OS Clinic

Rehabilitation Protocol

ACLR and MCL Reconstruction Surgery

ACL Reconstruction and MCL Repair occur after a contact or non-contact knee injury when the ACL and MCL are both fully torn, often with involvement of the medial meniscus. Surgery uses an allograft or autograft to reconstruct the torn ACL ligament arthroscopically. The MCL is repaired where it was torn, either distally near the insertion on the tibia, in the middle of the ligament, or proximally near the origin on the femur. Progression of range of motion after surgery depends on where the MCL was torn. No return to contact sports prior to 9 months post-op Return to gentle non-contact, non-competitive sports at the practitioner's discretion but must be over 8 months post-op.

Use protocol in combination with ACL post-operative protocol for reference.

Early post-operative phase 1 (ACLR 0-4 weeks)

Appointments - Post operative evaluation should be performed 3-5 days following surgery. Follow up appointments should be 1-2 times per week.

Rehabilitation goals

- Decrease effusion
- Decrease pain
- Emphasis on quadricep activation
- Symmetrical ROM activation into Extension

Precautions

1. No testing of repaired or reconstructed ligaments (Lachman, Anterior Drawer, Valgus Stress) prior to 12 WEEKS
2. Post-operative extension bracing for 2-4 weeks, unlocking is only permitted when patient establishes leg and pain control and safe gait mechanisms.
3. Meniscal repair (No WB in flexion, no compression type pain or discomfort when working in flexion ROM
4. No loaded open kinetic chain knee extension for 8 WEEKS

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- **IMPORTANT: Monitor wound**

  If you have any concerns about your wound immediately contact us on:
  OS Clinic: 0207 046 8000

  - This would include any of the symptoms or observations below:
    - wound leakage – blood or discharge
    - redness around the area
    - excessive or worsening pain
    - raised temperature

- **IMPORTANT: DVT awareness**

  If you have any concerns that you may have developed a DVT (deep vein thrombosis) immediately contact us on this number:
    - **WARD (please insert):**
    - **OS Clinic: 0207 046 8000**

  - This would include any of the symptoms or observations below:
    - sudden calf pain and swelling
    - pain, swelling and tenderness in one of your legs (usually your calf)
    - a heavy ache in the affected area.
    - warm skin in the area of the clot.
    - red skin, particularly at the back of your leg below the knee.
    - shortness of breath and chest pain (very rare)

Manage swelling

- Cryotherapy is advised
- **PHYSIOLAB portable S1 device** is the preferred cryo-pneumatic device of OS Clinic. See Appendix B for contact details.

Reduce mobility

- Rest as much as possible
- Limited walking to around the house
- If using crutches, please see appendix A for instructions on advice on their use.

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Weight-Bearing

- NWB for 0-2 weeks with brace locked in extension
- TTWB for weeks 2-4 with brace locked in extension

Rehabilitation outline

Extension:

Emphasis on achieving full knee extension immediately following surgery

Flexion:

Flexion PROM/AAROM 0-30° for distal MCL lesion weeks 0-2

Flexion PROM/AAROM 0-60° for distal MCL lesion weeks 2-4

No forced flexion beyond 90 degrees with meniscal repairs

- Flexibility as appropriate
- Basic neuromuscular training
- Cryotherapy
- Emphasis on quadricep activation – Static quads (no lag)
- Neuromuscular stim if voluntary quadricep activation is not possible
- Restore patella mobility (mobilizations Medial – lateral/ superior inferior translations)

Early home exercises

- Knee extension – Using a rolled towel under the foot so back of the client's leg is off
- of the bed, then squeeze the knee down into the bed.
- Cryotherapy treatment – ice therapy treatment daily to control the effusion
- Heel slides – laying supine but both feel on the bed begin to move the effected leg closer to your body then in the same controlled way slide the heel down the bed away from you.
- Quads/Hamstring/Calf isometrics – Without moving the lower limb below the knee resist against force (Either a wall or using TheraBand).

Criteria to progress to middle phase of rehabilitation (4-12 weeks)

✓ ROM - Must be greater or equal to 0-90 degrees

✓ Strength - Quadriceps set with normal superior patellar translation, SLR x 10 seconds without extensor lag. Hamstring, calf, adductor, abductor activation

Goals - (These do not limit progression to the next phase however should be addressed with interventions)

✓ WB – Near normal gait without crutches (2 weeks) + open chain leg control

✓ Effusion – Minimal knee effusion (progressive with each session)

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Middle phase of rehabilitation (ACLR 4-12 weeks)

Goal to increase lower extremity strength and regain flexion ROM (MCL). 1-2 visits per week with emphasis on patient compliance with resistance and ROM training as part of HEP. This phase should begin when all Phase 1 criteria for progress is achieved. Important to note the graft is at its weakest between 8-10 weeks.

Appointments – 1-2 times per week in addition to 2-3 days HEP

Rehabilitation Goals

- Distal MCL lesion: Continue cautious knee flexion ROM to allow healing
    - Weeks 4-6: ROM 0-90°
    - Weeks 6+: flexion ROM as tolerated
- Monitor and progress knee ROM, patellar mobility, and LE flexibility
- Initiate bike for ROM and warm-up for distal MCL lesions, keeping knee in slight Varus position.
- Normalize gait
- Quadricep strengthening/activation
- Adherence to HEP
- Develop and assess movement patterns
- Progress gluteal and lumbopelvic strength and stability
- Progress single leg balance and proprioceptive exercises

Precautions

1. Unlock the brace at 6-8 weeks post-operatively and discontinue brace over post-operative weeks 8-12 as the patient gains leg control and balance without pain
    - WBAT 4-6 weeks with brace locked in extension
    - WBAT at 6-8+ weeks with brace unlocked, wean from brace
2. No open chain hamstring strengthening or isolated hamstring exercises
    - Initiate submaximal leg extension 90-45 degrees
    - Initiate knee AROM 90-0 degrees (modify if painful)
3. No hamstring stretching
4. Avoid dynamic knee valgus with all interventions, including warm-up and endurance activities
5. ACL graft at its weakest at 8-10 weeks

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Rehabilitation Outline

- Soft tissue mobilization to anterior knee and incisions
- Patellar mobilizations (with taping if needed)
- Heel slides/ wall slides actively
- Gait drills Balance drills with brace
- Gluteal and lumbopelvic strength and stability
- Double leg WB balance drills
- When tolerable progression to single leg balance and proprioceptive exercises
- Further Effusion control (Cryotherapy)
- Initiate and progress WB strengthening/stability with emphasis on proper LE mechanics avoiding knee valgus
- Multi-angle knee isometrics from 60-90 degrees for patients unable to tolerate (high- intensity muscle stim)
- Endurance: low impact - treadmill walking (6 weeks)

Home exercises

- Weight acceptance and control - shallow squat with lateral shifting.
- Double leg heel raises – using balance support (hand against the wall) slowly raise up onto your toes hold for 3 seconds and control the movement back down.
- Double leg squats – squatting so thighs are parallel to the floor.
- Bridging – laying supine on the floor with your feel flat to the floor slowly begin to lift your pelvis of off the ground while keeping your back straight and glutes engaged hold this position before controlling the movement back down to the floor then repeat.

Criteria to progress to late stages of rehabilitation – (12 weeks - return to sport)

✓ ROM - Maintain full, pain free AROM including patellofemoral mobility

✓ Effusion - 1+ or less (no reactive effusion after exercise)

✓ Strength - Isometric or isokinetic quadriceps and hamstrings strength >/= 80%

✓ WB - Able to tolerate therapeutic exercise program without increased pain or >1+ effusion (Adherence to HEP).

✓ Neuromuscular Control - Demonstrates proper lower extremity mechanics with all therapeutic exercises (bilaterally).

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Late phase of rehabilitation (ACLR 12 Weeks – Return to sport)

This stage of rehabilitation will only be appropriate when all the middle phase criteria has been achieved, and the practitioner is comfortable with the progression.

Appointments - 1-2 times every week with progressions on HEP

Rehabilitation goals

- Non-impact balance and proprioceptive drills- progression over 12 weeks - RTP to WB training.
- ROM - Full, symmetrical to contralateral limb, and pain-free with overpressure
- Maintain full patellofemoral and tibiofemoral range of motion
- No knee swelling, stiffness or meaningful pains
- To further develop strength, hypotrophy, power and endurance
- Neuromuscular re-education

Precautions

1. No open chain hamstring strengthening or isolated hamstring exercise
2. Avoid post-activity swelling
3. ROM- full, pain-free knee ROM, symmetrical with the uninvolved limb
4. Strength- Isokinetic testing 80% or greater for hamstring and quad.
5. WB- normalized gait and jogging mechanics
6. Neuromuscular Control: Pain-free hopping in place
    - Audible rhythmic strike patterns and no gross visual compensation
7. Knee must be symmetrical to contralateral limb, and pain free with overpressure
8. Begin single leg hopping and low intensity jogging only when above criteria have been achieved.
9. Single leg progressions are based on MCL rehabilitation levels. (caution into knee valgus)

Rehabilitation outline

- Performance of the quadriceps, hamstrings and trunk dynamic stability
- Muscle power generation and absorption via plyometrics
- Sport and position specific activities
- Begin agility exercises between 50-75% effort (utilize visual feedback to improve mechanics as needed)
- Advance plyometrics (progression based on each individual): Bilateral to single leg, progress by altering surfaces, adding ball toss,3D rotations, etc.

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- Good control and no pain with functional movements, including step up/downs and squats
- Single leg control-open and closed chain
- Quad strengthening closed chain (progressing to multi-plane) and open chain exercises
- Non-impact balance and proprioceptive drills
- Hip and core strengthening
- PWB to FWB jumping

Home Exercises

- Strength + Neuromuscular re-education
    - Squats
    - Leg extension /leg press
    - Deadlifts
    - Lunges (multi-direction)
    - Rotational trunk exercises
- Agility
    - Side shuffling
    - Figure 8
    - Zig-zags
    - Ladder drills
- Plyometrics
    - Single-leg hop downs from increasing height (progressive dependent on MCL integrity)
    - Single-leg hop-holds
    - Double and single-leg hopping onto unstable surface
    - Repeated tuck jumps

Criteria to return to port specific training session before full return to play.

✓ ROM: full pain free knee ROM, symmetrical with the uninvolved limb

✓ Strength: Isokinetic testing 90% or greater for hamstring and quad.

✓ Effusion: No reactive effusion with sport-specific activity.

✓ WB: normalized gait and jogging mechanics

✓ Neuromuscular control: appropriate mechanics and force attenuation strategies with high level agility, plyometrics, and high impact movements

✓ Functional Hop Testing: LSI 90% or greater for all tests

✓ Physician Clearance

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Additional stage of rehabilitation (slower progressively loading)

Stage Four – 12-16 weeks

- Begin rehabilitation towards sports
- Full range isokinetic
- Knee extension machine with low weight high reps progressing isokinetic quads to full extension.

Stage Five – 16 weeks to 6 months

- Begin plyometric program
- Concentrate on agility training
- Begin to introduce gentle sport specific drills

Stage Six – After 6 months

- Return to recreational sports if full range of motion 120 degrees
- Hamstring strength superior to 90% of no inured
- Quads superior to 85% + agility training completed.
- Aim to delay contact sport for a further six weeks.
- Maintenance of HEP 2-3 times per week.

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Suggested outcome measures tests to be used to monitor progression throughout the rehabilitation

Bilateral Drop Jump Test

- Participant stands on a 30cm box
- Jump two footed off the box landing with feet either side of a line 30cm from the box
- Immediately attempt to undertake a maximum vertical jump reaching up to touch a target held above the line
- Score a zero if the appropriate strategy is used and one for inappropriate movements. (Best overall score is 0, worse is 10 points)

Qualitative Analysis of Drop Jump Landing			
Date: Left	Patient: Right	Condition: Bilateral	
		Left	Right
Trunk alignment	Leaning in any direction from midline		
Foot on landing	Initial foot contact not symmetrical (timing)		
	Initial foot contact not symmetrical (foot landing away from mark)		
	Significant ground contact time		
	Foot not neutrally aligned (facing forwards)		
	Failure to land on mid foot		
Limb on landing	Thigh pelvis angle <90 degrees		
	Stiff upright landing		
	Patella pointing towards 2nd toe (noticeable valgus)		
	Patella pointing past inside of foot (significant valgus)		
	Total:		

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Tuck Jump Test

- Subjects stand in a 30cm box marked on floor
- Undertake tuck jump continuously for 10 seconds
- Must attempt to raise the knees above the hips each time and land and take off within the box
- Score a zero if the appropriate strategy is used and one for inappropriate movements. (Best overall score is 0 and worse is10 points)

Tuck Jump Test Score Sheet

Date:

Patient:

Condition:

Left:

Right:

Bilateral:

	Score
Knee and thigh motion	
1. Knee valgus on landing	
2. Thighs not reaching parallel (peak of jump)	
3. Thighs not equal side to side (during flight)	
Foot position during landing	
4. Foot placement not shoulder width apart	
5. Foot placement not parallel (front to back)	
6. Foot contact timing not equal	
7. Does not land in same foot print	
8. Excessive landing contact noise	
Plyometric technique	
9. Pause between jumps	
10. Technique declines prior to 30 seconds	

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Qualitative Analysis of Single Leg Loading

Single leg squat
Single leg step down
Single leg hop for distance

- See page 12 for test descriptions
- Score a zero if the appropriate strategy is used and one for inappropriate movements. (Best overall score is 0, worse is 10 points)

Date:

Patient:

Condition:

Left:

Right:

Bilateral:

QASLS		Left	Right
Arm strategy	Excessive arm movement to balance		
Trunk alignment	Leaning in any direction		
Pelvic plane	Loss of horizontal plane		
Thigh motion	WB thigh moves into hip adduction		
Knee position	Patella pointing towards 2nd toe (noticeable valgus)		
	Patella pointing past inside of foot (significant valgus)		
Steady stance	Touches down with NWB foot		
	Stance leg wobbles noticeably		
	Total:		

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Qualitative Analysis of Single Leg Loading – Test Descriptions

Single leg step down

- Participant stands on a 30cm box
- Instructed to step off the box onto a mark, 30cm from the box and 5cm on the contra-lateral side to the midline

Single leg hop for distance

- Participant stands on mark at side of standard tape measure
- Hands resting on iliac crests
- Attempts to hop as far as possible staying parallel to the tape

Cross Over Hop Test

- Subject stands by two parallel lines 20cm apart extending at least 5m
- Undertakes four consecutive hops without pause crossing the grid lines each time

Star Excursion Balance Test

- Subject stands on leg to be tested in centre of star. Keep heel down.
- Instructed to reach as far as possible down the line without taking undue support from the reaching leg or stepping over onto that leg
- 4 practices then test 5 repetitions

General notes

- All landings for single leg step down and single leg hop for distance must be held for 3 seconds, emphasis during task instruction must be placed on this
- Evaluate all landings using the QASLS scoring system
- For single leg hop for distance also include the distance hopped and the leg length
- Position camera a minimum of 2m from the landing position, zoom in to maximise the size of the subject within the frame
- Allow the subject a minimum of two practice attempts (continuing until they are able to do tasks appropriately) then record a single attempt.

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Appendix A: Use of crutches

- When standing up and sitting down, make sure you take your arms out of the crutches and hold them in one hand. This will help to avoid any shoulder injuries.
- When walking with the crutches, keep the handles pointing forwards and your arms close to your sides.
- Place both crutches forwards together with enough space in between them to step into.
- If you are advised that you are not allowed to put any weight through your injured leg (non-weight bearing), place your crutches forwards together. Now lean through your arms as you hop your uninjured leg up to the same level as the crutches. The foot on your injured leg must stay off the floor at all times when walking.
- If you are advised that you are allowed to weight bear, place the crutches forwards together and then step your injured leg up to the crutches. Now lean through your arms as you step you uninjured leg forwards to the same level.
- When climbing stairs, try to use a banister or rail in one hand and a crutch in the other (you can also carry the extra crutch in this hand):
- GOING UP: Good leg, bad leg, crutch
- GOING DOWN: Crutch, bad leg, good leg.
- Check the rubber stoppers regularly. If they are worn down, bring them back and the physiotherapist will replace them.

Appendix B: Physiolab

Link for hire:

https://physiolab.com/products/to-rent/s1-portable.html

Website:

www.physiolab.com