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Rehabilitation Protocol: Quad/Patellar Tendon Repair

The knee consists of four bones that form three joints. The femur is the large bone in the thigh and attaches by ligaments and a capsule to the tibia, the large bone below the knee commonly referred to as the shin bone. Next to the tibia is the fibula, which runs parallel to the tibia on the outside of the leg. The patella, commonly called the knee cap, is embedded in the quadriceps and patellar tendon which articulates with the front of the femur, forming the patellofemoral joint (Figure 1). The patella acts as a pulley to increase the amount of force that the quadriceps muscle can generate and helps direct the force in the desired upward direction.¹

Complete ruptures or partial tears of the patellar tendon or quadriceps tendon can result from landing from a jump, a fall causing excessive knee flexion or other heavy loading of the tendon. Quadriceps tendon ruptures usually occur in people older than 40 years of age. One review article cited 88% of patients with quadriceps tendon rupture were 40 and older. In contrast, most patellar tendon ruptures occur in patients younger than 40. One study reported the average age for patellar tendon rupture to be 28. In both cases it is more likely to occur in males than females. Chronic tendinopathy from repetitive sporting activity; chronic diseases (i.e. renal failure, hyperparathyroidism, diabetes) that compromise blood supply to the tendon; or chronic steroid use may weaken the quadriceps tendon or patellar tendon and make it more susceptible to rupture. The nature and size of the tear, the age of the patient and the activity level of the patient are all important factors in determining the safest and most effective treatment. Good outcomes can be obtained with non-surgical treatment for many small, partial tears. This may involve a short period of immobilization, followed by supervised rehabilitation with a physical therapist or athletic trainer.

Surgical repair is usually necessary to obtain the optimal outcome for large, partial tears and complete ruptures. Most often the torn tendon is re-attached to the knee cap by passing the tendon through drill holes in the knee cap for fixation. In some cases graft tissue may be added to the repair to obtain the desired length of the repaired tendon. In rare cases an "end to end" tendon repair may be done. This technique is used when the tendon is ruptured in the mid-portion as opposed to near the bony insertion. In either operation, often times a "relaxing suture" is placed to provide extra protection to the repaired tendon by taking some tension off the repair during the initial healing phase (Figure 2).

The outcome from surgical repair is dependent on several variables. People who have their surgery performed early after the injury generally do better than people who have delayed surgery.

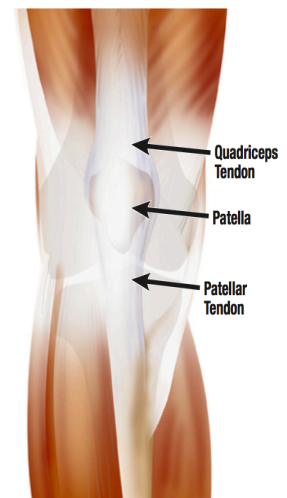


Figure 1. Front view of normal knee anatomy, showing the quadriceps tendon above the patella (knee cap) and patellar tendon below the patella.

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Most people should be able to return to their previous occupation and level of daily activity. Return to sports will be dependent on the sport to which the individual is returning, age, severity of the injury and return of strength.

Supervised and structured post-operative rehabilitation is an integral component to obtaining an optimal outcome. Research from our institution has shown that early rehabilitation and mobilization are safe and effective for maximizing outcome.³

Our rehabilitation guidelines are presented in a criterion based progression program. 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.

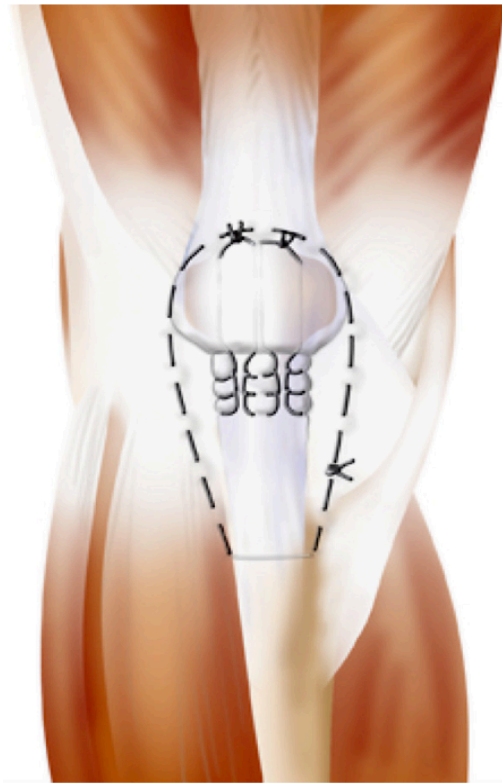


Figure 2. Front view of knee after patellar tendon repair. The primary sutures repair the torn tendon and the relaxing suture encompasses the repair and goes around the patella, providing initial protection to the repaired portion of the tendon.

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POST-OPERATIVE

Appointments	<ul style="list-style-type: none"> ○ First PT visit 4 weeks after surgery
Goals	<ul style="list-style-type: none"> ○ Passive or active-assistive ROM for full extension and 0-30° flexion per MD discretion ○ TTWB crutch gait for 6 weeks with brace locked at 0° ○ Brace locked at 0° for all activities except therapeutic exercise
Precautions	<ul style="list-style-type: none"> ○ Water precautions
Therapeutic Exercises	<ul style="list-style-type: none"> ○ AAROM for flexion (see above) and full extension ○ Isometric quad, ham, adductor and abductor ○ Ankle theraband exercises
Other Suggestions	<ul style="list-style-type: none"> ○ Heat/Ice before and after PT sessions

Weeks 2-6

Appointments	<ul style="list-style-type: none"> ○ PT as necessary to meet goals
Goals	<ul style="list-style-type: none"> ○ Passive or active-assistive ROM, adding 15° flexion each week with a goal of 90° at 6 weeks ○ Advance beyond 90° after 6 weeks ○ Remove suture from incision and re-apply steri-strips at 2 weeks ○ TTWB crutch gait with brace locked at 0°
Therapeutic Exercises	<ul style="list-style-type: none"> ○ As above ○ Upper extremity exercise is okay

Weeks 6-12

Appointments	<ul style="list-style-type: none"> ○ PT as necessary to meet goals
Goals	<ul style="list-style-type: none"> ○ D/C brace at 6 weeks ○ PWB with crutches ○ Progress to FWB gait as tolerated
Therapeutic Exercises	<ul style="list-style-type: none"> ○ AAROM and gentle stretching ○ Lower extremity PRE's with low weight/high repetition ○ Stationary bicycle ○ Impact activities per MD discretion

References

1. Neuman DA. *Kinesiology of the Musculoskeletal System: Foundations for Physical Rehabilitation*. 1st ed. St. Louis, MO: Mosby; 2002.
2. <http://orthoinfo.aaos.org>
3. West JL, Keene JS, Kaplan LD. Early motion after quadriceps and patellar tendon repairs: outcomes with single-suture augmentation. *Am J Sports Med*. 2008 Feb;36(2):316-23. Epub 2007. Oct 11.