

## Quadriceps tendon repair post-operative protocol

These rehabilitation guidelines are criteria based. General time frames are given for reference to the average, but individual patients will progress at different rates depending on their age, associated injuries, pre-injury health status, rehabilitation compliance, tissue quality and injury severity. Specific time frames, restrictions and precautions may also be given to protect healing tissues and the surgical repair/reconstruction.

### Early Phase of Rehabilitation (Surgery – 2 Weeks)

**Appointments-** should begin around 3-5 days after surgery has taken place.

#### **Rehabilitation Goals**

- Protect the post-surgical repair
- Begin rehabilitation of quadriceps with exercise within pain levels
- Progression with range of motion
- Reduce pain and effusion

#### **Precautions**

- Walking with crutches as prescribed (appendix A)
- Continually use the hinged knee brace locked in extension and crutches for weight bearing as tolerated for walking.
- The brace must be worn and locked at all times other than when performing rehabilitation exercises.
- Follow range of motion guidelines (0-30 degrees of knee flexion)
- **IMPORTANT: Monitor wound**
  - If you have any concerns about your wound immediately contact us on:  
OS group: 0203 397 7779
  - This would include any of the below symptoms or observations;

- 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 group: 0203 397 7779
  - This would include any of the below symptoms or observations;
    - 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 group. See Appendix B for contact details.
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### Rehabilitation Exercises

- ❖ Ankle pumps
- ❖ Isometric quadriceps strengthening
- ❖ Hamstring sets
- ❖ Glute strengthening and activation
- ❖ Ice therapies for pain and swelling control

### Criteria to progress to the next stage of rehabilitation

- ✓ Progress two weeks post operatively alongside client's pain tolerance

### Early to middle phase of rehabilitation (2-6 weeks)

**Appointments-** Rehabilitation sessions should be 1-2 times per week

#### **Rehabilitation goals**

- Address pain and effusion accordingly
- Use crutches for weight bearing (WB) activities involve progression of WB
- Continue with knee brace locked into extension
- Discontinuation of crutches is determined on leg control and client tolerance to exercises

#### **Precautions**

- Use brace locked into extension only take off when completing rehabilitation sessions

#### **Range of motion**

- Weeks 3-6
  - 0 - 90 degrees of knee motion without active quadricep activation (knee active knee extension)
- Continue to protect the post-surgical repair
- 90 degrees of knee flexion by 6 weeks post-surgical repair

#### **Rehabilitation exercises**

- ❖ Heel slides
- ❖ Weight shifting on to surgical side with brace
- ❖ Upper body circuit training or upper body exercise
- ❖ Progressive knee extension range of motion with foot resting on a towel roll
- ❖ Four-way leg lifts with brace locked in extension

#### **Criteria to progress to middle stage of rehabilitation**

- ✓ Progress six weeks post-operatively
- ✓ Knee range of motion at 0 to 90 degrees (avoid knee hyperextension)
- ✓

### Middle phase of rehabilitation (6-12 weeks)

**Appointments-** rehabilitation session should be once every 1-2 weeks

#### **Rehabilitation goals**

- Normal gait on level surfaces using brace opened to 30-40 degrees without crutches

- Initiate active quadriceps contractions in weight bearing

### **Precautions**

- Ensure all progression are gradual to weight bearing in knee flexion
- Avoid knee flexion in weight bearing past 70 degrees for the first 12 weeks post-surgery
- Continue to follow range of motion guidelines as below

### **Range of motion**

#### **Post-operative weeks 7 to 8**

- 0 to 115 degrees of knee motion without active quadriceps knee extension

#### **Post-operative weeks 9 to 10**

- 0 to 130 degrees of knee motion – active knee extension is now permitted progressively

**Precautions may be altered by the surgeon based on the integrity of the repair.**

### **Rehabilitation exercises**

- ❖ Active range of motion for open chain knee flexion and extension
- ❖ Closed chain quadriceps control from 0 to 40 degrees with light squats and leg press, progressing to shallow lunge steps at weeks 10 to 12
- ❖ Prone knee flexion
- ❖ Stationary bike with low resistance
- ❖ Patellar mobilizations
- ❖ Open chain hip strengthening
- ❖ Core strengthening
- ❖ Upper body circuit training

### **Criteria to progress to end stage rehabilitation**

- ✓ Normal gait mechanics without crutches
- ✓ Active knee range of motion at least 0 to 110 degrees
- ✓ Pain free with prescribed exercise

### **End stage rehabilitation 12-24 weeks**

**Appointments** – Rehabilitation appointment once every week

### **Rehabilitation goals**

- Normalize gait on all surface's
- Single leg stands with good control for 10seconds
- Full knee range of motion

- Good control with squat to 70degrees of knee flexion

### **Precautions**

- Avoid any forceful eccentric contractions
- Avoid impact activities
- Avoid exercises that cause movement compensation

### **Rehabilitation exercises**

- ❖ Non-impact balance and proprioceptive drills
- ❖ Stationary bike
- ❖ Gait drills
- ❖ Hip and core strengthening
- ❖ Stretching for patient specific muscle imbalances
- ❖ Quad Strengthening  
Closed chain exercise initially starting as short arc and gradually progressing to 70 degrees of knee flexion
- ❖ Functional movements (squat, step back, lunge)
- ❖ Hip and core strengthening
- ❖ Swimming if available

### **Criteria for progression to return to play and impact training**

- ✓ Normal gait mechanics without the brace on all surfaces
- ✓ Squat lunge to 70 degrees of knee flexion without weight shift
- ✓ Single leg stands with good control for 10 seconds
- ✓ Full active range of motion for knee flexion and extension

### **Late stage Rehabilitation and return to play based exercise 24 weeks+**

**Appointments** – sessions should be once every 1-2 weeks

### **Rehabilitation goals**

- Good Lower limb control and no pain with sport specific movements including impact exercise

### **Precautions**

- Post activity soreness should resolve within 24 hours of exercise
- Avoid post activity swelling
- Avoid running with a limp

### **Rehabilitation exercise**

- ❖ Impact control exercises(hopping) beginning 2 feet to 2 feet, progressing from 1 foot to other and then 1 foot to same foot.
- ❖ Plyometric exercise beginning with low velocity, single plane activities and progressing to higher velocity, multi-plane activities.
- ❖ Sport/work specific balance and proprioceptive drills
- ❖ Hip and core strengthening
- ❖ Stretching for patient specific muscle imbalances
- ❖ Replicate sport or work specific energy demands

**Before returning to a modified training - dynamic neuromuscular control with multi-plane activities, without pain or swelling**

**Return to participation** – Modified sessions lower than the RTS level allowing the patient to regain fitness and psychological confidence in returning to training

**Return to sport** – The athlete has returned to sport but not at the required performance level progression and training adaptation to reach the same levels as pre injury fitness.

**Return to performance**- Extending the RTS element the athlete had gradually returned to sport and his performing inline or above the preinjury performance level.

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 and worse is 10 points)

**Qualitative Analysis of Drop Jump Landing**

Date: \_\_\_\_\_ Patient: \_\_\_\_\_ Condition: \_\_\_\_\_

Left                  Right                  Bilateral

		Left	Right
<b>Trunk Alignment</b>	Leaning in any direction from midline		
<b>Foot on Landing</b>	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		
<b>Limb on Landing</b>	Thigh pelvis angle <90deg		
	Stiff upright landing		
	Patella pointing towards 2 <sup>nd</sup> toe (noticeable valgus)		
	Patella pointing past inside of foot (significant valgus)		
	<b>Total</b>		

**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 is 10 points)

**Tuck Jump Test Score Sheet**

Date:

Patient:

Condition:

Left:

Right:

Bilateral:

	Score
<b>Knee and Thigh Motion</b>	
1. Knee valgus on landing	
2. Thighs not reaching parallel (peak of jump)	
3. Thighs not equal side to side (during flight)	
<b>Foot position during landing</b>	
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	
<b>Plyometric technique</b>	
9. Pause between jumps	
10. Technique declines prior to 10 seconds	



Qualitative Analysis of Single Leg Loading

(Single leg squat)

(Single leg step down)

(Single leg hop for distance)

- See page 14 for test descriptions
- Score a zero if the appropriate strategy is used and one for inappropriate movements. (Best overall score is 0 and 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 2 <sup>nd</sup> toe (noticeable valgus)		
	Patella pointing past inside of foot (significant valgus)		
Steady stance	Touches down with NWB foot		
	Stance leg wobbles noticeably		
	Total		

### 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 mid line

#### 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.

## Appendix A - 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 your 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 to the Physiotherapist will replace them.

## Appendix B - Physiolab

Link for hire <https://physiolab.com/products/to-rent/s1-portable.html>

Website [www.physiolab.com](http://www.physiolab.com)