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CLINICAL CASE REPORT

The Effect of Positional Release Therapy on Intercollegiate Male Basketball Athletes Classified With Patella Tendinopathy

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In the current case series, three male patients aged 19–21 years, all participating in basketball activities during their competitive season, were evaluated and classified with patella tendinopathy. A combination of positional release therapy (PRT) treatment with therapeutic exercises was used to decrease pain and improve function. Over the course of the treatment, each patient improved outcomes at discharge and sustained the improvements at follow-up. The purpose of this paper is to compare the results of this case series with a study of the effects of eccentric exercises on physically active patients diagnosed with patella tendinopathy and participating in jumping sports.

Keywords: autonomic nervous system, eccentric exercise, regional interdependency

Persistent pain in the anterior aspect of the knee is commonly associated with patella tendinopathy.[1–3] Patella tendinopathy includes conditions involving the patella tendon on the inferior pole of the patella and is commonly associated with inflammation or degenerative changes of the tendon.[1,2,4,5] The main symptom used to diagnose patella tendinopathy is insidious anterior knee pain related to repetitive sudden ballistic movements.[4] Patella tendinopathy is referenced to as jumper's knee because of the prevalence of patella tendon pain in athletes participating in sports and activities that involve repetitive jumping (e.g., basketball, volleyball).[5–8]

The treatment of this highly prevalent condition is directed at modifying activity levels, then increasing flexibility and strength of the tendon to decrease pain and increase function.[7–10] Protection-based treatment includes some combination of rest, cryotherapy, nonsteroidal anti-inflammatory drugs (NSAIDs), tape application, thigh and hip strengthening exercises, and static stretching of the quadriceps muscles.[5,6,10] Complete resolution of patella tendinopathy can take 3 to 6 months.[11] When resolution does not occur, surgical options are explored.[6,12,13] The limited amount of local treatments leading to long-lasting resolution supports the potential need of a more holistic approach to improve patient care.[13] As most conservative treatments are aimed at treating only the involved tissue, it may be warranted to assess other factors such as somatosensory and psychosomatic factors, along with the musculoskeletal system.

Key Points

- Patella tendinopathy, or jumper's knee, is common in basketball players.
- Treatment programs utilizing positional release therapy may be effective for patients diagnosed with patella tendinopathy.
- Positional release therapy paired with thigh and hip therapeutic exercise improved patient outcomes related to function and pain.

Research into conservative treatments of patella tendinopathy has increased over the past 20 years. Eccentric exercise is often prescribed for patients classified with patella tendinopathy. A protocol for eccentric exercise was presented in Young et al.[9] Young et al.[9] compared the short- and long-term effects of a decline squat protocol and step squat protocol on function and pain of patients with patella tendinopathy. Young et al.[9] determined that both protocols were effective at increasing function and decreasing pain in patients with patella tendinopathy following 12 weeks of the exercise protocol. Similar protocols are used by clinicians attempting local treatments to change the anatomy of the patella tendon. Throughout this paper, the study by Young et al.[9] will be compared with the current case series to assess generalizability.

Case Presentation

Patients

In the current case series, three male patients aged 19–21, participating in intercollegiate basketball, reported to the athletic training clinic with anterior knee pain. Each patient met inclusion criteria and was classified with patella tendinopathy (Table 1).[14] Following the initial evaluation, each patient provided his consent for treatment and dissemination of deidentified information. In Young et al.,[9] 17 participants (13 males and 4 females) 18–35-years-old, competing as elite volleyball athletes, presented with similar inclusion criteria, including an abnormal (hypoechoic) ultrasound which was assessed once during the initial evaluation.

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Table 1 Inclusion and Exclusion Criteria[14]

Inclusion	Exclusion
Tender to palpate over inferior pole of patella	Acute injury or specific MOI
Persistent pain for at least 6 months	Previous knee surgery
Knee extension MMT less or equal to 4/5	Lower extremity injury in the past 6 weeks

Abbreviations: MMT = manual muscle test; MOI = mechanism of injury.

Table 2 Initial Evaluation Data

Patient Number	Period of Persistent Pain	MMT of Knee Extension	Current/ Best/Worst NRS	Classification
1	2 years	3-/5	3/0/6	Patella tendinopathy
2	2 years	3-/5	5/2/7	Patella tendinopathy
3	1 year	3-/5	7/0/8	Patella tendinopathy

Abbreviations: MMT = manual muscle test; MOI = mechanism of injury; NRS = numeric rating scale.

The initial evaluation for the current case series included a history from each patient, including anterior knee pain and no mechanism of injury (MOI) related to symptoms (Table 2). Objectively, the palpation of the anterior thigh, knee, and leg were completed. No obvious deformity, discoloration, or swelling was noted in any of the patients. Range of motion was assessed with the active knee flexion test (AKFT). Strength was assessed through a manual muscle test (MMT) for knee extension. Specific, special tests were completed to rule out other conditions such as anterior drawer, the Lachman test was used for anterior instability of the knee, the McMurray test was used for meniscus pathology, and the Clarke sign was used for patella chondromalacia.

Intervention

All three patients were treated with positional release therapy (PRT) accompanied by therapeutic exercise in the current case series. PRT is a treatment indicated for patients with somatic dysfunction, defined as a disturbance in the sensory or proprioceptive system that results in a spinal segmental tissue facilitation and/or inhibition.[15] Related to strain-counterstrain, PRT begins by placing a muscle in a position of comfort, with absolutely no pain; the position is held until the muscle spindle releases through a twitch response or fasciculation.[15] In the current case series, all patients were treated with PRT at the patella tendon (Figure 1) and psoas muscle (Figure 2) to decrease somatic dysfunction and increase the effect of therapeutic exercises.

The treatment starts by assessing the patient for tender points (TP) similar to trigger points or areas of somatic dysfunction. The areas assessed through palpation by the treating clinician (TC) were the patella tendon, pes anserinus, iliotibial band, tibialis posterior, popliteus, medial gastrocnemius, tensor fascia latae, adductor magnus, adductor longus, pectineus, gracilis, and psoas muscle based on the protocol for patella tendinitis.[15] The treatment(s) of PRT were provided to eliminate only the TPs that were tender to palpation. Each muscle was held in a position of comfort until muscle fasciculation or twitch response subsided at the TP. The position of comfort was held for 1–4 min for patients in this current

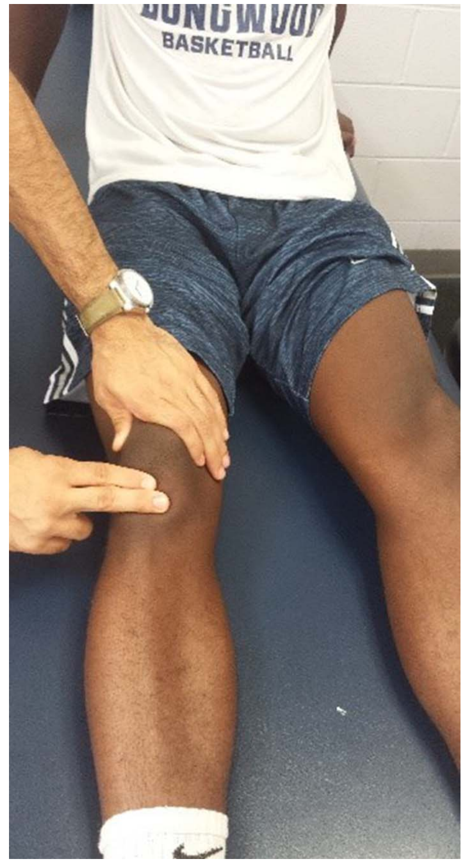

Figure 1 — Positional release therapy of patella tendon.

Figure 2 — Positional release therapy of psoas muscle.

case series. Immediately following the PRT treatment patients completed the therapeutic exercises outlined in Table 3. Patients completed the exercise phase based on pain-free ability to perform the exercise and completed each session in 10–15 min.

Young et al.[9] had patients complete the step squat and decline squat exercise twice a day for 3 sets of 15 repetitions. To increase the intensity of the squats, weight was added via backpack. Along with the increased intensity, the decline squat protocol emphasized the single-leg eccentric motion on the involved leg and concentric motion of the uninvolved leg on a 25° angle slant board. The step squat was completed with eccentric and concentric motion on the involved leg and the speed was increased from slow to fast before increasing the load. Participants completed the exercise protocols for 12 weeks and then the outcomes were reassessed.

Table 3 Patella Tendinopathy Exercise Protocol

Phase 1	Wall decline squat with stability ball, 2 × 15 (Figure 3); single-leg mini squats, 3 × 10 (Figure 4)
Phase 2	Squat, 2 × 10 (Figure 5); single-leg decline squat, 3 × 5 (Figure 6); step downs, 3 × 10 (Figure 7)
Phase 3	Drop squat, 2 × 5 (Figure 8); single-leg squat, 2 × 5 (Figure 9); jump downs, 2 × 10 (Figure 10)

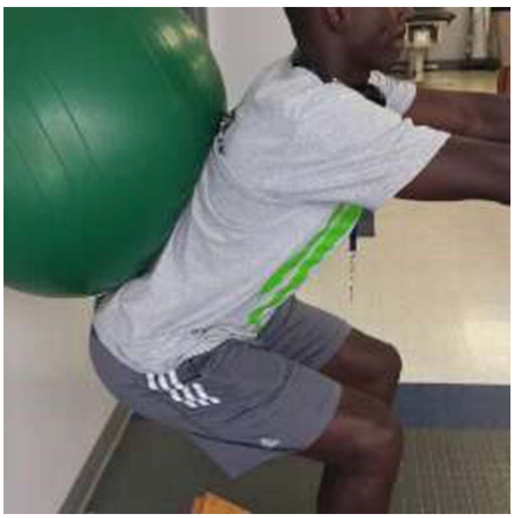

Figure 3 — Wall decline squat with stability ball.

Figure 4 — Single-leg mini squats.

In the current case series, patients met discharge criteria in an average of 3.3 treatments over 12 days (Table 4). Patients were

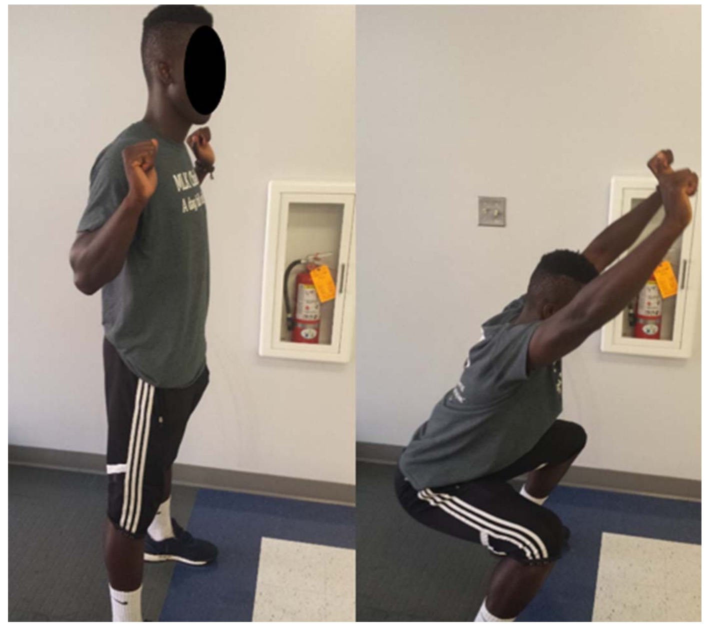

Figure 5 — Squat.

Figure 6 — Single-leg decline squat.

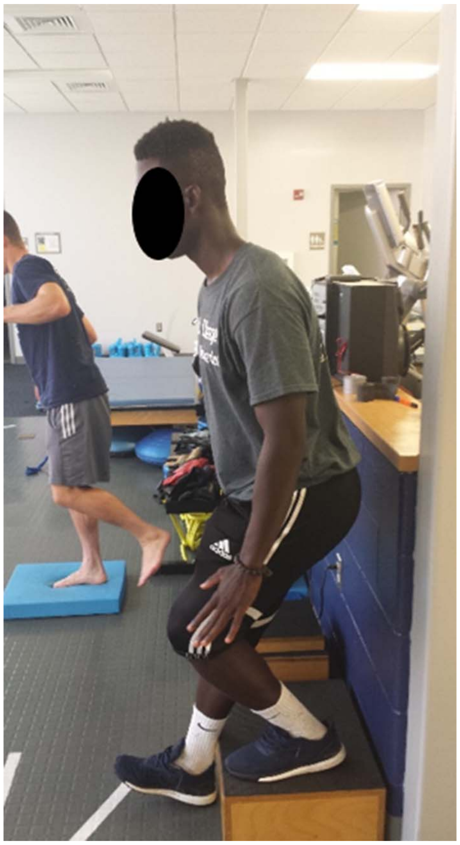

Figure 7 — Step downs.

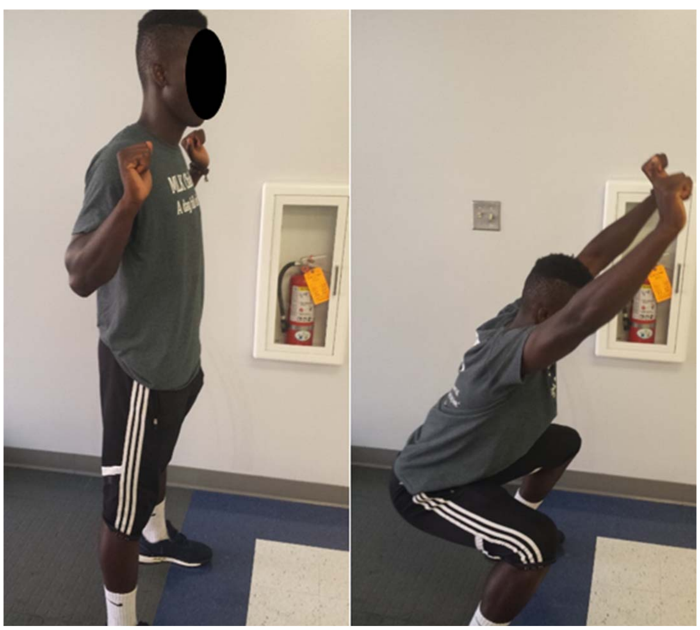

Figure 8 — Drop squat.

discharged when there was minimal pain (numeric rating scale [NRS] ≤ 2/10) on palpation of the inferior pole of patella, AKFT within 5° of uninvolved side, and 5/5 MMT for knee extension. The discharge criteria for patient-reported outcomes (PROs) included a current NRS score ≤ 2/10, Disablement in Physically Active (DPA) Scale score ≤

Figure 9 — Single-leg squat.

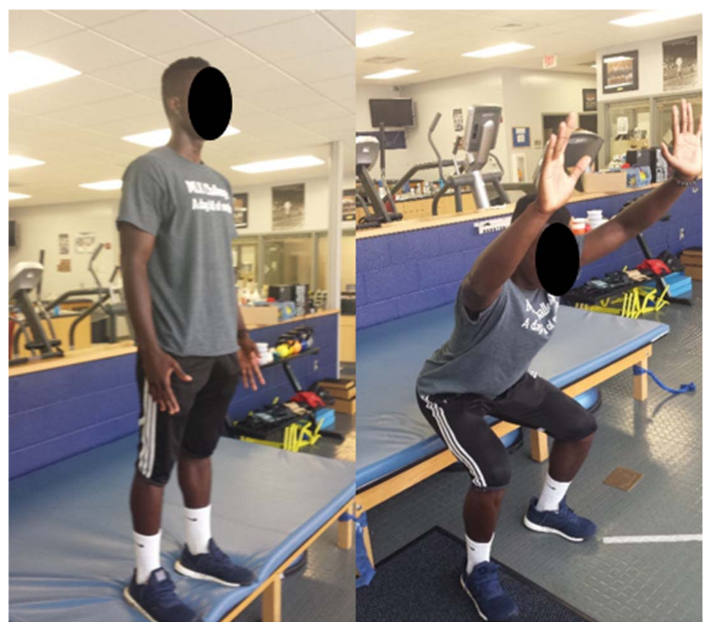

Figure 10 — Jump downs.

10 out of 64 points, Victorian Institute of Sport Assessment (VISA) score ≥ 80 points, and Patient-Specific Functional Scale (PSFS) score ≥ 8 points. Based on the persistent nature of the symptoms, each patient continued to participate in basketball-related activities through the duration of treatment; once discharge criteria was met, no more treatments were provided. No set discharge criteria was included in

Young et al.,[9] as the participants completed the protocol for 12 weeks based on theories of mechanobiology.

Comparative Outcomes

Each patient completed specific PROs and disease-oriented evidence (DOE) outcomes to add to the clinician's understanding of how the condition and course of treatment was affecting the patient. The patients in the current study completed these outcomes at initial session before treatment, posttreatment, 1 week into treatment, and once discharge criteria was met. Follow-up assessments were completed to determine if patients maintained the effects of the treatment at 1-month and 3-month timepoints (Tables 5–7). The outcomes were assessed in Young et al.[9] at baseline, at 12 weeks, and at the 12-month follow-up.

The NRS is used to assess the patient's pain at the current time of assessment. The patients selected one number on an 11-point scale from 0–10, where 0 was "no pain" and 10 was "worst pain imaginable". The minimal clinically important difference (MCID) for the NRS has been reported at 2 points.[16] The visual analog scale (VAS) was used to assess the patient's pain in Young et al.[9] For the VAS, the participant would place a mark on a 100-mm line corresponding to intensity of pain; one side of the line would indicate no pain and the other side would be the "worst" pain. The MCID for the VAS has been reported at 25.4 mm.[17] Even though it would have been ideal to use the same pain scale in each study, the similar MCID values allow for clinicians to assess meaningfulness of the change in pain on these scales. To assess disablement, the DPA Scale was provided to each patient. The scale includes 16 items, with each item scored on a 5-point Likert scale (0–4); 64 points would indicate most disablement and 0 would indicate no disablement. The MCID for the DPA Scale has been reported at 9 points for persistent conditions.[18]

Continuing with the PRO measures, the VISA was completed as a region-specific outcome focused on the patella tendon in both studies. The score is out of a 101-point scale, where 100 indicates high function and 0 indicates minimal or no function with activities related to the patella tendon.[19,20] The MCID for the VISA has been set at greater than 13 points. For the PSFS, each patient was asked to provide a score of his perceived function through three tasks ("going up stairs", "squatting", and "jumping") for the current case series. No PSFS was completed in Young et al.[9] The score was measured on a 11-point scale, where 10 was fully functional and 0 was no function.[20] An average increase of 2 points is considered a MCID for the PSFS.[21] Range of motion and strength were assessed through DOE outcomes of the AKFT and MMT of knee extension. In the current case series, the AKFT was completed with the patient laying in prone as he actively flexed his knee; a goniometer was used to measure the angle at the knee. The minimal detectable change (MDC) for the AKFT has been reported at 6.3° for an experienced clinician.[22] The MMT was

Table 4 Discharge Information: Treatment Number and Days

Patient #	Treatments	Days
1	5	11
2	4	10
3	7	15

Table 5 Patient 1 Outcome Data

Treatment Session	Initial Pretreatment	Initial Posttreatment	1 Week	Discharge	1-Month Follow-Up	3-Month Follow-Up
NRS	3	3	2	0*	0	0
DPA	16	N/A	17	3	8	6
VISA	84	N/A	89	96*	N/A	N/A
PSFS	8.7	N/A	9.3	10*	10	10
GRoC	N/A	N/A	7*	7	N/A	N/A
MMT	3-/5	N/A	N/A	5/5	N/A	N/A
AKFT (involved, uninvolved)	120°, 131°	124°, 130°	130°†, 132°	126°, 130°	133°, 133°	N/A

Abbreviations: AKFT = active knee flexion test; DPA = Disablement in Physically Active Scale; GRoC = global rating of change; MMT = manual muscle test; NRS = numeric rating scale; PSFS = Patient-Specific Functional Scale; VISA = Victorian Institute of Sport Assessment Scale.
*Minimal clinically important difference. †Minimal detectable change.

Table 6 Patient 2 Outcome Data

Treatment Session	Initial Pretreatment	Initial Posttreatment	1 Week	Discharge	1-Month Follow-Up	3-Month Follow-Up
NRS	5	2*	3	0	0	0
DPA	33	N/A	18*	8	4	0
VISA	57	N/A	64	81*	N/A	N/A
PSFS	7.25	N/A	9.3*	9.3	10	10
GRoC	N/A	N/A	3*	5*	N/A	N/A
MMT	3-/5	N/A	N/A	5/5	N/A	N/A
AKFT (involved, uninvolved)	116°, 125°	123°†, 130°	125°, 125°	125°, 125°	126°, 125°	N/A

Abbreviations: AKFT = active knee flexion test; DPA = Disablement in Physically Active Scale; GRoC = global rating of change; MMT = manual muscle test; NRS = numeric rating scale; PSFS = Patient-Specific Functional Scale; VISA = Victorian Institute of Sport Assessment Scale.
*Minimal clinically important difference. †Minimal detectable change.

Table 7 Patient 3 Outcome Data

Treatment Session	Initial Pretreatment	Initial Posttreatment	1 Week	Discharge	1-Month Follow-Up	3-Month Follow-Up
NRS	7	0*	0	0	0	0
DPA	24	N/A	17	8*	6	2
VISA	46	N/A	58*	93	N/A	N/A
PSFS	3.33	N/A	7*	9.3	10	10
GRoC	N/A	N/A	3*	5*	N/A	N/A
MMT	3-/5	N/A	N/A	5/5	N/A	N/A
AKFT (involved, uninvolved)	120°, 130°	128°†, 132°	129°, 133°	133°, 136°	139°, 136°	N/A

Abbreviations: AKFT = active knee flexion test; DPA = Disablement in Physically Active Scale; GRoC = global rating of change; MMT = manual muscle test; NRS = numeric rating scale; PSFS = Patient-Specific Functional Scale; VISA = Victorian Institute of Sport Assessment Scale.
*Minimal clinically important difference. †Minimal detectable change.

completed with the patient short sitting, with legs off of the table; then, the patient extended his knee against the force of the TC. The MMT was graded based on the MMT grading scale.[23] Both the AKFT and MMT were measured by the TC.

Discussion

In the treatment of patella tendinopathy, traditional conservative interventions include modifying activity levels and then increasing flexibility and strength of the tendon to decrease pain and increase function. With current conservative treatments taking 3–6 months to show improvement in patient outcomes, researchers have begun to explore more innovative treatments.[2,3,24,25] There is no "gold standard" for the treatment of patella tendinopathy, similar to other musculoskeletal conditions.[7,26] The improvements in outcome measures in Young et al.[9] occurred after 12 weeks of treatment, with an average of 72 treatments, which is considered a shorter timeframe. The current case series, incorporating a PRT treatment, led to improvements in outcome measures in an even shorter time period (average of 12 days with 3.33 treatments).

The TC completed a PRT treatment at the psoas muscle and patella tendon to decrease symptoms associated with the TP that may have developed through local and proximal somatic dysfunction.[15] Initially, all three patients had a decrease in range of motion (ROM) and muscular strength compared bilaterally that could be related to the myotatic reflex arch that could have occurred post-injury.[15] After injury, the pain threshold is reduced and efficiency of afferent sensory impulses to the central nervous system are increased.[27] Once the injury heals, these neurological reactions should subside. If the neurological impulses continued to transmit to the brain and increase the sensation of nociception, a false representation of the tissue state will occur.[27] Therefore, the use of PRT in this case series was theorized to treat global somatic dysfunction to improve pain and function scores along with strength and ROM, instead of a localized treatment of tissue dysfunction.

When comparing these two studies, the similarities in the patient populations are present with the current case series including three male patients participating in basketball and nine participants playing volleyball in the Young et al. study.[9] The VISA and pain scale outcomes are able to be compared between groups with the classification of patella tendinopathy following similar inclusion criteria in both studies. After 12 weeks the participants who completed the decline squat had a mean improvement of 18 points on the VISA and 15 mm on the VAS.[9] The change on the VISA did meet a MCID but the VAS did not. In the current case series, the patients treated with PRT and therapeutic exercise had a mean improvement of 27 points on the VISA and 5 points on the NRS. The follow-up assessment on pain was completed at 12 months for the participants in Young et al.,[9] and showed improvement of 22 mm on the VAS.[9] At the 3-month follow-up for this current case series, all of the participants remained pain-free, with an improvement of 5 points on the NRS (Tables 5–7).

In Young et al.,[9] the treatment protocol was based on tissue morphological changes and the outcomes were clinically significant for function but did not meet a MCID for decrease in pain. This may be due to the expectation of pain during the exercise and the use of pain to determine the load based on mechanobiological theories. The holistic approach of PRT with pain-free exercise had patients achieve MCID levels on both VISA and NRS as well as PSFS and the global rating of change (GRoC). GRoC is a 15-point scale used to measure the effectiveness of an intervention. The clinician asks the patient to assess his/her current health status on a scale from –7 (a very great deal worse) to 0 (no change) to 7 (a very great deal better).[28] All of the PROs, along with the MMT and AKFT measurements, improved in an average of 3.3 treatments over 12 days. This change could be due to the more global approach to treatment, which included somatosensory and psychosomatic factors of care with an emphasis on pain-free exercise.

Clinical Bottom Line

Clinicians can consider using PRT paired with therapeutic exercise, such as those completed in the current study, to improve pain and function outcomes in patients presenting with patella tendinopathy while participating in jumping activities. More research needs to be completed on this technique to investigate the effects on patients with other conditions and in different populations.

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