

RJAH Tibial Tubercle Transfer/ Osteotomy Rehabilitation 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 can be used as an indication for progression.*

****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 REHABILITATION	MINIMUM CRITERIA	WEIGHT-BEAR	ROM	REHABILITATION GUIDE	GOALS	SPECIAL INSTRUCTION
PHASE 1 From Day 1 Cont'd on page 2	<ul style="list-style-type: none"> Successful operative outcome. Adequate pain relief. Understands post-op instructions. 	FWB with brace locked in 0°E	Avoid weight bearing ROM. No limit to NWB ROM	<ul style="list-style-type: none"> Cryocuff/Ice. Active-assisted and active F and E exercises. EOR E mobilisations. Gentle patella mobilisations. H and calf stretches. Ankle Exercises (e.g. heel raises). Isometric Q & H. FWB with elbow crutches until effective SLR. 	<ol style="list-style-type: none"> Reduce inflammation. Gain terminal E. Promote distal circulation. Gradually regain ROM. Increase confidence. Promote early mobility. 	BEFORE DISCHARGE check the op note for any specific post-op instructions and amend the guide accordingly.

PHASE OF REHABILITATION	MINIMUM CRITERIA	WEIGHT-BEAR	ROM	REHABILITATION GUIDE	GOALS	OBJECTIVE TEST	SPECIAL INSTRUCTION
PHASE 1 cont From Week 1 (OPD Physio)	<ul style="list-style-type: none"> Mobilise independently with elbow crutches and brace. Adequate pain relief. Brace fits effectively. 			<ul style="list-style-type: none"> As above. Other muscle groups not to be neglected. Upper body active exercise →resis/reps/sets/speed. Unaffected limb active exercise →resis/reps/sets/speed. Core stability exercises as appropriate. Contralateral limb strength training 3x per week (continue for 10 weeks) Leg Press, Leg Curl & Leg Ext 3 x 5RM. 	1. Promote early function. 2. Increase ROM.	AROM. PROM. Clams.	

PHASE OF REHABILITATION	MINIMUM CRITERIA	WEIGHT-BEAR	ROM	REHABILITATION GUIDE	GOALS	OBJECTIVE TEST	SPECIAL INSTRUCTION
PHASE 2 From Week 6	<ul style="list-style-type: none">Clams 10 reps with 10 sec hold ideal control [L] & [R].AROM & PROM = 0°-90°.Satisfactory X-Ray review.Consultant approval.	FWB no brace required.	Unlimited unless specified. No resisted through range OKC Q until surgeon confirmed/earliest from Week 10.	<ul style="list-style-type: none">Gait re-education →predictable changes in direction.Prone auto-over press F → develop into Q stretch.Sit → Stand (dependant on check X-ray).Low step-touch → step-up → step over (dependant on check X-ray).Lunges - aim for ideal alignment and control (dependant on check X-ray).Bridges - aim for ideal alignment and control.Proprioception → single leg stance/wobble boards/Trampoline/crash mats/etc.Gymball and Theraband workLower body active exercise resis/reps/sets/speed.Core stability exercises as appropriate.Flexibility exercises as appropriate.Rowing → dist./speed/resis.X-Trainer → dist./speed/resis.Hydrotherapy (add breaststroke leg kick from Week 16).	<ol style="list-style-type: none">Progress functional activities.Prevent AKP.Prevent scar adherence.Prevent joint stiffness.Restore normal gait pattern.Promote appropriate muscle strength, power and endurance.Improve neuromuscular/proprioception/sensorimotor performance.Maintain cardiovascular fitness.Encourage patient compliance.	AROM – If 90° is not achieved by week 6 inform the patient's Consultant. PROM. SLR. Single Leg Stance. Clams. Planks.	

PHASE OF REHABILITATION	MINIMUM CRITERIA	REHABILITATION GUIDE	GOALS	OBJECTIVE TEST	SPECIAL INSTRUCTION
PHASE 3 From Week 12	<ul style="list-style-type: none"> SLR with no lag. Normal symmetrical gait. Full dynamic control - no brace required. AROM = Full E - $\geq 100^\circ$. Single leg stance $\geq 80\%$ parity. Directional Planks 30 sec hold ideal control. 	<ul style="list-style-type: none"> Step-ups (for/back/sideways/over) → height/ reps/speed. PWB (parallel bars, deep water or AntiG) landing drills - jumps, hops, leaps → control technique/speed/ reps. Leg Press/Squats → resis/ reps/sets/speed. Add speed exercises, e.g. prone heel flicks. <p><i>Sequence Training:</i></p> <ul style="list-style-type: none"> 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. <p>Strength: [Through range OKC Q $\approx 50\%$RM until week 16]</p> <p>Hypertrophy: [Through range OKC Q $\approx 50\%$RM until week 16]</p> <p>Endurance: [Through range OKC Q $\approx 50\%$RM until week 16]</p> <p>Gradually progress toward ≥ 45 min continuous CV exercise (exception of jogging/running – until Week 16, if Consultant approval & if adequate strength and control).</p> <p>See appendix; Pages 8 – 9</p> <p>Adjust if necessary, based on symptoms.</p>	<ol style="list-style-type: none"> Promote appropriate strength, power and endurance based on individual's needs. Improve neuromuscular performance. Increase confidence. 	<p>AROM.</p> <p>PROM.</p> <p>Single Leg Squat 60°.</p>	<p>Avoid deep squats and lunges and heavy Q resis. Until Consultant approval.</p>

PHASE OF REHABILITATION	MINIMUM CRITERIA	REHABILITATION GUIDE	GOALS	OBJECTIVE TEST	SPECIAL INSTRUCTION
PHASE 4 From Week 16	<ul style="list-style-type: none"> Single Leg Squat 60° 5 sec hold with good alignment. No/ minimal pain. Full AROM Full PROM 	<ul style="list-style-type: none"> Gradually progress from PWB to FWB and double footed to single footed plyometrics as dictated by surgeon's approval, neuromuscular control, pain and swelling. Through range OKC Q, progress resis as dictated by symptoms & surgeon's opinion. Introduce jogging → running on the surgeon's approval and when Q strength, neuromuscular control, pain and swelling are adequate. 	1. Sport specific function.	AROM. PROM. 5 RM. Hop for distance.	

PHASE OF REHABILITATION	MINIMUM CRITERIA	REHABILITATION GUIDE	GOALS	OBJECTIVE TEST	SPECIAL INSTRUCTION
Phase 5 From Week 24	<ul style="list-style-type: none"> Full pain free AROM. 5 RM >80% parity. Hop for distance >80% parity. Surgeon's approval required. 	<ul style="list-style-type: none"> Progress from jog → run → sprint. Add agility drills when sufficient control and confidence is achieved e.g. twist/turn/pivot/cut/accelerate/decelerate/direction. Progress from predictable agility to unpredictable. Advance dynamic proprioceptive exercises e.g. volleying football, throwing, catching, racket and ball while balancing on Trampette. Perturbation training e.g. therapist randomly nudges patient off balance during a single leg throw-catch drill. Non-contact sport specific training → terrain/volume/periodisation. 	1. Prepare neuromuscular and psychological ability to return to unrestricted function.	Vertical Jump. As indicated for individuals goals.	

PHASE OF REHABILITATION	MINIMUM CRITERIA	REHABILITATION GUIDE	GOALS	OBJECTIVE TEST	SPECIAL INSTRUCTION
PHASE 6 From Week 24+	<ul style="list-style-type: none"> All Tests > 90% parity. Dependent on surgeon's approval. 	<ul style="list-style-type: none"> 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:

E	Extension	PWB	Partial Weight Bear
F	Flexion	FWB	Full Weight Bear
EOR	End of Range	ROM	Range of Movement
IRQ	Inner Range Quadriceps	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
PFJ	Patellofemoral Joint	RTS	Return to Sport
MDT	Multidisciplinary Team		

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

Activity	Dictated by sufficient neuromuscular control, post-op X-Ray and time from surgery.
Limit ROM 0° E when weight bearing/ mobilising. No limit to NWB range of movement.	From Day 1
No limit to weight bearing ROM	From week 6.
Open Kinetic Chain Q.	From Week 10, based on X-Ray and Consultant approval.
Resisted OKC Q, deep squats, lunges, and breaststroke leg kick.	From Month 3 – 4, see guide for progression.
High Impact Activities, including jogging.	From Month 4.
Agility Drills.	From Month 6.
Return to full contact sports.	From Month 6 – 12, dependent on specific RTS criteria and MDT opinion.

Appendix:

Patient 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 2-3/10 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 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.