

Medial Patellofemoral Ligament (MPFL) Reconstruction Rehabilitation Guidelines using hamstring graft

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Written by: M Denton
Peer reviewer Candice Sutcliffe
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Purpose

To guide rehabilitation following reconstruction of the MPFL utilizing a hamstring graft.

Intended Audience

Orthopaedic Surgeons and physiotherapists.

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1. Introduction

Guideline for physiotherapists involved in the rehabilitation of patients after MPFL reconstruction

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Post MPFL Reconstruction Rehabilitation Guidelines

Post operatively

Always check the operation notes and the post-operative instructions. Discuss any deviation from routine guidelines with the surgical team concerned.

The information given below is a guideline of the appropriate management for an MPFL reconstruction using a hamstring graft (semitendinosis or gracillis)

The essence 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 judgement as patients progress. Even if an exercise or activity is listed at a particular time frame, some patients may not be ready to perform it. Early return to high level activity runs a definite risk of reinjury. Patients will heal and progress at different rates and rehab may need to be delayed or adjusted accordingly

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

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, orthopaedic consultant or contact us at the Sheffield Children's NHS foundation trust.

Inclusion criteria

- Good quality graft
- Adequate fixation
- Optimum graft placement
- Able to attend regular doctor and physiotherapy appointments
- Compliant patient

Exclusion Criteria

- Meniscal repair
- Other ligament injury or surgery
- Major joint surface disruption/bone bruise
- Hyperlax patients

Expected Outcome

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

Possible Complications (some complications of surgery)

- Infection
- Immediate post-operative haemarthrosis
- Graft failure
- Anterior knee pain

Post MPFL Reconstruction Rehabilitation Guidelines**Post-operatively**

Always check the operation notes, and the post-operative instructions. Discuss any deviation from routine guidelines with the surgical team concerned.

- **No Open Kinetic Chain (OKC) quads work for 4 – 6 weeks.**

Possible problem	Action
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 ~ 2 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: 90° 4 wks 120° 6-8wks Full 12 wks	<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 (once graft fully healed)
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)
Hamstring strain / pain	<input type="checkbox"/> Reduce hamstring exercises <input type="checkbox"/> +/- Protected weight bearing <input type="checkbox"/> Hamstring stretches
Anterior Knee Pain	<input type="checkbox"/> Control knee swelling <input type="checkbox"/> Address muscle length (esp rec fem) <input type="checkbox"/> Taping / PFJ mobs (once graft is well healed) <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

Week 1 - Phase 1 – Protection**PWB or FWB brace in-situ set to limit flexion as per surgeon****Sleep with brace locked in full extension until end of week 2****Goals**

1. Protect fixation and surrounding tissues.
2. Diminish swelling / inflammation.
3. Regain active quadriceps / VMO control.
4. Maintain full knee extension / hyperextension.
5. 30° knee flexion.
6. Patient education regarding rehabilitation process

Treatment

- Advice / Education: Teach how to monitor sensation, colour, circulation, temperature, swelling, and advise what to do if concerned. Teach protection, rest, icing, compression and elevation (PRICE).
- Swelling management.
- Example Exercises:
 - Isometric quads/glutes/hamstrings
 - Knee range of movement exercises to achieve full range of extension
 - Ankle range of movement exercises
 - Closed Kinetic Chain (CKC) quads work

Weeks 2 – 4 – Phase 1 – Protection**Goals**

1. Control swelling / inflammation.
2. Gradual increase in range of movement (within limits of pain).
3. Gradual adjustment of brace to achieve 90° knee flexion by end of week 4.
4. Quadriceps strengthening (especially VMO bias exercises).

Treatment

- Posture advice / education
- Swelling management
- Gait re-education & Mobility: to ensure safely and independently mobile with walking aid/s
- Stretches of tight structures as appropriate
- **Example Exercises:**
 - Knee range of movement exercises to ensure achieving full range of extension and progressing range of movement into flexion up to 90 degrees
 - Strengthening of muscles stabilizing the knee i.e. closed kinetic chain quadriceps exercises in prone, open kinetic chain hamstring exercises
 - Glute control and strength

Manual therapy:

- Soft tissue techniques as appropriate.
- Hydrotherapy as appropriate (check contraindications and wound healing)
- Pacing advice as appropriate

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Milestones to progress to next phase:

- Achieving full range of knee extension to 90° flexion
- Minimal joint effusion (particularly am)
- Full quadriceps activation
- Full weight bearing with mobility aid/s

Weeks 5 – 6 – Phase 2 – Intermediate Protection**May require Brace until 6/52****Goals**

1. Flexion >100°
2. Good activation of quadriceps and straight leg raise with no lag (knee bend).
 - Can start swimming (not breaststroke until 10-12 weeks post operatively).
 - Optimise normal movement
 - Improve strength and balance/proprioception

Restrictions

- **Period of vulnerability:** Avoid impact (i.e. jogging, aerobics) as well as excessive loading and shearing forces
- All exercises should be pain free

Treatment:

- Advice/education: Comprehensive education and instruction on restrictions. Education regarding carrying out activities of daily living (to avoid activities that can provoke excessive shear forces or impact)
- Posture advice/education
- Swelling management
- Mobility: ensure safely and independently mobile with/without walking aid
- Exercises:
 - Controlled active range of movement of the knee
 - Strengthening of muscles stabilising the knee including introduction of resistance and/or COG shift e.g. resistance work with therabands/weights and duration.
 - Progressive quadriceps, especially closed chain
 - Strengthening exercises of other muscle groups as appropriate
 - Core stability work
 - Teach patient to find and maintain neutral extension in standing, **avoiding hyper extension**, with good control
 - Balance/proprioception work once appropriate, including double leg to single leg stand +/- eyes open/closed
 - Stretches of tight structures as appropriate, ensuring normal flexibility of quadriceps, hamstrings and calf muscles
- Review lower limb biomechanics and kinetic chain. Address issues as appropriate
- Incorporate functional dynamic test with the patient whilst working on proprioceptive control e.g. descending stairs, gait and sit to stand
- Manual therapy:
 - Soft tissue techniques as appropriate
 - Joint mobilisations as appropriate
 - Ensure mobility of patello-femoral joint **respecting graft location**, grade and angle of technique
- Hydrotherapy if appropriate

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- Pacing advice as appropriate
- Scar treatment

Milestones to progress to next phase:

- Pain free exercises
- Full knee ROM
- Mobilising independently
- Able stabilise knee with good eccentric control during single leg stand/squat.

Weeks 7 – 12 Phase 3 – Functional Strengthening and Movement Correction**Goals**

1. Eliminate any joint swelling.
2. Increase quadriceps and VMO control for restoration of proper patella tracking.
3. Improve muscular strength / control / endurance without exacerbation of symptoms.
4. Avoid overstressing fixation site.
5. No altered walking pattern.
6. Functional exercise.
7. Able to return to P.E. depending on structure of lesson (with guidance from physiotherapist).
8. Can start breaststroke when swimming.

From 8 weeks onwards

9. May initiate open chain knee extension through full range
10. May begin squatting and lunging past 90° knee flexion

Treatment

1. Pain relief
2. Advice/education
3. Posture advice/education
4. Mobility: progression of mobility and function
5. Gait re-education
6. Example Exercises:
 - Range of movement
 - Strengthening through range
 - Core stability work
 - Stretches of tight structures as appropriate

Milestones to progress to next phase:

- Pain free exercises
- Full knee ROM
- Mobilising independently

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- Able to dynamically stabilise knee with good eccentric control during single leg stand/squat including early perturbation work

Weeks 12 – 16 Phase 3 – Functional Strengthening and Movement Correction - Goals

1. Knee extension strength at least 70% other knee.
2. Work towards achieving maximum strength and endurance of leg musculature.
3. Good active patella control with no evidence of lateral tracking or instability.
4. May begin straight ahead running at 12 weeks if the following criteria are met:
 - a. Stable patella: asymptomatic with current activity,
 - b. Able to dynamically stabilise knee with good eccentric control during single leg stand/mini squat

Treatment:

- Pain relief
- Advice/education
- Posture advice/education
- Mobility: progression of mobility and function
- Gait re-education
- Return to gym based activities
- Early Sport specific activities
- Example Exercises:
 - Range of movement
 - Strengthening through range
 - Core stability work
 - Stretches of tight structures as appropriate
- Review lower limb biomechanics and kinetic chain. Address issues as appropriate
- Functional dynamic work including straight line jogging
- Balance/proprioception - introduction of unstable base including use of uni/multidirectional wobble boards, trampet, gym ball and airex-cushion (progress with distractions including throwing, catching, reaching, turning)
- Tie in core stability work
- Progress from static to dynamic exercises as appropriate (e.g. lunging)
- Introduce gym work including unrestricted static cycling, rowing, stepper
- Manual Therapy:
 - Soft tissue techniques as appropriate
 - Joint mobilisations as appropriate
- Hydrotherapy as appropriate
- Pacing advice as appropriate

Weeks 16-24 Phase – Advanced Activity and Return To Sport Drills**Goals:****Gradual Return to unrestricted sports at 24 weeks if the following criteria are met:**

1. Pain free running
2. Functional Tests (>90% LSI) and Pain free with good neuromuscular control (e.g. FLEE, T Running, Lysholm-Tegner Functional Hop Test, Triple Hop for distance, Single Hop for distance, Lateral Hop (12"x12" squares separated by 12"- # of hops IN BOX in 20 seconds), Unilateral Vertical Jump)
3. Cardiovascular endurance to subjective pre-morbid level
4. Pedi-IKDC

Exercises:

1. Continue strength, endurance, proprioception progression
2. Jogging (progressing to) running, jumping and hopping (if sufficient dynamic stability – concentrate heavily on jump land strategies)
3. Begin bilateral low level plyometrics and progress as able
 - a. Single-leg plyometrics (if demonstrating sufficient control)
4. Begin agility drills and sport specific activities as able
5. Cutting/pivoting drills with stutter step pattern building awareness of knee angle/shank position
6. High intensity aerobic/anaerobic sport specific training
7. Advanced lower extremity strengthening
8. Optimise normal movement/control
9. Grade V muscle strength in operated leg
10. Pain free exercises
11. Hopping/changes of direction with good control
12. Optimum balance/proprioception
13. Establish long term maintenance programme
14. To be fit to return to high impact sport training **from 6 months** if above goals achieved (can take longer).

Restrictions:

- No contact sport training until 6 months post op and only if there is sufficient dynamic stability

Weeks 24+ Phase 5 – Return to Sport

Goals

1. Full pain free range of movement.
2. Continued improvement in quadriceps strength (80% or greater of contra lateral leg).
3. Improve functional strength and balance reactions.
4. Maximise confidence in returning to appropriate activity level.
5. Functional return to work / sport.

** Return to sports dictated by particular sport, ability, fitness and confidence – minimum 6 months (with guidance from physiotherapist and surgeon)

Failure to progress

If a patient is failing to progress, then consider the following:

Possible problem	Action
Swelling	<ul style="list-style-type: none"> • Ensure elevating leg regularly • Use ice as appropriate if normal skin sensation and no contraindications • Decrease amount of time on feet • Pacing • Use walking aids • Circulatory exercises • If decreases overnight, monitor closely • If does not decrease over a few days, refer back to surgical team
Pain	<ul style="list-style-type: none"> • Research has shown that the cartilage is continuing to heal for up to 3 years and this may account for slower progressing patients • Decrease activity • Ensure adequate analgesia • Elevate regularly • Decrease weight bearing and use walking aids as appropriate • Pacing • Modify exercise programme as appropriate <p>Should continue isometric work at all times</p> <ul style="list-style-type: none"> • If persists, refer back to surgical team
Breakdown of wound e.g. inflammation, bleeding, infection	<ul style="list-style-type: none"> • Refer to surgical team
Recurrent instability	<ul style="list-style-type: none"> • Refer back to surgical team • Ensure exercises not too advanced for patient • Address core stability/glutes
Numbness/altered sensation	<ul style="list-style-type: none"> • Review immediate post-operative status if possible • Ensure swelling under control • If new onset or increasing refer back to surgical team • If static, monitor closely, but inform surgical team and refer back if deteriorates or if concerned

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