RJAH Hip Arthroscopy - autologous cartilage and bone marrow concentrate cartilage repair (Autocart) Guide

Patient Details: **Co-morbidity:**

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		SPECIAL INSTRUCTION
PHASE 1 **From Day 1** ***Post-operative recovery phase*** **Range of movement/muscle activation** **No passive flexion beyond 90 degrees for 4 weeks**	○ Successful operative outcome. ○ Adequate pain relief. ○ Understands post-op instructions.	• **Weight-bear as op note allows.** • **PWB with E/C 0 - 4/52,** • **E/C 4 – 6/52** • Mobility: aim for comfort and safety • Ice, POLICE (see appendices) **ROM exercises:10-15 x 3** • Supine: hip flexion (below 90) • Hip abduction • Bent knee fall out • Circumduction **Upper limb maintenance: 0.5 – 2kg 10 -15 x 3** **Low Load muscle activation exercises** 5- 10 seconds x 3 – 5 • Glute squeeze • ISOM abd/add 0 and 60 degrees flexion • Core squeeze • Bridge	1. Manage Pain **2. Allow healing** ***3. Prevent scar adhesions/stiffness*** 4. Reduce inflammation. 5. Promote distal circulation. 6. Increase confidence. 7. Promote early mobility. 8. Normalise gait 9. Maintain health, fitness and wellbeing	***Persisting symptoms in the groin region NORMAL for 3 months+, due to operation procedure, access to the capsule and allowing this to heal. Important to ensure the hip does not stiffen.***	**BEFORE DISCHARGE check the op note for any specific post-op instructions and amend the guide accordingly.** ***If labral repair, limit weight bearing hip flexion to 90 degrees***

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PHASE 2 **From Week 1** **Increase ROM/ increase muscle activation** **No passive flexion beyond 90 degrees for 4 weeks**	○ Adequate pain relief. • **Mobilise PWB with E/C 0 - 4/52,** • **E/C 4 – 6/52** ○ Increase Range of Motion	**Hydrotherapy (when wound allows) for ROM** **Manual therapy to increase ROM – reduce limit of scar tissue formation, not beyond 90 degrees flexion** HEP: Standing: • Hip flexion • Hip abduction • Hip extension • Bridge • Supported mini squat **Muscle activation exercises 5 - 10 seconds 5 x 3** • Clam • Hip abd • Fire hydrant • Wall press • ½ side plank • Wall slide • Hip flex – sitting **Cardiovascular exercises:** • Static bike • Alter G treadmill (gait re-education) **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. ***Prevent scar adhesions/stiffness*** 4. *Increase muscle activation* 5. Increase confidence. 6. Reduce anterior pelvic tilt. 7. Maintain good pelvic control 8. Prevent increased shearing forces	AROM (up to 90 degrees flex). PROM. (up to 90 degrees flex). SLR.	Do Not force movement. Use pain and discomfort as a guide – do not exceed 2-3/10 pain on the NRS. Work muscles to 7-8/10 on rate of perceived exertion. ***If labral repair, limit weight bearing hip flexion to 90 degrees***

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PHASE 3 **From 6 weeks** **Regain Full ROM** ***Limit weight bearing hip flexion to 90 degrees*** **Establish movement/motor control**	○ Adequate pain relief. ○ Mobilise independently +/- aids. ○ 90 degrees flexion ○ Good rotation ROM ○ Trendelenberg negative ○ Good muscle activation throughout	**Manual therapy to increase ROM – reduce limit of scar tissue formation** **Muscle control**: *15 – 25 x 3* 1. Crab/monster walk 2. Bridge/hip thrust 3. Box Squat 4. Rack pull/restricted RDL 5. DLHR overstep 6. Step up/lunge **Lumbo-pelvic dissociation** • 4-point pelvic tilts → 4 point hip extension → Superman's • Deadbugs with progression • ½ planks: all directions **Cardiovascular exercises:** • Static bike – possible intervals • Alter G treadmill (gait re-education) • Independent gait re-education **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. Full ROM 2. Improve muscular control 3. Maintain health, fitness and wellbeing	A/PROM Single leg stance Bridge DL and SL Squat x 15 Single leg dip Y – balance	Use pain and discomfort as a guide – do not exceed 2-3/10 pain on the NRS. Work muscles to 7-8/10 on rate of perceived exertion. ***If AutoCart, limit weight bearing hip flexion to 90 degrees for 12/52***

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PHASE 4 **3months+** ***Motor/muscle Control – increase muscle capacity*** *Cardio vascular fitness*	○ Directional Planks 30 sec hold ideal control. ○ Bridge10 reps with 10 sec hold ideal control. ○ Body Weight squat x 15, minimal discomfort. ○ 4-point hip extension with neutral lumbar spine 10 reps/10 sec hold	**Single leg muscle control**: *15 – 25 x 3* 1. Side plank clam 2. High step up/down 3. Lunge/Bulgarian split squat 4. Supported SL squat (TRX) 5. SL RDL 6. SL hip thrust 7. SLHR overstep 8. Cross over step up 9. Curtsy lunge 10. Lateral lunge **Cardiovascular exercises >45miinutes**: Introduce High Intensity Interval training (HIIT). *Work hard 10 seconds 50 seconds active recovery x 5 – progress to 30:30 x 5 then increase.* 1. Bike 2. Cross trainer 3. Swimming (if would healed) 4. Walking 5. Stepper **Upper limb maintenance:** increase weight. ***Strength, Hypertrophy, Endurance as required (see Appendix)*** 1. Shoulder press 2. Upright row 3. Reverse flys 4. Bent over row **Core:** *20 second's work: 10 rest x 3 – 5. Pick 3 – 6* exercises of your choice e.g. 1. Dead bugs 2. Front plank 3. Side plank 4. Russian twist 5. Chop 6. Lift 7. Mountain climbers	1. Improved neuromuscular control 2. **Progress functional activities** 3. Ensure good lumbo-pelvic stability. 4. Promote appropriate muscle strength 5. Increase cardiovascular fitness	STS in 30 seconds SL bridge in 30 seconds. Aim 80%+ R = L SL hamstring bridge in 30 seconds. Aim 80%+ R = L SL HR in 30 seconds. Aim 80%+ R = L Side plank. Aim 80%+ R = L SL dip x 15 (control R = L) SL stands from chair Dynamo as able.	Do Not force movement. Use pain and discomfort as a guide – do not exceed 2-3/10 pain on the NRS. Work muscles to 7-8/10 on rate of perceived exertion.

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PHASE 5 **Progressive Strength phase –**	• SL bridge in 30 seconds. Aim 80%+ R = L • SL hamstring bridge in 30 seconds. Aim 80%+ R = L • SL HR in 30 seconds. Aim 80%+ R = L • Side plank. Aim 80%+ R = L • SL dip x 15 (control R = L) • SL stand from chair	**Max strength (any variation of the below)**: *1-5 reps x 4 -5* sets, 3 minutes rest, 2 – 3 x a week 1. Squat 2. Lunge 3. Hinge (Dead lift etc.) 4. Leg press 5. Hip thrust 6. Heel raise • Train strength and endurance on separate days. • Have a minimum of 24 hours between strength days. **Strength:** *See **appendix.*** • Adjust if necessary, based on symptoms. **Hypertrophy:** • *See **appendix.*** • Adjust, if necessary, based on symptoms. • **Endurance:** Gradually progress toward ≥45 min continuous CV exercise (exception of jogging/running). ***See appendix.*** Adjust if necessary based on symptoms **Return to Run Assessment:** Couch to 5km Get running with Couch to 5K - NHS (www.nhs.uk) Progress to Rowing and more dynamic cardiovascular exercises. Can begin gym classes e.g., Spinning, body pump	**1. Improve strength** **2.** Ensure good biomechanical control **3.** Improve dynamic stability and ability to accept force **4.** Prepare neuromuscular and psychological ability to return to unrestricted function.	SL bridge in 30 seconds. Aim 90%+ R = L SL hamstring bridge in 30 seconds. Aim 90%+ R = L SL HR in 30 seconds. Aim 90%+ R = L Side plank. Aim 90%+ R = L SL dip x 15 (control R = L) SL stands from chair Dynamo as able Y-Balance Single hop test	

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PHASE 6 **Power/RFD** **Ballistics** **Plyometrics** **Speed** **Endurance**	• SL bridge in 30 seconds. Aim 90%+ R = L • SL STS in 30 seconds. Aim 90%+ R = L • SL hamstring bridge in 30 seconds. Aim 90%+ R = L • SL HR in 30 seconds. Aim 90%+ R = L • Side plank. Aim 90%+ R = L • Dynamometry if available 90% R = L	**Ballistic Training** See Appendix 0 – 80% 1RM – ***intention to move quickly most important*** 3 – 6 reps 3 – 4 sets Rest 2 – 3 minutes 1. Box jump 2. Ball slam 3. Trap bar jump 4. Broad jump 5. Cleans/snatch/jerk (Olympic lifts) **Plyometrics** See Appendix Intensity – High**, *intention to move quickly and efficiently most important. Increase sets not reps.*** 3 -6 reps 3 – 5 sets Rest 2 – 3 minutes 1. Air squat jumps 2. Jumping lunges 3. Skaters 4. Tuck jump 5. Burpee 6. SL RDL to hop up ***Begin non – contact sport specific drills, progressing intensity.*** **Discuss with coach and fitness goals required and train accordingly**	**1. Develop explosive Power** **2.** increased motor-unit recruitment **3.** Increase rate of force development **4.** Increase intra- and inter-muscular coordination **5.** Improve storage and utilisation of elastic strain energy **6.** Improve type 2 muscle fibres utilisation	Broad jump Single hop test Vertical jump Power clean load Triple hop test Triple hop cross over test	

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PHASE 7 **Return to Sport and Injury Prevention**	• All Tests > 90% parity. • *Consider parity with normative population data.*	• 1 Day a week maintenance strength (1 - 5 reps x 4 -5 sets), Push/Pull exercises, can super set (see appendices) • 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. • Contact sport specific training. • Fifa 11+ (football) • Activate (Rugby Union) Progress to full restriction free sports and activities.	1. Prepare psychological ability to return to unrestricted function. **2. Injury prevention.**	T – Test Illinois T – Test Spider agility test Broncho Yo – yo test Bleep test Any Validated sport specific test	

PWB	Partial Weight Bear	**FWB**	Full Weight Bear
EOR	End of Range	MDT	Multidisciplinary Team
E	Extension	**ROM**	Range of Movement
RTS	Return to Sport	**AROM**	Active Range of Movement
SLR	Straight Leg Raise	**PROM**	Passive Range of Movement
DL	Double Leg	**RM**	Repetition Maximum
SL	Single Leg	**resis**	Resistance
CV	Cardiovascular	**reps**	Repetitions
[L]	Left	[R]	Right

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

Activity	Dictated by **sufficient neuromuscular control** and time from surgery.
Post-operative recovery phase (including inpatient stay), reduce stiffness , Early Muscle activation	From 1 - 6 weeks.
Range of movement, Motor/muscle Control – progressing to strength	From 6 – 12 weeks.
Progressive Strength phase – plyometrics (non – contact sport)	From 3+ months.
Power/RFD, Ballistics, Plyometrics, Speed & Endurance	4.5 months + (Dependant on patient)
Return to Sport and Injury Prevention	From 6+ months, dependent on specific RTS criteria and MDT opinion.

Appendix:

POLICE:

Protection

Optimal Load

Ice

Compression

Elevation

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:

Strength: 1 – 5 RM, **3 min.** rest between sets.
Hypertrophy: 6 – 10 RM, **1 min**. rest between sets.
Endurance: 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 your 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).

Ballistic Training

Ballistic training involves the use of jumps, throws, or strikes to continually accelerate throughout the concentric action, and should not be confused with plyometrics.

This form of training can be used with light, moderate, and/or heavy loads and it seems it is the intent to move quickly, rather than the actual velocity of the load, that is the driving force behind neural adaptations such as increased motor-unit recruitment, rate of force development, and intra- and inter-muscular coordination.

As ballistic exercises have an inherent level of risk and may be performed with high loads (e.g. ~ 90 % one-repetition maximum [1RM]), care should be taken to make sure that they are coached effectively and only undertaken after prior periods of traditional strength training.

Plyometrics

Plyometric training involves the usage of jumps, hops, bounds, and/or skips and should not be confused with ballistic training. This form of training is governed by the stretch-shortening cycle, otherwise known as the reversible action of muscles. Plyometric activities can be separated into two categories depending upon the duration of the ground contact time: 1) fast plyometric movements (≤ 250 milliseconds (ms)) e.g. Sprint, long jump, and 2) slow plyometric activities (≥ 251 ms) e.g. Race walking, counter movement jump.

This training modality appears to be very effective for improving athleticism and speed in both youth and adult populations. Moreover, both land- and aquatic-based plyometric training appears to be a potent stimulus for improving athletic qualities. As plyometric activities are highly coordinated and skilful movements, they should be coached with full care and attention by qualified personnel.