Rehabilitation Guidelines for Patellar Tendon Repairs

About the Patellar Tendon

The patellar tendon is a strong band that connects the bottom part of the kneecap (patella) to a bump on the shin bone (tibia). Patellar tendon injuries occur most often in patients younger than 40 years old with a higher prevalence of this condition in males.

The patellar tendon transfers forces from the thigh muscle to the shin bone. During active knee extension, forces are transferred from the thigh muscle (quadriceps muscle group) to the tibia through the patellar tendon. When knee bend increases, there is a contact point between the patella and thigh bone (femur) that causes the patella to take on greater stress than the quadriceps tendon which is when patellar tendon ruptures often occur.

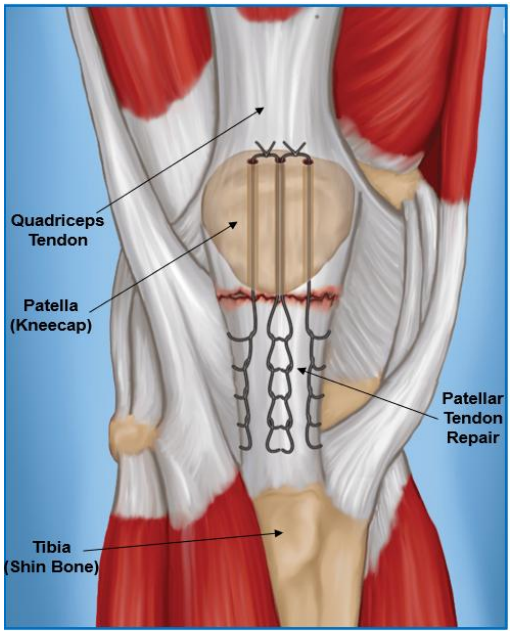

Figure 1. Anatomy of the patellar tendon.

Mechanism of Injury and Risk Factors

A patellar tendon injury occurs from a forceful contraction of the thigh muscle while the knee is in a bent position. Individuals may hear or feel a popping sensation with sudden pain. In professional athletes, ruptures can occur when the ankle is plantarflexed with an associated knee valgus force. The most common causes of a patellar tendon rupture are direct trauma, repeated microtrauma, and/or tendon degeneration. Risk factors for patellar tendon rupture consist of degenerative tendinopathy, local corticosteroid injections, and rheumatologic and immunologic conditions.

Diagnosis of a Patellar Tendon Rupture

Patellar tendon ruptures can be categorized into 3 types based on location of the rupture: 1) at the inferior pole of the patella, 2) in the middle part of the patellar tendon, and 3) at the tibial tuberosity.

There are different methods to diagnose patellar tendon injuries. In the beginning, a thorough assessment will be completed by a physician, physical therapist or athletic trainer that includes history, physical examination, and imaging. Clinical findings that indicate a possible patellar tendon rupture consist of limited ability to straighten knee, inability to perform a straight leg raise, a high-riding patella, or a noticeable gap at the site of the tendon. Partial tendon tears are commonly seen after prolonged activity in athletes with patellar tendinopathy.
Diagnostic imaging will be used to assess partial- versus full-thickness tears, location of tear, and the presence of other injuries. There are many diagnostic imaging procedures that can help in identifying patellar tendon ruptures, including radiographs (X-ray), magnetic resonance imaging (MRI), or ultrasonography. X-ray images are used to assess the bony alignment of knee joint. MRI is highly accurate in identifying patellar tendon tissue

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quality and is often used to distinguish between partial and complete patellar tendon ruptures. Ultrasonography, though less accurate, is a cost-effective method that can be used to examine both partial and complete patellar tendon injuries.

Treatment Options for a Patellar Tendon Injury

Your medical team will speak with you regarding treatment options. No matter where the injury is, restoring tendon function is important for patients of all ages and activity levels. Surgery may be needed. The goal of surgery is to repair and re-attach the patellar tendon.

There are many surgical techniques to repair a patellar tendon rupture. One common method is a tendon repair through trans-osseous tunnels. This technique includes two-to-four bone tunnels formed at the patella (see Figure 2). Sutures are passed through these tunnels and tied to the tendon.

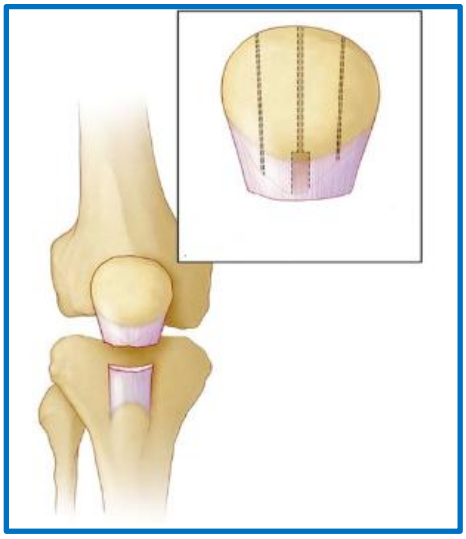

Figure 2. Repair of a torn patellar tendon.

Rehabilitation Following Surgical Repair

If surgery is needed, it should be performed as soon as possible to improve the healing and rehabilitation process. The recovery process may take up to 12 months and return to sport may take a year or more from surgery.

Rehabilitation will follow 5 general phases. Your physical therapist and surgeon will guide you through each step.

Phase 1. Protect the repair and reduce pain and swelling to prevent any potential complications.
Phase 2. Range of motion and gentle strengthening exercises and preparation to return to walking.
Phase 3. Return to walking without any complications. Increases in range of motion and lower extremity strength will continue throughout this phase.
Phase 4. Lower extremity exercises to further increase strength of the quadricep muscles and to maintain milestones achieved from the earlier phases.
Phase 5. Symmetrical leg strength to the other leg. Progress to return to running, jumping, and recreational or sport-related activities based on your personal goals.

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Images

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Rehabilitation Guidelines for Patellar Tendon Repairs

Rehabilitation Guidelines

Phase I: Protection Phase (0 to 2 weeks post-op)	
Appointments	Physical therapy: 1-2 x / week *Depending on surgeon preference
Precautions	• Weight bearing as tolerated (WBAT) in brace • Knee immobilized in brace at all times • Keep incision dry
Rehabilitation Goals	• Protect the repair • Reduce swelling and minimize pain
Range of Motion (ROM)	• Passive knee flexion ROM usually limited to 0-45º • Please review operative notes or surgeon's preference on safe range of motion, as more complex or chronic repairs may require further restrictions
Therapeutic Interventions ***(Examples, but not limited to…)***	Therapeutic Exercise • Quadriceps sets • Ankle pumps, hamstring sets, and glute sets • Patellar mobilizations Cryotherapy • Cryotherapy every 2 hours for 15-20 minutes
Criteria to Progress to Phase 2	✓ At least **2 weeks post-surgery** ✓ Appropriate activity tolerance with initial passive ROM drills – pain ≤ 3/10

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Phase II: Mobility / Range of Motion (2 to 6 weeks post-op)	
Appointments	Physical therapy: 1-2 x / week *Depending on surgeon preference
Precautions	• Knee locked in extension in brace
Rehabilitation Goals	• Protect repair • Passive knee flexion ROM to 0-90º • Gradual progression to weight-bear as tolerated with brace locked in extension • Gait training toward the end of phase II and phasing out crutch use at the end. This will be guided by your therapist
Range of Motion (ROM)	• Progress knee flexion ROM ○ Progress knee flexion ROM by 15 degrees per week • By **week 6**: 0-90º

Therapeutic Interventions
(Examples, but not limited to…)
	Therapeutic Exercise
	• Passive and active knee range of motion
	  ○ Depending on surgeon preference
	• Quadriceps sets
	  ○ Consider use of neuromuscular electrical stimulation
	• Short arc active knee extensions
	• Ankle pumps
	• Stationary bike within range of motion restrictions
	• Open chain hip strengthening
	• Core strengthening
	
	Gait training:
	✓ Initiate around **week 6 post-op**
	
	Manual Therapy
	• Patellofemoral joint mobilizations (avoid superior glides)

Criteria to Progress to Phase 3	✓ Need to be at least **6 weeks post-surgery**
	✓ By end of week 6:
	  ○ Knee flexion ROM should be at 90º
	  ○ Symmetrical quadriceps setting
	  ○ Swelling less than 2+ with modified stroke test
	  ○ Weight-bearing as tolerated without increased pain and no increase in swelling

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Phase III: Functional Strengthening (6 to 12 weeks post-op)	
Appointments	Surgeon/Physician Assistant: week 6 post-op Physical therapy: 1-2 x / week
Precautions	• Gradual closed kinetic chain strengthening • Avoid weight-bearing quadriceps strengthening exercises past 60º **until week 12** • No quadriceps stretching
Rehabilitation Goals	• Full knee flexion active range of motion • Removal of brace • Normalized gait mechanics • Progressive quad strengthening
Precautions	• Gradual closed kinetic chain strengthening • Avoid weight-bearing quadriceps strengthening exercises past 60º **until week 12** • No quadriceps stretching
Range of Motion (ROM)	• Knee flexion range of motion to 120º • Begin double leg press/weight-bearing strengthening to 40º of knee flexion • Progress to a shallow lunge around week 12 • Stationary bike – progress resistance gradually • Open kinetic chain strengthening

Therapeutic Interventions
(Examples, but not limited to…)
	Therapeutic Exercise
	• Begin stationary bike through full arc of motion
	• Gradual progression of closed kinetic chain exercises
	  ○ Leg press
	  ○ Step downs
	  ○ Squat
	  ○ Heel taps
	• Blood flow restriction therapy
	• Straight leg raises
	• Long arc quad extensions without resistance
	• Aquatic therapy

Criteria to Progress to Phase 4	✓ Full knee range of motion ✓ Full weight-bearing with normalized gait mechanics and without pain ✓ Swelling less than 1+ with modified stroke test

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Phase IV: Progressive Strengthening (12 to 16 weeks post-op)	
Appointments	Surgeon/Physician Assistant: week 12 post-op Physical therapy: 1x / 1-2 week(s)
Precautions	• Avoid forceful eccentric contractions • Avoid impact activities like jumping and running
Rehabilitation Goals	• Increase lower extremity strength • Good balance on one leg • Ability to squat to 70º of knee flexion
Range of Motion (ROM)	• Full active range of motion

Therapeutic Interventions
(Examples, but not limited to…)
	Therapeutic Exercise
	• Initiate gradual heavy slow resistance training in both open and closed kinetic chain
	  ○ Leg extensions with resistance
	  ▪ Begin with high reps and low load
	  ▪ Progress to medium reps and then 8-10 reps by end of phase
	  ○ Lunges
	  ○ Stair training with resistance
	  ▪ Step downs
	  ▪ Step ups

Criteria to Progress to Phase 5	✓ Maintained full and pain-free active range of motion ✓ Swelling less than 1+ with modified stroke test ✓ Appropriate isometric quadriceps and hamstrings strength – see **Appendix B**

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Phase V: Return to Activity / Sport (4+ Months post-op)	
Appointments	Physical therapy: 1x / 1-2 week(s)
Rehabilitation Goals	• Initiate impact progression when isometric strength is 2.0 Nm peak torque to body weight (PTBW) • Assess isokinetic knee extension and hamstring strength at 6+ months ○ Goal of 3.0 Nm PTBW • Hop testing demonstrates 90% limb symmetry
Range of Motion (ROM)	• Full active ROM
Therapeutic Interventions *(Examples, but not limited to…)*	Therapeutic Exercise • Progress heavy slow resistance training in both open and closed kinetic chain • Progress single leg resistance exercises • Initiate sport-specific speed and agility drills
Criteria to Return to Activity / Sport	✓ Physician clearance ✓ Maintained full and pain free active range of motion ✓ Swelling less than 1+ modified stroke test ✓ See **Appendix B**

***Important to continue participation in ongoing preventative strength, power and motor control exercises at return to sport**

All physical therapy appointment frequencies are recommendations only. Your physical therapy provider will work with you to select an appointment frequency that best fits your individual needs.

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