

Patellar Tendon Rupture and Rehabilitation

Surgical Indications and Considerations

Anatomical Considerations: Rupture of the patellar tendon most often takes place at the osteotendinous (tibial tubercle) junction. Rupture of the tendon in this area causes complete derangement of the extensor mechanism of the knee. Destruction of the extensor mechanism may lead to an inability to actively obtain and maintain knee extension.

Pathogenesis: Patellar tendon ruptures tend to occur during resisted knee flexion with violent quadriceps contraction (when landing from a jump). A force greater than 17.5 times body weight has been reported as the estimated force required to rupture the patellar tendon. The patellar tendon sustains greater stress than the quadriceps tendon during knee flexion. Since there is more tensile load on the tendon at its insertion sites than in the middle portion, the tendon tends to rupture just distal to its attachment to the patella.

Etiology: Intrinsic factors that can lead to rupture of the patellar tendon include repetitive microtrauma, systemic inflammatory disease, diabetes mellitus, and chronic renal failure. Extrinsic factors include ruptures that may occur as a result of a corticosteroid injection near the inferior pole of the patella, sudden eccentric contraction of the quadriceps with the foot planted and the knee flexed while the person falls (most prevalent mechanism). Surgery to the knee can also cause rupture of the patellar tendon, these include total knee replacement, using the central third of the patellar tendon as an autograft (ACL repair) and excision of patellar tendonitis.

Diagnosis: Rupture of the patellar tendon is usually associated with a “pop” or “tearing” sensation with immediate pain, immediate swelling, and an inability to rise and weight-bear will also be noted. Upon physical exam the patient will present with tenderness along the anterior knee and retinacula, patella alta and ecchymosis will also be observed. Lab values may be taken to rule out systemic disease. Plain film radiographs (AP, axial and lateral views), and/or MRI provide the confirmation.

Nonoperative versus Operative Management: The type of treatment given to a patient with a rupture depends on the severity of the rupture. A patellar tendon rupture can be treated nonoperatively, but only in the case of a partial tear where the patient is able to maintain active full extension and has normal patellar height. In this case the patient would be immobilized until the tendon has fully healed and strengthening exercises should be delayed for at least 3 months. Operative management is typically the approach of choice, especially with a complete rupture. Surgical intervention is typically initiated as soon as possible to limit the amount of quadriceps contracture and atrophy.

Surgical Procedure: Surgical repair of a ruptured tendon is usually delayed 4-7 days to allow a decrease in inflammation and decrease the risk of wound complications. For a patient with an acutely ruptured tendon the general surgical procedure would include suturing the torn tendon through bone tunnels in either the patella or tibial tubercle. The location of suturing depends on the location of the rupture. Debridement of viable tissue may also be performed along the patellar tendon, tibial tubercle and patella. In patients with chronic patellar tendon ruptures or

patients where repair may be impossible the surgeon may choose to do surgery in stages. This decision depends on the need to replace the patellar tendon with and autograft or allograft, the degree of patella alta, whether the repair requires augmentation or whether there is peripatellar scarring.

Preoperative Intervention:

- Discuss with the importance of postoperative rehabilitation
- Identify appropriate patellar height for patient (Surgeon responsibility)
- Identify possible injuries to associated structures: medial/lateral retinacula, menisci, ACL, PCL, MCL, LCL

POSTOPERATIVE REHABILITATION

Phase I for Immobilization and Rehabilitation: 4-13 days

Goals: Control pain and inflammation

Maintain patellar mobility

Maintain hamstring strength of the ipsilateral leg and lower extremity strength of the contralateral leg

Active knee flexion to 45° and passive knee extension to 0°

Intervention:

- Crutch training with toe-touch weight-bearing
- Ice and elevation
- Isometric ipsilateral hamstring exercise, contralateral LE strengthening
- Gentle medial/lateral patellar mobilization (~25%)
- AROM, AAROM and PROM
- Hinged knee brace locked in extension

Phase II for Immobilization and Rehabilitation: 2-4 weeks

Goals: Control pain and inflammation

Begin weight-bearing

Maintain patellar mobility

Active flexion to 90° and passive knee extension to 0°

Maintain ipsilateral hamstring and contralateral LE strength

Begin ipsilateral quadriceps retraining

Intervention:

- Crutch training with partial weight-bearing (25-50%)
- Ice and elevation
- Isometric ipsilateral hamstring exercise, contralateral LE strengthening
- Gentle medial/lateral patellar mobilization (~25%)
- AROM, AAROM and PROM
- Hinged knee brace locked in extension

- Ipsilateral quadriceps sets (NO straight leg raises)

Phase III for Immobilization and Rehabilitation: 4-6 weeks

Goals: Control pain and inflammation

Progress weight-bearing (possibly discontinue crutch use)

Active flexion progressed as tolerated and passive extension to 0°

Maintain patellar mobility

Maintain ipsilateral hamstring and contralateral LE strength

Continue ipsilateral quadriceps retraining

Intervention:

- Progress to weight-bearing as tolerated, may discontinue crutch use if good quadriceps control is acquired
- Gait training
- Ice and elevation
- Isometric ipsilateral hamstring exercise, contralateral LE strengthening
- Gentle medial/lateral patellar mobilization (~25%)
- AROM, AAROM and PROM
- Hinged knee brace locked in extension
- Ipsilateral quadriceps sets (NO straight leg raises)

Phase IV for Immobilization and Rehabilitation: 6-12 weeks

Goals: Control pain and inflammation

Progress to full active ROM

Maintain patellar mobility

Maintain ipsilateral hamstring and contralateral LE strength

Continue ipsilateral quadriceps retraining

Intervention:

- Weight-bearing as tolerated
- Gait training
- Hinged knee brace locked in extension until good quadriceps control and normal gait are obtained
- Ice and elevation
- Isometric ipsilateral hamstring exercise, contralateral LE strengthening
- Gentle medial/lateral patellar mobilization (~50%)
- AROM
- Ipsilateral quadriceps strengthening (straight leg raises without resistance and stationary cycling at 8 weeks)

Phase V for Rehabilitation: 12-16 weeks

Goals: Complete weight-bearing
 Progress ipsilateral quadriceps strength
 Begin neuromuscular retraining

Intervention:

- Gait Training
- No immobilization
- Ipsilateral quadriceps strengthening
- Proprioception and balance activities (including single leg support)

Phase VI for Rehabilitation: 16-24 weeks

Goals: Begin running
 Sport/Job specific training

Intervention:

- Progress program as listed for Phase IV, with sport or job specific training

Phase VII for Rehabilitation: >6 months

- May begin jumping and contact sports when ipsilateral strength is 85-90% of contralateral extremity

Selected References:

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