Knee Patellar Tendinopathy

Diagnosis/Condition:	Patellar Tendinopathy ("Jumper's Knee")
Discipline:	DC
ICD-10 Codes:	M76.50, M76.51, M76.52
Origination Date:	1996
Review/Revised Date:	04/2024
Next Review Date:	04/2026

Patellar tendinopathy is a clinical diagnosis, characterized by focal pain at the inferior pole of the patella, that is exacerbated by mechanical loading with increased loads resulting in a greater degree of pain.[1] Often referred to as "Jumper's knee", the term is usually applied in sports medicine to a variety of conditions involving the patellar tendon at its attachments to the patella and the tibial tuberosity. It is most associated with overuse or repetitive stress in sports that emphasize repetitive jumping (basketball, volleyball, or high or long jumping), but also seen in athletes involved in running and kicking sports, with many experiencing recurrent symptoms after treatment. Symptoms of patellar tendinopathy are load dependent, with increased loads resulting in a greater degree of pain. The extrinsic overloading of the tendon results in microtears which fail to heal properly and can develop into chronic tendinopathy, degenerative changes, or uncommonly, a rupture. This condition has also been associated with single-event, blunt trauma.[2] It is more common in athletes with a pronated foot posture or low ankle dorsiflexion.[3]

Histopathology of a wide variety of tendons consistently reveals few inflammatory cells. Subsequently, the prevailing view became that tendinopathy was essentially a degenerative condition caused by repeated mechanical loading (overuse), not an inflammatory condition. The term "tendinitis" fell out of favor, and the terms "tendinopathy" and "tendinosis" became more commonly used. Immunohistochemical examination has shown a prevalence of mast cells that may mediate hypervascularity.[4] Doppler ultrasound examination reveals neovascularization in 60% of PT patients.

Having abandoned inflammation as the primary model of this painful condition, a clear model of pathophysiology of chronic tendinopathy is not fully understood but does involve a degenerative component. This limits our capacity to establish effective treatment approaches and, in some ways, explains the wide variety of treatment approaches used.

History and Presentation

- Prevalence:
    - The prevalence of patellar tendinopathy is high, with 11.8–14.4% of recreational volleyball and basketball players reporting symptoms. In elite players the prevalence is even higher, with 32% of elite men's basketball players and 45% of elite men's volleyball players experiencing symptoms.[5]
    - Often found in younger athletes with jumping activity or sprints.
    - Occurs usually in skeletally mature adults, age range 16 to 40 years, males slightly > than females.
- Clinical risk factors:
    - Intrinsic: Age over 35 years, prior tendon injury, anatomic and biomechanical abnormalities (e.g., pes planus or pes cavus, excessive foot pronation, subtalar joint stiffness, reduced ankle dorsiflexion, muscle tightness, and sacroiliac joint dysfunction), gender (e.g., up to twice as common in male athletes), medications (e.g., fluoroquinolones, statins, aromatase inhibitors), and comorbidities (e.g., diabetes mellitus, rheumatologic disease, cardiac disease, lipid disorders, collagen vascular disease).
    - Extrinsic: Improper training (e.g., abrupt, large increase in training volume), poor movement patterns (e.g., abnormal running gait, poor weightlifting technique), poor ergonomics (e.g., excessive movement or awkward joint position during activity), poor equipment (e.g., running shoes with excessive wear), and activities on hard playing surface and/or high number of training sessions.
- Symptom quality and severity:
    - Anterior knee pain, often described as achy, at the pole(s) of the patella or tibial tuberosity. General, diffuse knee tenderness, knee stiffness.
- Symptom onset/timing, frequency, duration:
    - Usually insidious, rarely a result of acute trauma.
- Aggravating and mitigating factors:
    - Tendon pain occurs instantly with loading and usually ceases almost immediately when the load is removed.

Physical Exam Findings

- Palpation:
    - Tenderness at the insertion sites (tenderness at the inferior pole of the patella has high sensitivity and moderate specificity for diagnosing patellar tendinopathy.[6,7]
    - Localized swelling over the involved tendon attachment.
    - Palpatory heat (localized).
    - Bassett Sign:
        - Tenderness to palpation with knee at full extension and patellar tendon relaxed.
        - Non-tender with knee in flexion and patellar tendon taut.

- Range of Motion:
    - Limitation in knee range of motion can vary depending on acuity, but movement would generally be limited in flexion.
    - Resisted knee extension may be painful.
- Orthopedic Testing:
    - Resisted extension often painful such as with a single leg decline squat.
    - Hamstrings and quadriceps tightness.
    - Catching and/or locking may be demonstrated.
    - Normal ligamentous stability of the knee.
    - The hips and ankles should be evaluated.
- Chiropractic specific:
    - A thorough assessment of the kinetic chain and spine often reveals changes, including muscle weakness, abnormal movement patterns, leg length differences, joint stiffness and dysfunction.

Imaging Findings

- X-ray imaging is generally normal and not necessary to reach a diagnosis but may be useful to rule out stress fracture or to evaluate for other more serious causes of pain.
- Diagnostic ultrasound is useful to assess the size of an acute tear, assess dynamic tendon function that may reveal tearing, evaluate for hematoma and any calcifications, and to identify neovascularization associated with tendinopathy.
- MRI is useful, when diagnostic ultrasound is unavailable, to rule out other causes of knee pain if the presentation is atypical or not responding to conservative care.

Laboratory Findings

- No specific laboratory tests.

Assessment

The clinical impression should indicate the specific anatomical structures involved and clinically correlate with mechanism of injury, history, subjective complaints, and objective findings.

- Grading/Classification of the Condition/Disease: Knee Patellar Tendinopathy can be classified into 1 of 4 stages:
    - Stage 1 - Pain only after activity, without functional impairment.
    - Stage 2 - Pain during and after activity, although the patient is still able to perform satisfactorily in his or her sport.
    - Stage 3 - Prolonged pain during and after activity, with increasing difficulty in performing at a satisfactory level.
    - Stage 4 - Complete tendon tear requiring surgical repair.
- Differential Diagnoses: infrapatellar bursitis, pes anserine bursitis, tibial plateau fracture, infrapatellar fat pad syndrome, Sinding-Larsen-Johansson syndrome, Osgood-Schlatter disease (in adolescents), tumor, knee-joint infection, hip pain referral.

- Associated Conditions:
    - Quadriceps muscle imbalance and patellofemoral tracking issues.
    - Overpronation at the foot.
- Red Flags:
    - Signs of infection such as malaise, fever, joint warmth, swelling, erythema, and stiffness should warrant a referral to an urgent care or emergency room for evaluation and management.
    - Signs of cancer/malignancy such as night pain, weight loss, malaise, and lack of improvement in condition with conservative care.

Treatment

Pharmaceuticals (OTC)

- NSAIDS recommendations range from limited to none based on the fact that this is not an inflammatory based condition and NSAIDS have demonstrated to not be effective in the long run.[8,9]
- Analgesics for acute symptoms.

Pharmaceutical (Prescriptions)

- Limited evidence exists to support the use of topical nitroglycerin.
- Nitric oxide patches had inconclusive evidence of benefit.[10]

Immobilization/bracing/taping

- RICE) Rest, ice, compress, elevate in the acute phase.
- Limited evidence exists to support the use of bracing or orthotics.
- Crutches may be useful when the patient is unable to weight bare.
- Kinesio-tape® with a tendon corrective and muscle facilitative strip.[11]

Physical Modalities (Western)

- Modalities such as shock wave therapy, therapeutic ultrasound, ionto- and phonophoresis, and low-level laser therapy all had inconclusive evidence of benefit.[12]

Movement and Exercise

- A 2021 systematic review and network meta-analysis supports eccentric loading as the first line treatment for patellar tendinopathy.[13]
- The majority of current evidence supports the first line treatment option for this condition as exercise, specifically eccentric, or some version of eccentric-concentric, to improve the capacity of the tendon to manage the strain/load of the aggravating activity.[14,15]
- Treatment program should include a decline board of 25 degrees (decline improves the specificity of the squat by decreasing the contribution of the calf muscles and passive

ankle structure to controlling the squat) and should be performed with some level of discomfort.[16]
- Heavy slow resistance training improved the clinical outcome of patellar tendinopathy.[17]
- There is also evidence that suggests that athletes who are participating in an eccentric exercise protocol do not have better outcomes when they are withdrawn from sport.[18]
- Training in proper mechanics of joint protection and exercises.

Manual Adjustments/Manipulation
- There is limited evidence of the benefit of manipulation and mobilization of the knee in the treatment of tendinopathy.
- Lower extremity and spinal manipulation to correct joint dysfunction.
- There is anecdotal evidence that suggests correction of biomechanical faults in the kinetic chain of adjacent structures may help.
- Fascial manipulation of the quadriceps.[19]
- Limited evidence exists to support the use of deep friction massage.[20]

Acupuncture
- Limited evidence exists to support the use of acupuncture.

Injection Therapies
- Corticosteroid injections (CORT) has good short-term but poor long-term clinical effects.[21]
- The use of platelet rich plasma (PRP) injections has some limited support from small trials.[22]
- Limited evidence exists to support the use of sclerosing injections, prolotherapy, and autologous blood.

Length of Conservative Care
- The treatment of PT is often specific to the degree of involvement, clinical Stages I-IV (see Hyman article below).
- Up to 12 weeks for persistent patellar tendinopathy.
- Activities/work restrictions: Limit activity depending upon diagnosis, degree of symptoms, and type of daily activities.

Specialist and Surgical Referral Criteria
- Eccentric training should be tried for twelve weeks before open tenotomy is considered.[23] Some sources recommend 6-12 months of conservative treatment prior to consideration of surgery and in some cases only for those in Stages 3 and 4.
- Referral to orthopedist for complete rupture, refractory tendinosis and septic bursitis, progressive loss of range of motion or strength
- Referral to physical therapy.

- Failure to respond to care.
- Surgery is rarely required if training loads are limited, and an appropriate rehabilitation program is implemented.
- A 2019 Cochrane systematic review looked at comparisons of surgery (open and arthroscopic) with exercise and other non-surgical interventions. Overall, the quality of evidence for any of these interventions is limited and conclusions are of low certainty. The review concluded, "We are uncertain if surgery is beneficial over other therapeutic interventions, namely eccentric exercises or injectables. [And that] surgery seems to be embedded in clinical practice for late-stage patella tendinopathy, due to exhaustion of other therapeutic methods rather than evidence of benefit."[27]

Resources for Clinicians

Malliaras P, Cook J, Purdam C Rio E. Patellar Tendinopathy: Clinical Diagnosis, Load Management, and Advice for Challenging Case Presentations J Orthop Sports Phys Ther 2015;45(11):887-898. Epub 21 Sep 2015. doi:10.2519/jospt.2015.5987 (Available at https://www.jospt.org/doi/pdf/10.2519/jospt.2015.5987

Wheeless' Textbook of Orthopedics. "Jumper's Knee" WheelessOnline.com is published by Duke University Medical Center's Division of Orthopaedic Surgery, in conjunction with Data Trace Internet Publishing, LLC. This is the most comprehensive, unparalleled, dynamic online medical textbook in existence.
http://www.wheelessonline.com/ortho/patellar_tendonitis_jumpers_knee

Resources for Patient

Patellar Tendonitis. MayoClinic.com. Manage your health with useful and up-to-date information in more than 35 disease and lifestyle categories.
http://www.mayoclinic.org/diseases-conditions/patellar-tendinitis/basics/definition/con-20024441

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