

# Rehabilitation Guidelines for PCL Reconstruction Using Allograft – Tibialis Anterior

Reference: 2002v1  
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## Purpose

A guideline protocol to be used in the rehabilitation of children following posterior cruciate ligament reconstruction.

## Intended Audience

Orthopaedic surgeons and physiotherapists

## Table of Contents

1. Introduction
2. Intended Audience
3. Guideline Content
4. References

### 1. Introduction

- Guideline for therapists involved in the rehabilitation of patients post PCL reconstruction or repair

### 2. Intended Audience

- Orthopaedic surgeons and paediatric physiotherapists

### 3. Guideline Content

#### **Rehabilitation Guidelines for PCL Reconstruction using Hamstring Graft**

The information given below is only a guideline as to the appropriate management for an PCL reconstruction utilising allograft. The essence of the program is to protect the repair during all phases with a graduated exposure to increasing loads.

**It is your responsibility to evaluate each individual patient's problems and clinical reasoning must be applied to inform decisions on progression**, rather than timescale alone.

Use professional judgment as patients progress, never jump ahead of the timescales. Beware of the happy early functioning patient (they will be stretching the graft).

Even if an exercise or activity is listed at a particular time frame, some patients may not be ready to perform it.

Time frames are a rough guide to the "average" speed of progression only.

**Early return to high level activity runs a definite risk of re-injury.**

Over aggressive rehabilitation will risk graft integrity.

Patients recover at different rates and rehab needs to be delayed or adjusted accordingly.

**The key to a successful outcome is a phased rehabilitation with criteria based progression not time dependent progression.**

If at any times you have concerns regarding a patient's progression or lack thereof or any symptomatic changes please confer with a senior clinician or contact us at the Sheffield Children's hospital.

#### **Inclusion criteria**

- Good quality graft
- Adequate fixation
- Optimum graft placement
- Able to attend regular doctor and Physiotherapy appointments
- Patient wishes to achieve high level of activity
- Compliant patient

Rehabilitation Guidelines for PCL Reconstruction Using Allograft – Tibialis Anterior

**Exclusion criteria**

- Excessive patellofemoral joint symptoms
- Meniscal repair
- Other ligament injury or surgery
- Major joint surface disruption
- Hyper lax patients
- Congenital knee disorders

**Expected outcome**

- Patients report a stable knee within a certain level of function activities
- Patients may need to be counselled regarding what is a realistic level of function post op.
- Some patients may continue to experience some pain post op ( e.g. AKP, joint pain from degenerative menisci etc)
- No reaction swelling with activity

**Possible complications**

- Infection
- Immediate post op haemarthrosis
- Graft failure
- Posterior knee pain

**Possible Problems**

<b>Possible problem</b>	<b>Action</b>
Uncontrolled pain (>3/10 VAS)	<input type="checkbox"/> Regular analgesia <input type="checkbox"/> Ice & elevation <input type="checkbox"/> Protected weight bearing <input type="checkbox"/> Modification of activity level
Excessive swelling (>2cm side to side difference sup patella level)	<input type="checkbox"/> Ice & elevation <input type="checkbox"/> Protected weight bearing <input type="checkbox"/> Modification of activity level <input type="checkbox"/> Decrease number of exercises
Unable to regain passive knee extension (should be full by ~ 3 weeks)	<input type="checkbox"/> GAPS / Prone hangs <input type="checkbox"/> Hamstring and gastroc stretches <input type="checkbox"/> Static quads contractions (+/- electrical stim) <input type="checkbox"/> Control knee swelling
Slow to regain passive knee flexion Should be approximately: 120° by week 12	<input type="checkbox"/> Control pain <input type="checkbox"/> Control knee swelling <input type="checkbox"/> Compliance with exercise <input type="checkbox"/> Rec fem stretches / PFJ mobs
Poor quadriceps contraction / weakness	<input type="checkbox"/> Control knee swelling <input type="checkbox"/> Control pain <input type="checkbox"/> Compliance with exercise <input type="checkbox"/> Static quads contractions (+/- electrical stim)
Ongoing Knee Pain	<input type="checkbox"/> Control knee swelling <input type="checkbox"/> Address muscle length <input type="checkbox"/> Taping / PFJ mobs <input type="checkbox"/> Alignment assessment
Patient complains of "giving way"	<input type="checkbox"/> Early stages this can be due to quads weakness (hyperextension) <input type="checkbox"/> Refer back to clinic / not resolving

## Rehabilitation Guidelines for PCL Reconstruction Using Allograft – Tibialis Anterior

**Phase 1 - Protection (approx. 1-3 weeks TWB/WBAT) - Note – Postero-lateral instability or Meniscal precautions: (please discuss with surgeon and knee therapist)**

- *TWB/WBAT crutches*
- *ROM brace locked in extension for 3/52 (Likely to offer some postero anterior pressure to support graft)*
- *PCL brace to be worn for at least 3 months (up to 6months)*
- *Good static quads contraction*

**Standard PCL:****Goals:**

1. Pain control (VAS <3/10)
2. Swelling controlled (<2cm difference at superopatella level)
3. Good gait pattern FWB/PWB crutches
4. Good static quads contraction
5. Maintain/regain full knee extension

**Restrictions:**

1. No open chain Hamstrings
2. Weight bearing – WBAT – promote early weight bearing
3. No seated passive knee extension – it allows tibial sag and this will stress the graft
4. DO NOT PERFORM A PCL EXAMINATION UNTIL AT LEAST 3 MONTHS (this can stretch the graft in the vulnerable phase)

**Treatment****ROM**

- 0 –30° Passive and AAROM exercises
- Gravity Assisted Passive Stretch (GAPS) to increase extension
- Stretches ( gastroc / soleus / hamstring)
- Sleep with brace locked in full extension

**Patella mobilisations****Strength**

- SLR
- Static quads contractions (in extension)
- Inner range quads 0-30°
- Calf raises

**Balance**

- Weight transference forward / back, side /side in standing

**Modalities**

- Electrical stimulation of quadriceps
- Ice pack

**Phase 1- Protection (approx. 3 - 12 weeks WBAT)****General Observations:**

1. Weight bearing as tolerated with 1 crutch when pain controlled without narcotics
2. Incremental increase to achieve 120° at week 12
3. Swelling controlled

**Goals:**

1. Pain control (VAS <3/10)
2. Swelling controlled ( <1cm difference at superopatella level)
3. Good gait pattern WB as tolerated with 1 crutch
4. PROM 0-120° (by week 12) (Observe PCL precautions Re:Flexion at all times)
5. Good static quads contraction

**Restrictions:**

1. No open chain hamstrings
2. Weight bearing as tolerated by pain, strength and swelling
3. DO NOT PERFORM A PCL EXAMINATION UNTIL AT LEAST 3 MONTHS (this can stretch the graft in the vulnerable phase)

**Treatment**

## ROM

- AROM and AAROM exercises into extension
- PROM and AAROM flexion
- GAPS
- Stretches (gastroc / soleus / hamstring)
- Patella mobilisations
- Sleep with brace locked in extension

## Strength

- Glut med exercises
- Calf raises
- Mini squats (limited to max 60° knee flexion until 16 weeks)
- Multi hip machine (abduction/adduction /flexion /extension)

NB Resistance **MUST** be above knee joint)

## Balance

- Stepping over mini hurdles on floor (improve active knee flexion during gait)
- Gait re-education heel/toe etc
- Tandem stance

## Modalities

- Ice pack

**Phase 2 – Intermediate protection (approx. 12-16 weeks)****General Observations:**

1. Independently mobile without aid, symmetrical gait
2. ROM 0 -120°
3. Swelling controlled

**Goals:**

1. Pain control (VAS <1/10)
2. Swelling controlled (<0.5mm)
3. ROM 0 -130°
4. Good muscle control of knee
5. Minimal patellofemoral symptoms

**Restrictions:**

1. No loaded open chain hamstrings
2. Avoidance of twisting on knee

**Treatment**

ROM

AROM 0-120°

Stretches (gastroc / soleus / hamstring / quadriceps)

+/- Patella mobilisations

**Strength**

- Mini Lunges (1/2 depth, not full lunge)
- Glut med exercises
- Commence early bridging (teach imprinting and pelvic tilt + activation)
- Calf raises
- Mini squats (max 60° knee flexion)
- Leg press 60 - 0° (low resistance only)
- Multi hip machine (abduction/adduction /flexion /extension)

NB Resistance **MUST** be above knee joint – caution must be exercised with hip extension NOT to allow hamstrings to flex the knee)

**Cardiovascular**

- Static bike
- Treadmill walking

**Balance**

- Gym ball compressions in lying, sitting and standing
- Wobble board 2 feet
- Lateral walking over mini hurdles
- Single leg balance

**Modalities**

- Ice Pack

**Phase 2 - Intermediate protection (approx. 16-20 weeks)****General Observations:**

1. No swelling, pain free ROM, stable joint
2. ROM 0 -135°
3. Walk for 20 mins without pain FWB

**Goals:**

1. Manual muscle testing 4/5 (quads, abductors, adductors)
2. No Swelling
3. ROM 0 -135°
4. Minimal patellofemoral symptoms

**Restrictions:**

1. Avoidance of rapid twisting on knee – can start to slowly introduce twisting or COD exercises

**Treatment**

## ROM

- Stretches (gastroc / soleus / hamstring / quadriceps)

## Strength

- Lunges (slowly introduce change of direction)
- Bridging and then progress to on gym ball
- Commence light open chain hamstrings
- Commence light terminal extension rapid hamstring work (e.g. prone pillow kicks)

## Cardiovascular

- Static bike
- Treadmill walking

## Balance

- Wobble board 2 feet / Sit to stand on wobble board
- Trampet marching
- 2 legged jumps (**EMPHASIS ON LANDING TECHNIQUE**) – quad soaking and maintenance of good knee positioning

## Modalities

- Ice Pack



**Phase 3 – Functional Strengthening and Movement Correction (approx. 20-26 weeks)****General Observations:**

1. No swelling, pain free ROM, stable joint
2. ROM 0 -135°
3. Walk for 20 mins without pain

**Goals:**

1. Manual muscle testing 4/5 (quads, abductors, adductors)
2. No Swelling
3. ROM 0 -135°
4. Minimal patellofemoral symptoms

**Restrictions:**

1. Slow controlled twisting movements

**Treatment****ROM**

- Stretches (gastroc / soleus / hamstring / quadriceps)

**Strength**

- Lunges with change of direction
- Bridging on gym ball (& commence introduction of rolling ball forwards and back)
- Leg press 90 - 0°
- Knee extension with resistance
- Multi hip machine
- Hamstring curls (light weight increase reps, not weight)
- Bean bag flicks

**Cardiovascular**

- Static bike
- Treadmill walking
- Swimming (straight leg kicking only, no breast stroke)
- Rower / Stepper / Cross Trainer

**Balance**

- Wobble board single leg (+/- external challenge, ball etc)
- Trampet
- 1 leg hops (with caution, emphasis on landing technique)
- Sit to stand on wobble board
- Simple change of direction drills (walking pace)

**Modalities**

- Ice

**Phase 4 – Advanced Activity (approx. 26-30 weeks)****General Observations:**

1. No swelling, pain free ROM, stable joint
2. ROM 0 -135°

**Goals:**

1. No Swelling
2. ROM 0 -135°
3. Minimal patellofemoral symptoms
4. Hop index >75%

**Restrictions:****Treatment**

## ROM

- Stretches (gastroc / soleus / hamstring / quadriceps)

## Strength

- Bridging on gym ball (& rolling ball forwards and back)
- Multi hip machine
- Hamstring curls
- Nordic work (Quads)
- Plyometrics (box jumps, 2 legs, 1 legs)

## Cardiovascular

- Static bike
- Jogging (change of direction & agility drills with caution)
- Swimming
- Rower / stepper / Cross Trainer

## Balance

- Wobble board single leg (+/- external challenge, ball etc)
- Trampet
- 1 leg hops forwards / lateral (+/- theraband)
- Sit to stand on wobble board
- Lunges with TB at waist
- Profitter

## Modalities

- Ice pack

**Phase 5 – Return to play Preparation (approx 30 - 52 weeks)****General Observations:**

1. No swelling, pain free ROM, stable joint
2. ROM full

**Goals:**

1. ROM full
2. Stable posterior Draw
3. No patellofemoral symptoms
4. Hop index >at least 85%
5. Quads Strength 90% of contralateral leg
6. Building to hamstring symmetry
7. Return to previous activity

**Potential Outcome measure:-**

- Lysholm score >95%, IKDC 85%
- MATT (Modified Agility T Test)
- LSI
- LESS

**Outcome scores, plus clinician reasoning will inform return to sport.**

Restrictions:

1. **No full contact sport until 12 months**

**Treatment**

Strength programme as previously

## Cardiovascular

- Static bike
- Jogging
- Change of direction running, cone drills
- Swimming (any stroke)
- Rower / Stepper / Cross Trainer

## Balance

- Wobble board single leg (+/- external challenge, ball etc)
- Profitter
- Trampet
- 1 leg hops forwards / lateral (+/- theraband)
- Sit to stand on wobble board

## Sport specific drills

Return to training for sports (6 months) ensure gradual exposure to sports specific drills

Return to contact sport (12 months)

**NB return to sport CAN take longer than this. This is a guideline only**

## 4. References

### **Summary of evidence for physiotherapy guidelines**

A literature search was carried out to identify research relating to rehabilitation following Posterior Cruciate Ligament reconstruction of the knee. After reviewing the articles and information, and discussion with the consultants and therapy team at the SC(NHS)FT, the physiotherapy guidelines were produced on the best available evidence. They are subject to regular change and review as new information becomes available.

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## Rehabilitation Guidelines for PCL Reconstruction Using Allograft – Tibialis Anterior

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## Rehabilitation Guidelines for PCL Reconstruction Using Allograft – Tibialis Anterior

**Glossary – of common orthopaedic abbreviations**

AAROM – active assisted range of motion

ACL – anterior cruciate ligament

ALL – anterolateral ligament

AROM – active range of motion

CKC – closed chain knee

COD – change of direction

D/C – discharge

FWB – full weight bearing

GAPS – gravity assisted positional stretch

IRQ - inner range quads

LCL – lateral collateral ligament

LSI – limb symmetry index

MCL – medial collateral ligament

MWMs – mobilisation with movement

NMT – neuromuscular training

NWB – none weight bearing

OCC – open chain knee

PCL – posterior cruciate ligament

PFJ – patella femoral joint

PROM – passive range of motion

PWB – partial weight bearing

ROM – range of motion

SGC – static glutes contraction

SLR – straight leg raise

SQC – static quads contraction

STS – sit to stand

TWB – touch weight bearing (note this is NOT toe touch weight bearing!)