Research Paper Review

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Physiotherapy Management of Patellar Tendinopathy (Jumper's Knee)

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BACKGROUND INFORMATION

Patellar tendinopathy (PT) is a painful dysfunction of the patellar tendon. It is typically a clinical diagnosis, which most commonly affects jumping athletes by limiting their sport participation and activities of daily living. The condition typically presents gradually and can even be career-ending in some cases! The authors of this study are world leaders and authorities on the topic of tendon injury, and sought to discuss the evidence regarding prevalence, diagnosis and management of PT.

SUMMARY

Patellar Tendinopathy most commonly affects elite/high level athletes, especially basketball and volleyball players. It also affects a large number of recreational (1) and adolescent athletes.

While several models outlining the pathology and etiology of tendinopathy have been proposed, the exact process remains unknown. Among these, the continuum model of tendinopathy has been most widely accepted clinically. The model categorizes tendon pathology into 3 interchangeable stages: Reactive – Tendon disrepair – Degenerative. Clinical tendon pathology can move forward and backward along this continuum through a season or career. Tendinopathies typically start in the reactive stage, progressing toward disrepair and finally to degeneration, with regression back to the reactive stage if loading is beyond the tendon's capacity.

While PT is most often diagnosed clinically, many clinicians and researchers utilize MRI and ultrasound to confirm their diagnosis. However, while imaging might reveal structural tendon disruptions, many athletes remain clinically asymptomatic. Among the sports investigated, asymptomatic yet pathological tendons are most commonly found in basketball players, followed by netball, cricket and Australian football players (2). These asymptomatic changes are also found in up to 26% of adolescent basketball players (2). Still, certain findings, such as large hypoechoic regions visualized on ultrasound, may increase the risk of developing patellar tendinopathy later on.

The risk factors for patellar tendinopathy can be separated into two categories:

Extrinsic:

- Increase in training volume – the most common factor.
- Change in surface density and/or shock absorption of shoes and training surface - some athletes may be more vulnerable on hard floors, athletic tracks or surfaces with high horizontal traction.

Intrinsic:

- Anthropometric characteristics such as height, weight, lower limb joint ROM, leg length, body composition, lower limb alignment and length/stretch of hamstring and quadriceps. Less extensible quads and hamstrings have been associated with patellar tendinopathy (4).
- Greater strength has been associated with reduced pain and increased function (3).
- Greater knee extensor strength and jumping ability has been reported in athletes with patellar tendinopathy. Generally, those with better vertical jumping ability (especially women) are affected by PT more commonly.
- Muscle recruitment and different lower limb kinematics in horizontal landing – horizontal breaking (as in stopping from a run) places the highest load on the patellar tendon (5).
- Lower foot arch height (3), reduced ankle dorsiflexion (6), greater leg length discrepancy and patellar alta in men (7).
- Male gender (8).
- Males with a waist circumference greater than 83 cm (9).
- Larger infrapatellar fat pad (10).

Tendon overload (defined as load beyond what the tendon has adapted to) is the key factor associated with pain onset. Your patient will typically describe situations such as recently beginning plyometric training, or participating in a high volume tournament. Other times, they will describe returning to normal training after significant downtime, such as recovering from an injury or holidays. PT might be more agitated upon starting an activity, and will likely be sore the following day. Pain with ADLs such as prolonged sitting, navigating stairs and squatting is also common. Non-jumping activities (i.e. cycling or swimming) and repetitive low loading activities (i.e. running) rarely aggravate the patellar tendon.

When asked to indicate where they are experiencing pain, the athlete will often point to the proximal aspect of the patellar tendon. The Victorian Institute of Sports Assessment for the Patellar Tendon (VISA-P) should be completed as a treatment baseline and during re-evaluation – this is a commonly available, condition-specific questionnaire (9).

They key test for the diagnosis of patellar tendinopathy is the single-leg decline squat. The test is performed with the athlete performing a single-leg squat while standing on a 25 degree decline board. They are asked to maintain an upright trunk and squat to 90 degrees. Performance is compared to the healthy leg. The maximal angle of knee flexion, angle of pain provocation through the arc of motion and VAS should be recorded for both legs. Observation will usually show calf and quadriceps wasting, even if they continue to play in the presence of symptoms.

The astute clinician should also examine the hip, knee and ankle. Ankle (12) and first ray dorsiflexion ROM is a critical assessment, as the ankle and calf are known to absorb much of the landing energy during jumping tasks (13). Single-hop testing and change of direction tasks should be assessed, particularly with a VAS/pain level recording for each leg at take-off and landing.

To help your athletes recover, the clinician must first manage the amount of load the tendon is bearing at any time. Removing high-load drills from training, reducing frequency of training and decreasing time/volume of training are all helpful means of decreasing load. Complete rest is NOT helpful.

Early rehabilitation can begin with heavy sustained isometric contractions as they have been shown to provide analgesia (14). The patient can perform either supine or standing knee extension isometric contractions, at any painless knee flexion angle. Isometric contractions can then be performed at

progressively greater or lesser angles of knee flexion, provided it is not too painful. For instance, the patient can start with both the knee and hip at 90 degrees. Once this position is asymptomatic, the patient can progress to placing the knee at 105 degrees or 75 degrees of flexion. The 15 degree change is based on the physiological law of specificity, which stipulates that isometric strength gains are limited to +/- 15 degrees from which the isometric contractions were performed. Clinicians will commonly prescribe 4 sets of 45-60 second holds, at 75% MVC. Protocols such as this can provide analgesia for 2-8 hours, and can be performed several times a day. If the tendon is highly irritable, bilateral exercise, shorter holding times and fewer reps are advised.

Eccentric training has been shown to have favourable short-term or long-term effects on symptoms and VISA-P scores. Several studies have shown that the 25 degree decline squat results in more favourable outcomes than a standard single-leg squat. Exercises should be performed daily. Eccentric training in the presence of a high-load environment is detrimental to healing. It is important for these athletes to perform these exercises throughout their careers to ensure optimal load bearing capacity.

Later in the treatment program, the athlete can perform functional strengthening exercises to address kinetic chain dysfunction and faulty movement patterning, while continuing to perform eccentric training. Drills such as skipping, jumping and hopping are good places to start. Later on, the athlete can progress to sport specific agility tasks, sprinting, jumping and bounding.

Unfortunately, little evidence exists for passive interventions. Knee extensor myofascial manipulation has shown positive effects on reducing pain in the short and long-term. Braces and taping are often used, but very little evidence exists proving their efficacy. Passive therapies are typically used during the season to allow athletes to continue participating in sport and rehabilitation. Shockwave therapy, corticosteroid injections and platelet rich plasma injections are frequently used in a clinical setting, but little evidence exists supporting their use, clinically.

CLINICAL APPLICATION & CONCLUSIONS

Patellar tendinopathy can be incredibly difficult injury to manage. Many times, athletes present with anterior knee pain overlying the proximal patellar tendon, after an acute increase in training intensity or volume. The most important early management strategy is to modify loading according to their painful symptoms. The athlete is then trained on how to progressively increase the load bearing capacity of the tendon using exercise (isometric → isotonic → eccentric → ballistic etc.). Many manual therapy techniques, while having poor or unknown efficacy, can be used in-season to keep athletes playing and performing their rehabilitation exercises.

STUDY METHODS

This was a clinical commentary: the authors did not include any study selection criteria, search strategy or statistical analysis.

STUDY STRENGTHS / WEAKNESSES

Strengths

- These authors are leaders in the field, and combine their opinions and the available evidence to diagnose and manage PT.
- The authors also offered good quality objective outcome measures – VAS during activity and VISA-P – and stated that clinicians should not use imaging to diagnose or prognosticate.
- The authors separated the concepts of pain management and functional improvement (i.e. sports performance) – this is always needed in the management of any patient.

- The authors were also realistic in stating that athletes with tendinopathies require continued care to maintain optimal load bearing capacity throughout their career.

Weaknesses

- The authors did not offer any insight into the clinical and histological effect of instrument assisted soft tissue mobilization on disorganized tendons.
- They alluded to assessment and treatment of the kinetic chain, but did not offer any further insight.

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