



Rehab Practice Guidelines for: Patellar Tendinopathy

Diagnostic Hallmarks¹:

- Pain localized to inferior pole of patella
- Pain that increases with increased load on knee extensors, particularly during plyometric type activities involving the knee (e.g. jumping)

Differential Diagnosis¹:

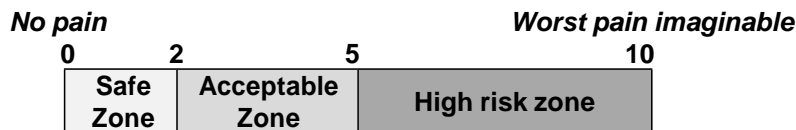
- Fat pad irritation
- Patellofemoral pain
- Joint pain
- Growth plate injuries in pediatric population

Assessment to include:

- Single leg decline squat test^{2,3}
 - perform 2 single leg squats from 0-50° on decline board (angle 25°)
 - rate pain 0-10
- Thorough kinetic chain assessment, including jumping, hopping and squatting mechanics
- Quadriceps strength testing
 - Using mechanical dynamometer at 60°, or angle of comfort if painful
 - Use Burst super imposition technique if appropriate; use clinical judgment and monitor pain
- Hip strength testing (with hand-held dynamometer)
- Outcome Measure: VISA-P⁴

Use Pain Monitoring Model⁵ for Progression:

- Visual Analog Scale (VAS) 0-10



- The pain is allowed to reach 5/10 on the VAS during exercises
- The pain after the whole exercise program is allowed to reach 5/10 on the VAS but should subside to baseline by the following morning
- Baseline pain is not allowed to increase from week to week

Phase	Initiate when:	Treatment Ideas	Dosage and Progression
Phase I: Acute	Pain with isotonic loading is >5/10	-Isometric exercises: Knee Extension between 30-60° Spanish Squats between 45-90° Wall Sits between 45-90° -Address hip strength deficits as indicated -Noxious stim protocol [^] -NMES* to the quadriceps if QI<80%	-Isometrics: 5x45" holds ^{6,7} -Perform daily if pain returns to baseline



Phase II: Recovery	Pain with isotonic loading is <5/10	-Isotonic exercises Knee Extension Sit to Stands -Heavy Slow Resistance (HSR) training ⁸ : Leg Press Squat Hack Squat -Continue hip strengthening, noxious stim and NMES as indicated	-All exercises performed: bilaterally, every other day -HSR: 3-4 sets, progress from 15 RM □ 6RM, 90-0°, complete with 3 sec eccentric phase, 3 sec concentric phase -Can continue Phase I exercises on off days
Phase III: Rebuilding	Tolerating decline squat of involved limb with <5/10 pain	-Progress Phase II exercises -Add: Split Squat Step-Downs (Lateral & Forward) Isokinetics (concentric/eccentric) -Decline Squat Program ⁹	-Progress Phase II exercises to eccentric (2 up, 1 down) then unilateral -Progress 3x8 □3x15 -Decline Squat Program: 3x15, 1x/day
Phase IV: Return to Activity	Tolerating load with plyometric activities that replicate training demands	-Jump/Landing training -Acceleration -Deceleration -Cutting -Sport specific training	-Progressively increase volume and then intensity -Progress through training drills then full competition
MVIC: Maximum voluntary isometric contraction, NMES: Neuromuscular electric stimulation, QI: Quad Index, HSR: Heavy slow resistance			

^Noxious stim protocol: Pulse width >150us, frequency >50 pps, 2 sec ramp, 12 sec on, 8 sec off, 10-15 min total, max tolerance (aim for 3x sensory threshold)

***NMES Guidelines:**

- Electrodes placed over proximal lateral quadriceps and distal medial quadriceps.
- Stimulation parameters: 400 us (2500Hz), 75 pps, 2 sec ramp, 12 sec on, 50 sec off, intensity to max tolerable[at least 50% MVIC, 10 contractions per session, continue until quadriceps strength MVIC is 80% of uninvolved.
- Stimulation performed **isometrically at 60°**, or angle of comfort if painful.

References

1. Malliaras P, Cook J, Purdam C, Rio E. Patellar Tendinopathy: Clinical Diagnosis, Load Management, and Advice for Challenging Case Presentations. *J Orthop Sport Phys Ther.* 2015;45(11):1-33. doi:10.2519/jospt.2015.5987.
2. Purdam CR, Cook JL, Hopper DM, et al. Discriminative ability of functional loading tests for adolescent jumper's knee. *Phys Ther Sport.* 2003;4(1):3-9. doi:10.1016/S1466-853X(02)00069-X.
3. Mendonça et al. - 2016 - The Accuracy of VISA-P Questionnaire, Single-Leg Decline Squat and Tendon Pain History to Identify Patellar Te.pdf.
4. Visentini PJ, Khan KM, Cook JL, Harcourt PR WJ. The VISA score: an index of the severity of jumper's knee (patellar tendinosis). *J Sci Med Sport.* 1998;1:22-8.
5. Silbernagel KG, Thomeé R, Eriksson BI, Karlsson J. Continued sports activity, using a pain-monitoring model, during rehabilitation in patients with Achilles tendinopathy: a randomized controlled study. *Am J Sports Med.* 2007;35(6):897-906. doi:10.1177/0363546506298279.
6. Rio E, Kidgell D, Purdam C, et al. Isometric exercise induces analgesia and reduces inhibition in patellar tendinopathy. *Br J Sport Med.* 2015;49:1277-1283. doi:10.1136/bjsports-2014-094386.
7. van Ark M, Cook JL, Docking SI, et al. Do isometric and isotonic exercise programs reduce pain in athletes with patellar tendinopathy in-season? A randomised clinical trial. *J Sci Med Sport.* 2015. doi:10.1016/j.jsams.2015.11.006.
8. Kongsgaard M, Kovanen V, Aagaard P, et al. Corticosteroid injections, eccentric decline squat training and heavy slow resistance training in patellar tendinopathy. *Scand J Med Sci Sport.* 2009;19(6):790-802. doi:10.1111/j.1600-0838.2009.00949.x.
9. Young M a, Cook JL, Purdam CR, Kiss ZS, Alfredson H. Eccentric decline squat protocol offers superior results at 12 months compared with traditional eccentric protocol for patellar tendinopathy in volleyball players. *Br J Sports Med.* 2005;39(2):102-105. doi:10.1136/bjsm.2003.010587.