RJAH ACL Reconstruction Guide

Patient Details: **Co-morbidtity:**

Note to Therapist: **This is a guide to progression, not an exhaustive list of rehabilitation and does not replace clinical reasoning.*
**Treat any soft tissue symptoms on their merit.*
**Objective Tests (not exhaustive) can be used as an indication for progression. The choice can be individualised for the patient.*
****Special Instruction(s) includes specific post-operative advice for the individual patient based on the Consultant's recommendation(s). This will be completed on discharge or follow-up clinic appointments**.*

PHASE OF REHABILIATION	IDEAL CRITERIA	REHABILITATION GUIDE	GOALS	OBJECTIVE TEST	SPECIAL INSTRUCTION
PHASE 1 **From Day 1**	○ Successful operative outcome. ○ Adequate pain relief. ○ Understands post-op instructions.	• Ice/ Cryocuff/ Game Ready or equivalent. • Patella mobilisations [if PTG]. • EOR E mobilisations. • H and calf flexibility [care if H graft]. • Ankle Exercises (e.g. heel raises). • SQ progressing to SLR. • Co-contraction Q and H. • Prone SLR. • Mini squats/ small knee bends. • Weight transferring. • Elbow crutches for comfort.	1. Reduce inflammation. 2. Gain terminal E 3. Promote distal circulation. 4. Gradually regain ROM. 5. Increase confidence. 6. Promote early mobility.		**BEFORE DISCHARGE check the op note for any specific post-op instructions and amend the guide accordingly.**

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PHASE 2 **From Week 1**	○ Full active and passive E. ○ Mobilise independently +/- aids.	• Static Bike or Turbotrainer no/low resistance as tolerated (part revolution → full revolution as symptoms dictate). • Gradually increase weight-bearing. • Independent gait re-education. • Low step-touch → step-up → step over [avoid 'heavy' eccentric Q if PTG]. • Active OKC Q 90º - 45º ipsilateral leg. • **Contralateral limb strength training 3x per week (continue for 10 weeks) Leg Press, Leg Curl & Leg Ext 3 x 5RM.** • Other muscle groups not to be neglected. • Upper body active exercise→ resis/reps/sets/speed.	1. Promote early function. 2. Increase ROM. 3. Encourage FWB. 4. Improve muscular control. 5. Limit Ipsilateral deconditioning of Q.	AROM. PROM. SLR. Effusion.	

PHASE OF REHABILIATION	IDEAL CRITERIA	REHABILITATION GUIDE	GOALS	OBJECTIVE TEST	SPECIAL INSTRUCTION
PHASE 3 **From Week 2**	○ Minimal discomfort. ○ Resolving effusion. ○ FWB. ○ SLR with no lag. ○ AROM = Full E - ≥100º.	• Gait with predictable changes in direction. • Prone auto-over press F → develop into Q stretch. • Step-ups (for/back/sideways/over). • PWB (parallel bars, deep water or AlterG) landing drills - jumps, hops, leaps → control technique/speed/reps. • Calf raises DL → SL • A-March • Leg Press/Squats → resis/reps/sets/speed. • Proprioception → single leg stance/wobble boards/Trampette/crash mats/etc. • Lower body active exercise → resis/reps/sets/speed. • Resisted OKC Q limit range 90˚ - 45˚ • Core stability exercises as appropriate. • Flexibility exercises as appropriate. • Rowing → dist./speed/resis. • X-Trainer → dist./speed/resis. • Hydrotherapy	1. Progress functional activities. 2. Prevent AKP. 3. Prevent scar adherence. 4. Prevent joint stiffness. 5. Restore normal gait pattern. 6. Promote appropriate muscle strength, power and endurance. 7. Improve neuromuscular/ proprioception/ sensorimotor performance. 8. Maintain cardiovascular fitness. 9. Encourage patient compliance.	Single Leg Stance. Clam. Planks. Bridge. Hurdle Step.	

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PHASE 4 **From Week 6**	○ Normal symmetrical gait. ○ Full AROM. ○ No/minimal effusion. ○ Single leg stance ≥80% parity. ○ Clams 10 reps with 10 sec hold ideal control [L] & [R]. ○ Directional Planks 30 sec hold ideal control. ○ Bridge10 reps with 10 sec hold ideal control. ○ Controlled hurdle step ≥5 reps.	*Sequence Training:* • Train strength and endurance 3 – 4 x per week. • Train strength and endurance on separate days. • Have a minimum of 24 hours between strength days. • **Strength:** [include through range OKC Q from Week 10] *See appendix; Pages 9 – 12* Adjust if necessary based on symptoms. • **Hypertophy:** [include through range OKC Q from Week 10] *See appendix; Pages 9 – 12* Adjust if necessary based on symptoms. • **Endurance:** [include through range OKC Q from Week 10] Gradually progress toward ≥45 min continuous CV exercise (exception of jogging/running). *See appendix; Pages 9 – 12* Adjust if necessary based on symptoms • Add speed exercises, e.g. prone heel flicks, Trampette high knees, Trampette heel flicks. • Snap-downs • Add Landing control drills → FWB double footed plyometrics from Week 10 → control technique/speed/reps.	1. Promote appropriate strength, power and endurance based on individual's needs. 2. Improve neuromuscular performance. 3. Increase confidence.	Single Leg Squat 60º. Rotatory Stability. Single Leg Bench Bridge. Vertical Jump. Landing Drills. Single Leg Sit → Stand.	

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PHASE 5 **From Month 3**	○ Single Leg Squat 60º 5 sec hold with good alignment. ○ [L] & [R] Rotational Stability ≥80% parity. ○ Single Leg Bench Bridge 20 reps with ideal control. ○ Single Leg Sit → Stand 10 reps. ○ Ideal landing control > 6 reps. ○ Note Vertical Jump Height. ○ IKDC score ≥ 64 prior to introducing running.	• Box Jumps • Jump rope skipping (e.g 30s on 30s off) • A-Skipping • Ankling drills • Progress to single footed plyometrics as dictated by control. • Introduce jogging → running when Q strength and neuromuscular control is adequate. (refer to page 11 - 12 for an example of a return to running introduction and progression guide) • Advance dynamic proprioceptive exercises e.g. volleying football, throwing, catching, racket and ball while balancing on Trampette.	1. Sport specific function.	Tuck Jump. Vertical Jump. 5 RM. Hop for Distance. Deep Squat. Inline Lunge. Bulgarian Split Squat. Single Leg Romanian Deadlift. Vail Sports Test.	
Phase 6 **From Month 4**	○ Vertical Jump Height – shows improvement. ○ Deep Squat – ideal posture +/- heel raise.	• Add predictable agility drills when sufficient control and confidence is achieved e.g. twist/turn/pivot/cut/accelerate/decelerate/direction • Perturbation training e.g. therapist randomly nudges patient off balance during a single leg throw-catch drill.	1. As PHASE 5.	As PHASE 5.	

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PHASE 7 **From Month 5**	○ Tuck Jump ≥ 60% quality. ○ Vertical Jump Height – shows improvement. ○ 5 RM > 80% parity. ○ Hop for distance >80% parity. ○ Inline Lunge – ideal movement pattern >80% parity. ○ Bulgarian Split Squat – ideal movement pattern >80% parity. ○ Single Leg Romanian Deadlift – ideal movement pattern >80% parity. ○ Vail Sports Test ≥85%	• Progress from predictable to unpredictable agility drills. • Non-contact sport specific training → terrain/volume/periodisation.	1. Prepare neuromuscular and psychological ability to return to unrestricted function.	As indicated for individuals goals.	
PHASE 8 **From Month 9 – 12+**	• All Tests > 90% parity. • IKDC score ≥ 88 • *Consider parity with normative population data.*	• **Check and discuss with patient's Consultant prior to RTS.** • Contact sport specific training. • Earliest return to contact sport training. • Progress to full restriction free sports and activities.	1. Unrestricted confident function. 2. Injury prevention.	Full sporting Function.	

Terminology Key:

PTG	Patella Tendon Graft	**PWB**	Partial Weight Bear
EOR	End of Range	**FWB**	Full Weight Bear
E	Extension	**ROM**	Range of Movement
F	Flexion	**AROM**	Active Range of Movement
SLR	Straight Leg Raise	**PROM**	Passive Range of Movement
Q	Quadriceps	**OKC**	Open Kinetic Chain
H	Hamstrings	**resis**	Resistance
AKP	Anterior Knee Pain	**reps**	Repetitions
[L]	Left	**RM**	Repetition Maximum
[R]	Right	**CV**	Cardiovascular
MDT	Multidisciplinary Team	**RTS**	Return to Sport
DL	Double Leg	**SL**	Single Leg
IKDC	International Knee Documentation Committee (patient reported outcome)		

Summary of Post-Operative Restrictions (unless stated otherwise):

Activity	Dictated by **sufficient neuromuscular control** and time from surgery.
Open Kinetic Chain Q	From 10 – 12 weeks.
High Impact Activities, e.g. jumps, hops, running.	From 3+ months.
Predictable Agility, including twisting and turning movements	From 4+ months.
Unpredictable Agility	From 5+ months.
Return to full contact sports	From 9 – 12+ months, dependent on specific RTS criteria and MDT opinion.

Appendix:

Patient S&C Education.

A **repetition maximum** (RM) is the most weight you **can** lift, push, press or curl for a defined number of exercise movements. For example, a 5RM would be the heaviest weight you could lift for 5 consecutive repetitions. What will dictate your RM is muscle fatigue/ weakness, or you are experiencing pain more than 3-4/10 above your normal baseline (10 = worst pain imaginable, 0 = no pain at all), or you are losing technique/ form.

1 – 5 RM will improve Muscle Strength

6 – 10 RM will improve Muscle Hypertrophy

11 – 15+ will improve Muscle Endurance

Sets are is a series of reps of an exercise done in sequence (usually with a rest between). For example, 3 x 5 RM would be an exercise you can perform a maximum of 5 consecutive times (see **repetition maximum**), rest and then repeat twice more.

Perform ***a minimum*** **of two sets** for each exercise.

Progress:

As you progress and the loads you are lifting are getting easier, but not easy enough to increase the weight, increase the volume. For example if you are lifting 5RM for 3 Sets, increase the number of sets. When this starts to feel easier reduce the number of sets and try increasing the weight to ensure you remain in the specific training zone for you.

Recommended Rest times between sets:

1 – 5 RM, 2 min. rest between sets.

6 – 10 RM, 1 min. rest between sets.

11 – 15 RM, 40 sec. rest between sets.

Particularly when you have 2 mins between sets, you might choose to save time and increase your workout intensity by performing a **Superset.** This can be a combination of two or three different exercises that work opposing muscle groups, or upper and lower body, or left and right limbs, and the exercises are done back to back with no rest in between. For example you may choose to switch between the leg press and the chest press. Working on the chest press during the 2 min. rest on the leg press and vice versa.

Single Leg and or Arm exercises will give you an indication of the strength differences between your limbs. It also means the weaker limb cannot be assisted by the stronger limb. If you are performing single limb exercises, make sure the RM is specific for each limb. Remember strengthening your non-injured side will limit the deconditioning of your injured side.

Circuits are a collection of exercise sets you repeat without a rest. A rest will be recommended between circuits rounds.

CV Endurance and Strength training don't mix. If you want to progress your CV work to more than a 20 min moderate session, don't do this in the same session that you strength train. The benefits of the two exercises counteract with each other, meaning you will not strengthen as quickly. If you want to progress you CV do so on a separate day.

Treadmill Progression:

Add or progress one factor at a time, duration (length of session) or volume (how many sessions per week) or pace (speed) or terrain (incline, decline, surface). Start easy and find benchmark that does not produce symptoms during or after. You may choose to follow **Example 1**, below. Ensure this can be repeated once a week for few weeks, to ensure consistency of symptom control, prior to progressing.

Example 1:

Treadmill to ensure even consistent surface and control.

Start: 2 min walk e.g. 4 mph/ 6.5 kmph
1 min jog e.g. 6 mph/ 9.5 kmph
1min walk
1 min jog
Continue in this manner until 10 min achieved

Progress by

1. Maintaining the 2 min walk start, but then decrease the amount of walking and increase the amount of jogging within the 10 min.

Or

2. Performing **Example 1**, increased to twice per week.

Or

3. Performing **Example 1**, increasing the duration to 15 mins.

The choice of progression can be based on your preference and goals. Once the progression has been maintained for a few weeks with no exacerbation of symptoms a further progression can be introduced in the same manner.

When you can jog for 20 min add fartlek training if this meets with your return to sport/ activity goals.

Example 2:

2 min walk
3 min jog
30 sec sprint
1 min jog
30 sec sprint

Continue in this manner until 10-15 min mark and finish with a 10-5 min jog until 20 min total has been achieved.

- You may also vary the treadmill work by gradually adding inclines or declines (if available).