0	1	2	3	4
4. Walking between rooms.	0	1	2	3	4
5. Putting on your shoes or socks.	0	1	2	3	4
6. Squatting.	0	1	2	3	4
7. Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
8. Performing light activities around your home.	0	1	2	3	4
9. Performing heavy activities around your home.	0	1	2	3	4
10. Getting into or out of a car.	0	1	2	3	4
11. Walking 2 blocks.	0	1	2	3	4
12. Walking a mile.	0	1	2	3	4
13. Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
14. Standing for 1 hour.	0	1	2	3	4
15. Sitting for 1 hour.	0	1	2	3	4
16. Running on even ground.	0	1	2	3	4
17. Running on uneven ground.	0	1	2	3	4
18. Making sharp turns while running fast.	0	1	2	3	4
19. Hopping.	0	1	2	3	4
20. Rolling over in bed.	0	1	2	3	4

**Column Totals:**

Source: Binkley JM, Stratford PW, Lott SA, Riddle DL. The Lower Extremity Functional Scale (LEFS): scale development, measurement properties, and clinical application. North American Orthopaedic Rehabilitation Research Network. *Phys Ther*. 1999 Apr;79(4):371-83.

The Lower Extremity Functional Scale (LEFS) is a questionnaire containing 20 questions about a person's ability to perform everyday tasks. The LEFS can be used by clinicians as a measure of patients' initial function, ongoing progress and outcome, as well as to set functional goals.

The LEFS can be used to evaluate the functional impairment of a patient with a disorder of one or both lower extremities. It can be used to monitor the patient over time and to evaluate the effectiveness of an intervention.

## **Scoring instructions**

The columns on the scale are summed to get a total score. The maximum score is 80.

## **Interpretation of scores**

③ The lower the score the greater the disability.

# ACLRSI - Anterior Cruciate Ligament – Return to Sport after Injury

## Instructions:

Rate the following questions on a scale of 0-10, with 0 being extremely and 10 not at all.

**1. Are you nervous about playing your sport?**

												Extremely
Not at all	0	1	2	3	4	5	6	7	8	9	10	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**2. Do you find it frustrating to have to consider your knee with respect to your sport?**

												Extremely
Not at all	0	1	2	3	4	5	6	7	8	9	10	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**3. Do you feel relaxed about playing your sport ?**

												Extremely
Not at all	0	1	2	3	4	5	6	7	8	9	10	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**4. Are you fearful of re-injuring your knee by playing your sport ?**

												Extremely
Not at all	0	1	2	3	4	5	6	7	8	9	10	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**5. Are you afraid of accidentally injuring your knee by playing sport?**

												Extremely
Not at all	0	1	2	3	4	5	6	7	8	9	10	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**6. Are you confident that your knee will not give way by playing sport?**

												Extremely
Not at all	0	1	2	3	4	5	6	7	8	9	10	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**7. Are you confident that you could play your sport without concern for your knee?**

												Extremely
Not at all	0	1	2	3	4	5	6	7	8	9	10	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**8. Are you confident about your knee holding up under pressure?**

Not at all      0      1      2      3      4      5      6      7      8      9      10      Extremely

**9. Are you confident that you can perform at your previous level of sport participation?**

Not at all      0      1      2      3      4      5      6      7      8      9      10      Extremely

**10. Are you confident about your ability to perform well at your sport ?**

Not at all      0      1      2      3      4      5      6      7      8      9      10      Extremely

**11. Do you think you are likely to re-injure your knee by participating in your sport ?**

Not at all      0      1      2      3      4      5      6      7      8      9      10      Extremely

**12. Do thoughts of having to go through surgery and rehabilitation again prevent you from playing your sport?**

Not at all      0      1      2      3      4      5      6      7      8      9      10      Extremely

**Score ACL-RSI (Total x 100) / 120 = \_\_\_\_\_ %**

# Hop Tests

Video Link: <https://www.youtube.com/watch?v=OejqiPbxs4g>

## SINGLE HOP (A):

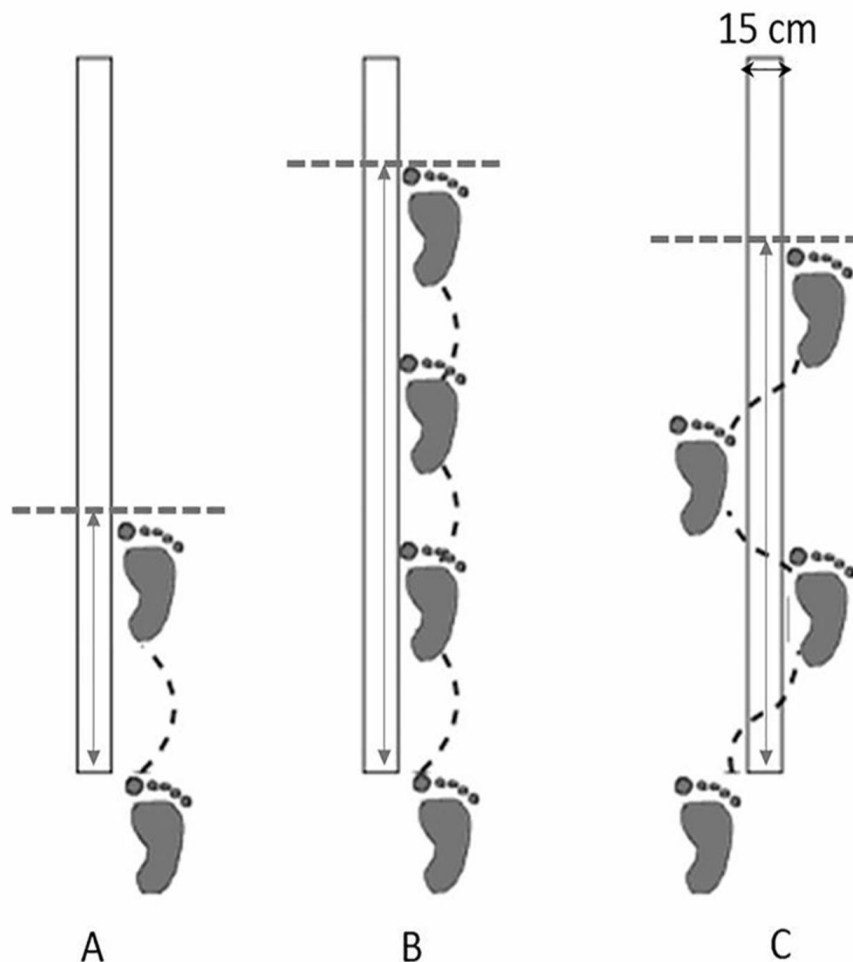
The test is a single 'big' hop covering the maximum possible distance and landing on the same leg. It is performed 3 times on each side with the average distance for each leg obtained. The percentage distance between the 2 sides is then calculated. Aim for 85% of distance covered by non-operated leg.

## TRIPLE HOP (B):

The triple hop for distance is performed with the patient standing on 1 leg and performing 3 consecutive hops as far as possible.

## CROSSOVER HOP (C):

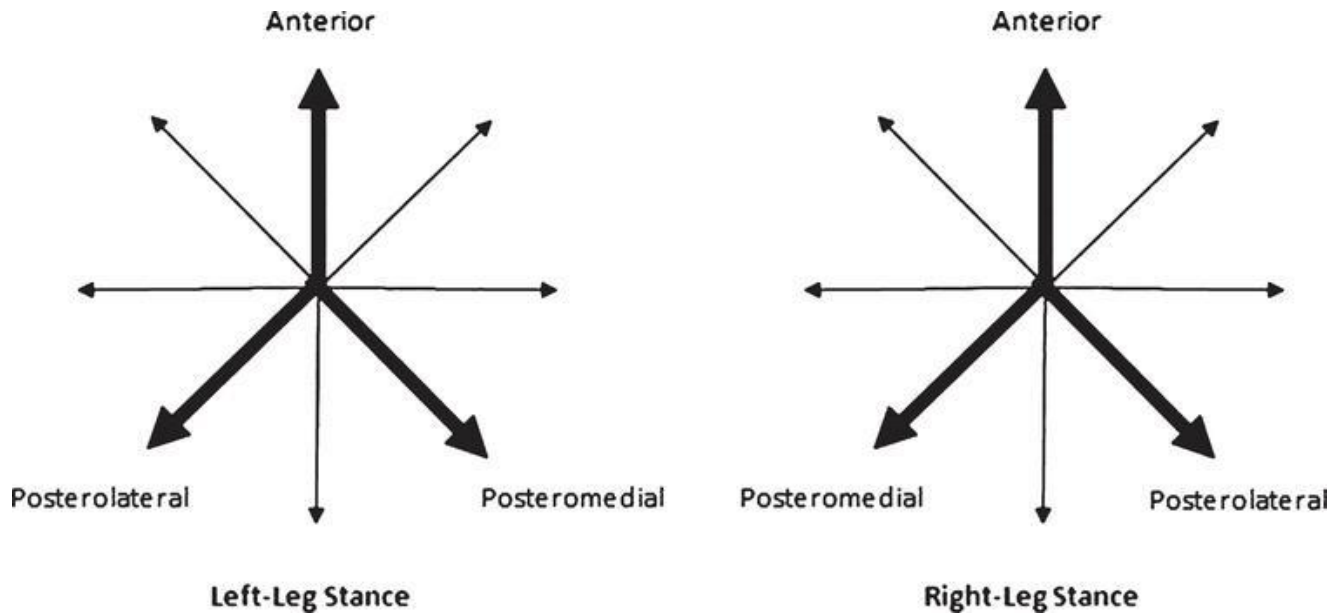
The crossover hop for distance is performed with the patient standing on one leg and performing 3 consecutive hops as far as possible while crossing a centre line with each consecutive hop.



# Y-Balance Test

<https://www.scienceforsport.com/y-balance-test/>

Video Link: <https://www.youtube.com/watch?v=kUBpKXAg02s>



Scoring Chart:

	Right	Left	Diff	Initial/sign
Anterior				
Postero-medial				
Postero-lateral				
TOTAL				

Total Difference should be less than 4cm if planning on return to Sport/Advanced Functional task



# Measuring Strength

## Leg Press/Sit to Stand

Test either Leg Press (if machine is available) or single leg sit to stand

Leg Press

Measuring 1RM in post operative patients/rehabilitation may not be appropriate, either 5RM/10RM may be more suitable.

LSI can be calculated using these parameters.

If leg Press is unavailable then a max rep single leg sit to stand can be used, this is demonstrated in the below video:

Mick Hughes <https://www.youtube.com/watch?v=-VQ9DtPRrBU>

## Measuring Strength – Single leg bridge

Patient in Supine bridge position, knees at 90°. Ask patient to lift one foot from the floor and proceed to bridge 20 repetitions

or until fatigue or unable to complete a full repetition.

Repeat on opposite leg.

Use the numbers for each leg to calculate LSI.

Pure Physio [https://youtu.be/A\\_irxl-8\\_rQ](https://youtu.be/A_irxl-8_rQ)

## Calculating LSI/RSI

### Calculation of Limb Symmetry Index(LSI)

$LSI (\%) = \text{Injured Limb Score} \div \text{uninjured limb score} \times 100$

### Calculation of Relative Strength Index (RSI)

$RSI (\%) = \text{weight pushed (Kg)} \div \text{bodyweight (Kg)} \times 100$

## Video Links - Exercise Ideas

These videos are included to give you some ideas, ensure you have assessed the patient's readiness to progress/perform the exercise by referring to the guideline.

### Phase 1

ACL Reconstruction Rehab- Matthew Boes Video 1&2

<https://youtu.be/7TAslq8p2Vo?list=PLMnHlHog4yFSjXGYFg6Aw0LqTvglAys5f>

Terminal knee extension - <https://www.youtube.com/watch?v=cU1rJjacMFE>

### Phase 2

ACL Reconstruction Rehab- Matthew Boes

Video 3 <https://www.youtube.com/watch?v=M9thyTdrYxw>

Video 4 <https://www.youtube.com/watch?v=1zv-tPGjXqY>

Hamstring Strength

"Tantrum" Hamstring – Mick Hughes <https://www.youtube.com/watch?v=etp6-G0SJc4>

Arabesque for Hamstring

<https://www.youtube.com/watch?v=ee6szWZTyuM>

Glider hamstring exercise (from Aspetar Hamstring protocol)

[https://www.youtube.com/watch?v=UU8pRuYL4b4&index=28&list=PLkeoBd4A272PvOD-KSdr\\_uELkF6kvvL8G](https://www.youtube.com/watch?v=UU8pRuYL4b4&index=28&list=PLkeoBd4A272PvOD-KSdr_uELkF6kvvL8G)

(RDL) Single leg Romanian dead lift

<https://www.youtube.com/watch?v=WAMBVWe65Qo>

Bridging progression ideas:

Bridge Progression - Christopher Johnson

<https://www.youtube.com/watch?v=WpQFJBfWllo>

Single leg bridge (from Aspetar Hamstring protocol)

[https://www.youtube.com/watch?v=ada1X4jipe0&index=29&list=PLkeoBd4A272PvOD-KSdr\\_uELkF6kvvL8G](https://www.youtube.com/watch?v=ada1X4jipe0&index=29&list=PLkeoBd4A272PvOD-KSdr_uELkF6kvvL8G)

Single Leg hamstring bridge - chair

<https://www.youtube.com/watch?v=vfFUqJ3sn88>

Bridge on stability Ball with progressions

<https://www.youtube.com/watch?v=czf-1snzG2c>

Single Leg gymball Hamstring Bridge

<https://www.youtube.com/watch?v=jS2Lf59urv4>

RETURN TO RUNNING – Mick hughes <https://www.youtube.com/watch?v=MnBVw3in8B4>

Examples of early drills <https://www.youtube.com/watch?v=HvH5WZk0f90>

Landing - Mick Hughes [https://www.youtube.com/watch?v=XI\\_VQQApblo](https://www.youtube.com/watch?v=XI_VQQApblo)

Early Plyometrics - Fusion Sport <https://www.youtube.com/watch?v=yI2PPMsvPNg&t=128s>

Ladder drills with progression – Redefining Strength (phase 2/3)

<https://www.youtube.com/watch?v=67XP-AekUoA>

### **Phase 3**

Mick Hughes Plyometric sequence 1 <https://www.youtube.com/watch?v=ek1uudCX97U>  
Plyometric sequence 2 <https://www.youtube.com/watch?v=u-bx1X6tjus>

Cone drills - Redefining Strength <https://www.youtube.com/watch?v=a2sCgSIOFlg>

Mini Hurdle Drills – Nick Parasiliti <https://www.youtube.com/watch?v=aQwKvO4yCG4>  
King Sports <https://www.youtube.com/watch?v=aQwKvO4yCG4>

Reaction drills cones <https://www.youtube.com/watch?v=OejqiPbxs4g>

Nordic hamstrings -(from Aspetar Hamstring Protocol)

[https://www.youtube.com/watch?v=ygdv2gZiT6Y&index=32&list=PLkeoBd4A272PvOD-KSdr\\_uELkF6kvvL8G](https://www.youtube.com/watch?v=ygdv2gZiT6Y&index=32&list=PLkeoBd4A272PvOD-KSdr_uELkF6kvvL8G)

ACL Reconstruction Rehab- Matthew Boes Video 6

<https://www.youtube.com/watch?v=ZWu9MSC6WMw&index=7&list=PL8SDFq4IlgdWCRrMlpYfNy7D0HLEQoVZ6&t=0s>

### **Phase 4 – sports specific**

Football Decision making drill Football (from 40sec)

<https://www.youtube.com/watch?v=kbZ4YAp0ucs>

Racquet / footwork drills <https://www.youtube.com/watch?v=-UubC-SIQz4>

Rugby speed / agility /stepping drills <https://www.youtube.com/watch?v=2jJrZd3ZcYs>

Jump exercises for basketball [https://www.youtube.com/watch?v=bjzqqbQp\\_k0](https://www.youtube.com/watch?v=bjzqqbQp_k0)

## RETURN TO RUNNING (guideline)

RETURN TO RUNNING CRITERIA – Mick hughes

<https://www.youtube.com/watch?v=MnBVw3in8B4>

### SIGNS OF TOO RAPID PROGRESSION:

- Increased pain
- Increased swelling
- Decreased range of movement

Walk	Run	Reps
4min 30secs	30secs	6
4min	1min	6
3min 30secs	1min 30secs	6
3min	2min	6
2min 30secs	2min 30secs	6
2min	3min	6
1min 30secs	3min 30secs	6
1min	4min	6
30secs	4min 30secs	6
0	30 minutes	1



**PROGRESS SPEED/DISTANCE AS ABLE**



**‘SINGLE HOP TEST FOR DISTANCE TEST’**



**‘START-STOP DRILLS’ – NO PIVOTING/TWISTING  
LADDER DRILLS, DOUBLE LEG JUMPS, TUCK JUMPS, HOPPING ON THE SPOT,  
STRAIGHT LINE HOPPING**



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