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1.0 Policy Statement
   1.1 It is the policy of Cappagh National Orthopaedic Hospital to provide a patient focused physiotherapy service delivered by chartered physiotherapists and support staff working in a well-equipped environment.

   1.2 It is the policy of Cappagh National Orthopaedic Hospital to provide health professionals and the public with the necessary advice and guidance on physiotherapy rehabilitation.

2.0 Purpose
   2.1 The purpose of this guideline is to advise health professionals and patients on the physiotherapy rehabilitation of a person undergoing Posterior Cruciate Ligament reconstruction surgery.

3.0 Scope
   3.1 This guideline applies to all staff involved in the care of a person undergoing Posterior Cruciate Ligament reconstruction surgery, community staff involved in the pre and post-operative care of the patient, the patient and their family.

4.0 Health & Safety
   4.1 There are health and safety risks involved in patient care, namely risk of physical injury to patient and staff, risk of infection.

   4.2 Physiotherapists have the necessary qualifications and clinical experience to carry out this guideline and to supervise unqualified support staff.

   4.3 They must be eligible for membership of their professional body, the Irish Society of Chartered Physiotherapists (ISCP).

   4.4 They undertake mandatory manual handling, basic life support training, fire safety, infection prevention and control and risk management.

   4.5 They complete a minimum of 100 hours continuing professional development every three years as required by the ISCP.

5.0 Responsibilities
   5.1 It is the responsibility of physiotherapists to implement this guideline.
6.0 Definitions and Abbreviations

- PCL: Posterior Cruciate Ligament
- PCL Reconstruction: Surgical repair of a torn PCL within the knee joint
- ROM: Range of movement
- SLR: Straight leg raise

7.0 Guideline

7.1 Pre-Operative

7.1.1 Patients should be evaluated prior to surgery, including:
   7.1.1.1 Assessment of joint range of motion, muscle strength, mobility and general function.
   7.1.1.2 Respiratory assessment and treatment if necessary.
   7.1.1.3 Explanation of post-operative physiotherapy management and exercise programme.

7.2 Post-Operative

Patients are braced and extension limited by locking the hinge in 5° to 20° flexion. Progression of range of movement (ROM) within the brace for the first 8 weeks should be discussed with the surgeon prior to discharge.

7.2.1 Day 1-2

7.2.1.1 Avoid hyperextension, brace limits full extension.
    7.2.1.2 Weight bearing as tolerated with crutches - patient usually partial weight bearing due to pain/swelling.
    7.2.1.3 Stairs/step practice.
    7.2.1.4 Ice and elevation to control swelling.
    7.2.1.5 Respiratory and circulatory exercises.
    7.2.1.6 Isometric quadriceps.
    7.2.1.7 Straight leg raise.

7.2.18 Discharge Criteria

- Pain and swelling under control
- Good static quadriceps control and able to SLR
- Independently mobile with crutches
7.2.2 0-2 Weeks - Immediate phase
7.2.2.1 Continue exercises as above, monitor swelling closely.

7.2.2.2 Add the following:
  • Hip abduction, adduction and gluteal strengthening
  • Patellar mobilisations

7.2.2.3 Commence strengthening program for upper body and unaffected leg.

7.2.2.4 Core stability programme as appropriate

7.2.3 2-4 Weeks - Maximum protection Phase I
7.2.3.1 Gradually increase range of movement within hinged brace up to 60º flexion (limit flexion to 60º during active and resisted exercises).

7.2.3.2 Aim for full active and passive extension.

7.2.3.3 May benefit from muscle stimulation (e.g. Kneehab) for quads inhibition’

7.2.3.4 Progress to full weight bearing without crutches if no limp, gait re-education if necessary.

7.2.3.5 Add: Active open chain quadriceps no resistance
  • Active quadriceps / VMO exercises into full extension no resistance.
  • Hamstring curls
  • Flexibility programme

7.2.4 4-6 Weeks – Maximum protection Phase II
7.2.4.1 Aim for independent mobility with no aids, full SLR no lag and unlimited range of movement within brace (limit flexion to 60º during closed chain resisted exercises).

7.2.4.2 Patient may drive at approximately 6 weeks

7.2.4.3 Add:
  • Prone quadriceps stretch
  • Static cycle no resistance initially
  • Cardiovascular work
  • Isokinetic quadriceps 0º to 60º
7.2.4.4 Proprioceptive exercise:
• Wobble board
• Single leg standing

7.2.4.5 Early protected Closed Chain programme within brace (below 60° knee flexion initially)
• Standing terminal knee extension with theraband resistance
• Wall slides <60°
• Minisquats <60°
• Mini lunges <60°
• Calf raises

7.2.5 6-12 Weeks - Control Phase
7.2.5.1 Brace usually removed at 8 weeks if isolated PCL procedure, no limit to active range of movement.

7.2.5.2 Aim for full range of movement

7.2.5.3 Progress running programme
• Add
  • Stationary bicycle: seat high, zero resistance to begin and cycle both directions.
  • Light weights 0.5-1kg at 3 to 4 weeks for progressive resistive exercises, increasing reps initially rather than increasing weight.
  • Pool walking at 4 weeks
  • Nordic trak/cross trainer, rowing within pain free ROM

7.2.5.4 Closed chain exercises above 60° flexion, adding:
• Single leg squat <60° initially
• Slow step ups of 20-30cm

7.2.5.5 Increase proprioception programme:
• Wobble board
• Ball throwing
• Eyes closed
• All single leg as tolerated
7.2.6 3-6 Months - Light Activity Phase

7.2.6.1 Brace usually remove at 3 months if combined PCL procedure.

7.2.6.2 Accelerate *sport specific training and drills* with a view to return to full activity from 4-6 months post operatively.

7.2.6.3 No limit to resisted range

7.2.6.4 Commence jogging depending on clinical signs (no effusion, full ROM e.g. can sit on heels):
- Jogging straight ahead initially then running

7.2.6.5 Add the following
- May commence open chain strengthening in gym (quads, hams bench, low resistance initially).
- Open chain hamstring work, adding resistance/speed and repetitions as tolerated.
- Swimming, including pool exercises and pool running.
- Plyometrics and agility work
- Swimming (exclude breaststroke for 3 months)
- May use road bike
- Stepper
- Power walking

7.2.6.6 **Closed chain exercises:** Increase to >60° knee flexion gradually.
- Add:
  - Step downs/ Dips (standing on step- step down, affected side on step)

7.2.7 3-9 Months - Activity Phase

7.2.7.1 *Activity Phase 1*

7.2.7.2 Continue full strengthening program

7.2.7.3 Progress running programme increasing pace, duration and incline as tolerated.

7.2.7.4 *Plyometrics*
- Stair jogging, hopping drills (double leg progress to one leg) – all directions, box jumps, skipping rope.
- Progress to jumping down from step double and single leg, then up.
7.2.7.5 **Agility drills**
- Figure of eight, large circles both directions
- Progress to shuttles, zigzags (90° turns initially), carioca crossovers (sideways running one leg crosses the other).
- Directional running (large square facing same direction running forward, sideways and backward)

7.2.7.6 **Sport specific training and drills** (1/4 to 1/2 speed) - *Activity phase II*

7.2.7.7 **Plyometrics**
- Increased height, add turning on landing, combine with agility / sports specific drills

7.2.7.8 **Agility drills**
- Progress zigzags (45° turns), tighter shuttles and turns, combine with agility sports specific drills
- Accelerate **sport specific training and drills** with a view to return to full activity from 9-12 months post operatively

7.2.7.9 **Isokinetic assessment**
- Add:
  - High speed isokinetics
  - Running
  - Sport specific plyometrics and training

7.2.8 9 Months - *High level activity phase*
7.2.7.1 Discuss with Consultant re return to full sporting activity

7.3 **Diagnostic criteria for return to sport**
7.3.1 Full ROM

7.3.2 Quadriceps strength $\geq 85\%$ of contralateral side.
7.3.3 Hamstring strength 100$\%$ of contralateral side.
7.3.4 Hamstring: Quadriceps (H:Q) ratio 70$\%$.
7.3.5 Functional testing $\geq 85\%$ of contralateral side (e.g. single leg hop for distance, single leg triple hop for distance, 6m timed single leg hop).

Please note the above are guidelines only. Rate of progression will vary between individuals and will require continuous monitoring of signs and symptoms.
8.0 Related Documents
   Individual Physio tools exercise sheets

9.0 Appendices
   N/A

10.0 References
   10.1 McNicholas Knee Clinic Protocol
       www.mcnicholaskneeclinic.co.uk/pclreconstructionrehab.htm
   10.2 Oswestry Protocol
       www.sportsinjurysurgery.co.uk/PCL_rehabilitation.doc
   10.3 Performance Orthopaedics Protocol
       www.performanceorthopedics.com/files/ProcProtocols/ACLPCLprotocol
   10.4 New York Sports Medicine Orthopaedic Institute