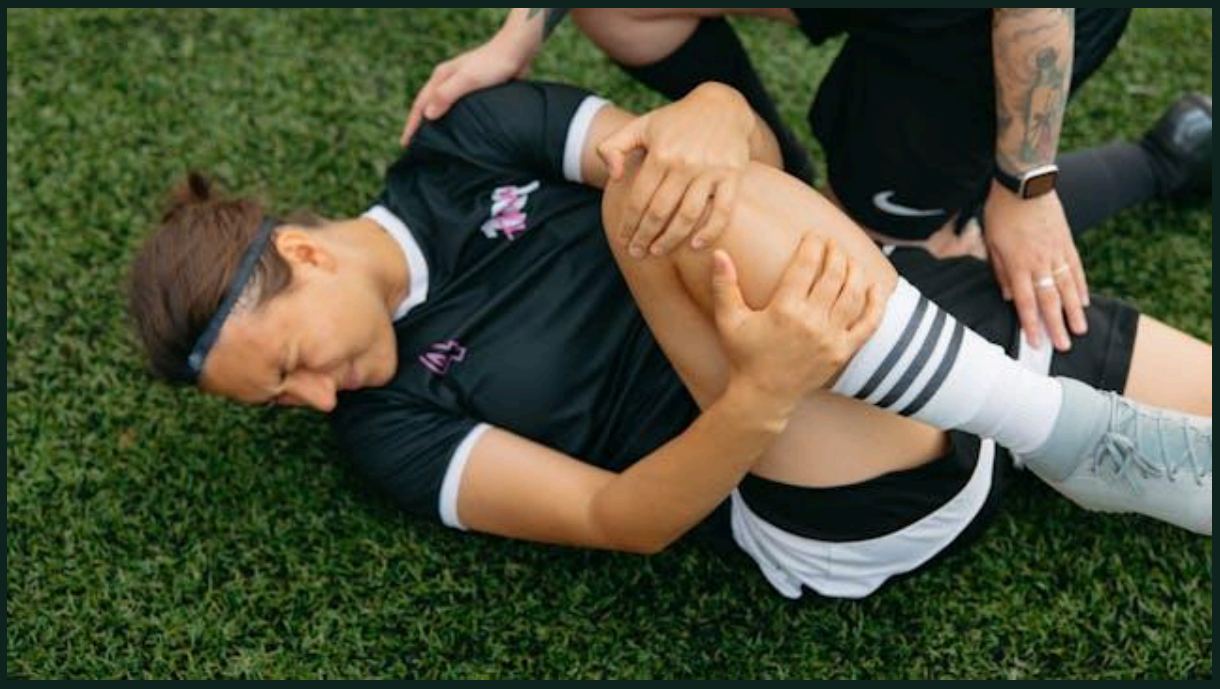
MAGNUS

REHABILITATION PROTOCOL



ANTERIOR CRUCIATE LIGAMENT TEAR

Date: 10-04-2025

ONE PAGER OVERVIEW

Phase	Focus	Period	Key goals (incl. and preferably objective measures & PROMS)
Pre-op	Injury recovery & preparation of surgery	Depends on surgery date	Goal 0: minimize swelling Goal 1: Patient education Goal 2: Regain ROM Goal 3: Improve strength Goal 4: Neuromuscular training
1	Recovery from surgery	Week 0-6	Goal 1: 0°-10° hyperextension, 125° flexion Goal 2: Normal gait Goal 3: Reduce Swelling / AMI
2	Strength & Neuromus cular control	Week 6-15	Goal 1: Single leg balance/stability Goal 2: Single leg strength Goal 3: Full ROM in extension, 150° flexion
3	Running, agility & landings	Week 14-22	Goal 1: Dynamic limb symmetry in functional movements Goal 2: Return to sport testings Goal 3: Attain >95% limb symmetry in strength testings
4	Return to sport	Month 6-9 men 6-10,8 women	Goal 1: Sport specific testings Goal 2: Retain limb symmetry testing phase 3 goals
5	Prevention from re-injury	After phase 4	Retain goals phase 4 by regular re-testing

*PROMS: Patient-reported outcome measures are surveys on quality of life (e.g. EQ5D) or disease specific (e.g. Oxford Knee Score)

ABBREVIATIONS

AE	Aerobic Exercise
ACL	Anterior Cruciate Ligament
BFR	Blood Flow Restriction
LSI	Limb Symmetry Index
RE	Resistance Exercise
ROM	Range of Motion

PRE-OPERATIVE PHASE (if applicable)

Period

Depends on time between injury and first visit at clinic. **Ideally within 2-5 days after accident.**

Main Goals

Goal description
Goal 1: Minimize swelling
Goal 2: Patient education on surgery and rehab process
Goal 3: Improve and normalize ROM
Goal 4: Strength training
Goal 5: Neuromuscular training

Outcome measures and goals

Outcome measure	Test instruction (video)	Goals	Mandatory for next stage?
Range of motion knee	ROM test knee Patellofemoral mobility test	• Knee extension <0° • Knee flexion >125° • Patellofemoral mobility Left = Right	Yes
Muscle strength	Isometric strength test with HHD: hamstrings and quadriceps	Isometric strength test >90% left vs. right (HHD)	Yes
Neuromuscular training/ coordination	Y-balance test	Balance test >90% similarity	Yes
Education	Inform patient about surgical options, outcomes and trajectory		Yes
Jump tests			
Single leg forward hop	https://rb.gy/4mggy5	operated leg must measure >90% distance compared to the CL leg.	Yes
Timed 6m hop test	https://rb.gy/dncpap	operated leg time >90% of the time of the CL leg.	Yes
Single leg triple hop	https://rb.gy/ylojgk	operated leg distance >90% of the time of the CL leg.	Yes

Outcome measure	Test instruction (video)	Goals	Mandatory for next stage?
Single leg crossover triple hop	https://rb.gy/jepvki	operated leg distance >90% of the time of the CL leg.	Yes
Single leg lateral hop	https://rb.gy/tr711e	Maintain balance (2sec) and distance >90% CL side	Yes
Single leg medial hop	https://rb.gy/i1eehd	Maintain balance (2sec) and distance >90% CL side	Yes
Single leg lateral rotation hop	https://rb.gy/iejaqp	Maintain balance (2sec) and rotation angle at >90% CL side (e.g. 135)	Yes
Single leg medial rotation hop	https://rb.gy/vz9vtb	Maintain balance (2sec) and rotation angle at >90% CL side (e.g. 135)	Yes
Single leg vertical hop	https://rb.gy/r7zl40	operated leg distance >90% of the time of the CL leg.	Yes

PHASE 1. RECOVERY FROM SURGERY

Period

4-6 weeks in 2 stages
- Stage 1. Week 0-2
- Stage 2. Week 2 - 4/6

Main Goals

Goal description
Goal 1: ROM extension >0° and flexion >125°
Goal 2: Normal gait pattern
Goal 3: Reduce swelling & arthrogenic muscle inhibition

Outcome measures and goals

Outcome measure	Test instruction (video)	Goals	Mandatory?
ROM extenstion	Passive knee extension	L=R minimal 0° tot 10° hyper extension	Yes
ROM flexion	Passive knee flexion	+- 125°	Yes
Swelling	https://tinyurl.com/3u7xdhhm	No wave following sweep test	Yes
Pain	VAS-score	≤4/10	Yes
Straight Leg Raise	https://tinyurl.com/nby2rfd5	No lag upon start Being able to keep at 30° for >10sec	Optional

PHASE 2. STRENGTH AND NEUROMUSCULAR CONTROL

Period

6-14 weeks post-op

Main Goals

Goal description
Goal 1: Single leg balance/stability
Goal 2: Single leg strength
Goal 3: Full ROM in extension, 150° flexion

Outcome measures and goals

Outcome measure	Test instruction (video)	Goals	Mandatory?
Quadriceps strength in NM	VALD HHD	LSI: 80-85%	Yes
Hamstring Strength	VALD HHD	LSI: 80-85%	Yes
Single leg bodyweight calf raises	https://tinyurl.com/y5n374pk	LSI: 85% and >20 rep Body Weight)	Yes
Side bridge endurance test *(upper leg not allowed to help with ADD)*	https://shorturl.at/AEoiK	LSI: 85% (min 30sec. BW)	Yes
Single Leg Squat (SLS) on box	https://tinyurl.com/37exvyst	LSI: 80% and >10 rep Controle!	Yes
ROM	Goniometer / VALD	A/P extensie: 0° A/P flexie: 120 - 140°	Yes
Zwelling	Stroke test	Swelling does not increase	Yes
Y Balance test	https://rb.gy/t9n5ok	LSI: 85%	Yes
VAS pain	Unipodal exercises	< 3/10	Yes

PHASE 3. RUNNING, AGILITY AND LANDING

Period

14-22 weeks

Main Goals

Goal description
Goal 1: Dynamic limb symmetry (linked to functional movements e.g jump length / height / speed)
Goal 2: Pass specific on hopping, agility, technique and endurance test
Goal 3: Attain >95% similarity (LSI) in strength test (flexion /extension)

Outcome measures and goals

Outcome measure	Test instruction (video)	Goals	Mandatory?
ROM knee flexion		=CL leg and /or >160°	Yes
Cybex test		Melbourne>85%	Yes
Return to sport tests			
10 single leg squats	https://tinyurl.com/3n5ynka5	The patient must squat down on one leg at least 60° of knee flexion while maintain balance and motor control. The patient cannot allow their knee to deviate into genu varum or valgum. The patient must complete 10 consecutive repetitions.	Yes
Single leg forward hop	https://rb.gy/4mggy5	operated leg must measure >90% distance compared to the CL leg.	Yes
Timed 6m hop test	https://rb.gy/dncpap	operated leg time >90% of the time of the CL leg.	Yes
Single leg triple hop	https://rb.gy/ylojgk	operated leg distance >90% of the time of the CL leg.	Yes
Single leg crossover triple hop	https://rb.gy/jepvki	operated leg distance >90% of the time of the CL leg.	Yes
Single leg lateral hop	https://rb.gy/tr711e	Maintain balance (2sec) and distance >90% CL side	Yes
Single leg medial hop	https://rb.gy/i1eehd	Maintain balance (2sec) and distance >90% CL side	Yes

Outcome measure	Test instruction (video)	Goals	Mandatory?
Single leg lateral rotation hop	https://rb.gy/iejaqp	Maintain balance (2sec) and rotation angle at >90% CL side (e.g. 135)	Yes
Single leg medial rotation hop	https://rb.gy/vz9vtb	Maintain balance (2sec) and rotation angle at >90% CL side (e.g. 135)	Yes
Single leg vertical hop	https://rb.gy/r7zl40	operated leg distance >90% of the time of the CL leg.	Yes
10 metre Lower Extremity Functional Test	https://rb.gy/2egmwy	Males ≤ 17-20 seconds Females ≤ 19-23 seconds	Yes
Triple broad jump	https://tinyurl.com/mryn26h4	operated leg must measure >90% distance compared to the CL leg.	Optional
10m T-test agility	https://rb.gy/j2rm7z	Not necessary if you conduct triple broad jump	Optional

PHASE 4. RETURN TO SPORT

Period

Men: 5,5 (early RTS) - 9 (full RTS) months Women: 5,5 - 10,8 months[1]

Main Goals

Goal description
Goal 1: Pass sport specific testings
Goal 2: Maintain strength ratios and functional testing criteria phase 3

Outcome measures and goals

Outcome measure	Test instruction (video)	Goals	Mandatory?
Attain outcome measures phase 3			Yes
Sport specific surveys			
KOOS-sports questionnaire	VALD health hub Freq: weekly	>90%	Yes
IKDC Knee Evaluation >93	VALD health hub Freq: weekly	Score >93	Optional
ACL-RSI	Orthotool online version	Score >76,6	Optional
TSK (Kinesiofobie)	Orthotool online version	Score <17	Optional
Sport specific testing protocols			
Field sports (soccer, hockey, handbal, …)	• T test of Illionois Agility Test • Zig zag cutting • Single leg lateral hop • Triple hop + directional change • SL Countermovement Test • 10 en 20m sprints • Repeated Sprint Ability • Foot-eye Coordination	Difference between operated and non-operated test <10% on test result (e.g. strength, repetitions, speed, control)	Optional
Volleybal	• Drop Vertical Jump (DVJ) • Repeated Jump Single Leg (30sec) • Side Hop Test • Single Leg	Difference between operated and non-operated test <10% on test result (e.g. strength, repetitions,	Optional

[1] https://pubmed.ncbi.nlm.nih.gov/38242500/

	Countermovement Jump • Lateral Shuffle Test (pro agility shuttle)	speed, control)	
Ski/snowboard	• Jumps met skibotten	Difference between operated and non-operated test <10% on test result (e.g. strength, repetitions, speed, control)	Optional
Dance	• Relevé en Sauté Test • Jeté Test • Assemblé • Turn-out en Plié • Pirouette • Side Hop Test • Drop Vertical Jump	Difference between operated and non-operated test <10% on test result (e.g. strength, repetitions, speed, control)	Optional

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BFR guidelines

- Blood flow restriction guidelines | Australian Institute of Sports