CLINICAL LESSONS FROM PHYSICAL THERAPY

Focus on the Proximal to Treat the Distal

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Having a framework in mind can help clinicians when evaluating patients, allowing us to stay consistent with guidelines and make sense of patient concerns. One such framework is to consider that distal maladies may have proximal causes, and the mindful clinician should consider the interconnected character of the human machine.

A CASE

Recently, in our physical therapy clinic, a patient arrived with a diagnosis of right posterior tibialis tendonitis and pointed to the medial aspect of her right lower leg as her source of pain. The patient was a runner and experienced pain while training for a marathon, resulting in her eventual pause from running. Frustrated, yet undefeated, she sought physical therapy to help restore pain-free walking and, eventually, running.

After completing several sessions of physical therapy with an emphasis on strengthening her intrinsic foot muscles, she was not experiencing much pain relief. A motivated patient who reported she was doing all her exercises, she nevertheless had pain with prolonged walking and wasn't yet ready to attempt running.

While the initial approach — to address pain with a treatment plan focused on the lower leg and foot — seemed appropriate, we began to consider what might be occurring further up the kinetic chain. Perhaps a weakness in the hip or trunk could be progressing to an aberrant movement or excessive force in the lower leg.

THEORY

Watching an infant learn to roll from supine to prone and crawling puts strength and function of a torso on full display. The small child uses their core muscles to create a rigid base from which their arms and legs then leverage their surroundings to roll over. Next, that same toddler gains the stability to advance onto their four limbs, again through use of their core. In a different scenario, experienced basketball players understand that when taking a jump shot, it is the hips rather than the arms that primarily propel the ball.

Reasoning that is conscientious of physics can provide a framework for evaluating the lower extremities. The hip is the largest weight-bearing joint in the human body. It withstands the greatest exertional forces as the lower extremity moves, and is stabilized by, the torso. If the hip cannot perform as intended, a more distal joint must work harder in terms of strength or range of motion to complete a task, even one as simple as walking (see Fig. 1).

An activity as modest as transferring from sitting to standing produces a peak reactive force in the hip up to six times greater than body weight.[1] Previous research also demonstrates that reductions in hip range of motion or strength, especially in the lateral musculature, can result in an increase in plantar foot pressure, especially on the plantar aspect of the foot, with push-off or end-range plantarflexion.

Being mindful of the proximal when treating a distal problem means, in this case, that evaluating trunk and hip mechanics is appropriate even when addressing knee, ankle, and foot mechanics. The patient described above displayed limited trunk rotation to one side. She also had significant reductions of her right hip flexion and extension strength. Numerous proximal impairments could have contributed to her distal pain.

Several treatment theories encourage the clinician to work up the kinetic chain to find the true cause of musculoskeletal impairments. Proprioceptive neuromuscular facilitation (PNF) is an approach that suggests we treat an impairment as it relates to function within the entire unit. In an approach like this, applying it to our case with this patient, exercise begins with the pelvis, leading to the hip, the knee, and ultimately the foot for full flexion and extension.

Spinal Engine Theory is another approach that encourages that the spine is the primary driver of lower extremity motion rather than a passive conduit for all connecting limbs. The Postural Restoration Institute bases much of its measurements and treatment interventions around the core of the body and specifically

on the function of the diaphragm and surrounding muscles (see Figs. 2a and 2b).

Famed neurologist Vladimir Janda, MD, described several pain patterns — including the upper cross syndrome, the lower cross syndrome, and the layered syndrome — and the treatment techniques he helped develop to address these are rooted in the philosophy that our patients may be best served by addressing imperfections proximally, in the shoulders and hips, before we explore distal abnormalities in locations such as elbows and knees. Historically, then, attention to proximal strength for the purposes of addressing distal health is not a novel concept.

EVIDENCE REVIEW

Lower extremity injuries are common in runners, especially novice runners. A 2024 study released in the *British Journal of Sports Medicine* made a compelling argument in favor of focusing treatment on more proximal structures.[2] This study placed novice runners into three groups and observed the differences in injuries among them. A total of 245 novice adult runners followed a prescribed plan, led by a physical therapist, for 24 weeks. Participants were randomly placed into groups that focused on either hip and core exercises, ankle and foot exercises, or static stretching exercises, and otherwise logged the same number of miles run per week.

In each of the three groups, participants warmed up for five minutes and then performed eight exercises that took 25 to 30 minutes in total to complete. This exercise intervention was led twice per week by a physical therapist, and patients were encouraged to perform the exercises an additional one to two sessions per week independently at home.

In those participants performing the hip-and-core program, there was a 39% decreased prevalence of all injuries and a 52% decreased prevalence of substantial overuse injuries. The hip-and-core program was not a panacea, as it was not effective in preventing acute running-related injuries such as severe cramps and muscle strains, many of which occurred when running at higher rates of speed or while running on hills.

Another study looked at the potential benefits of a core-and-coordination exercise program in comparison to strength training alone; both were compared to a control group.[3] The core-and-coordination exercise program was founded with PNF principles, which emphasize improving coordination and range of motion rather than strength alone. This treatment approach focuses on more precise resistance at specific locations through greater ranges of motion, and utilizes concentric, eccentric, and even isometric contractions with prolonged holds. The goal was to increase strength by

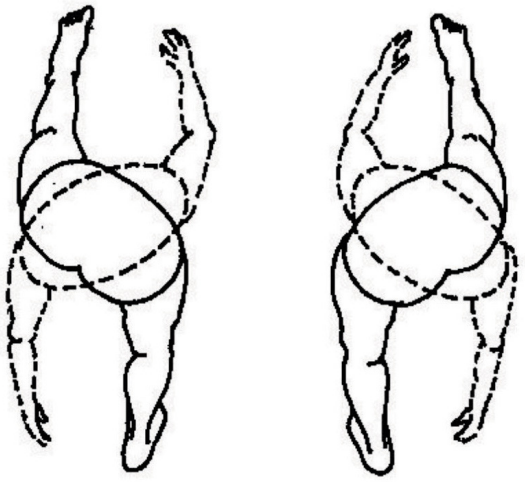
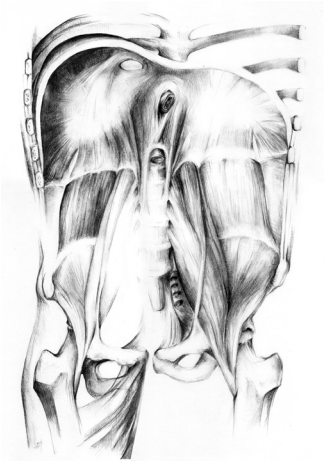


Fig. 1. Alternating reciprocal gait. Used with permission. Copyright © Postural Restoration Institute® 2026, www.posturalrestoration.com.



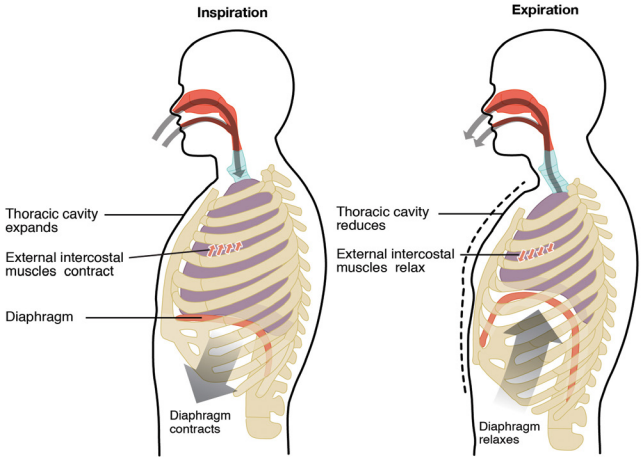


Fig. 2a (left). Functional relationship of diaphragm, psoas, quadratus lumborum, and right stance. Illustration by Elizabeth Noble. Copyright © Postural Restoration Institute® 2026, www.posturalrestoration.com.

Fig. 2b (right). Respiratory mechanics of inspiration and expiration. Illustration by OpenStax College, CC BY 3.0, via Wikimedia Commons.

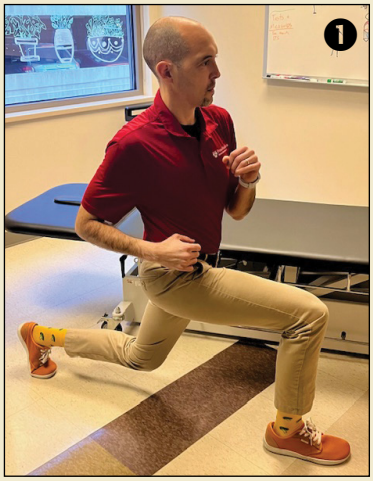
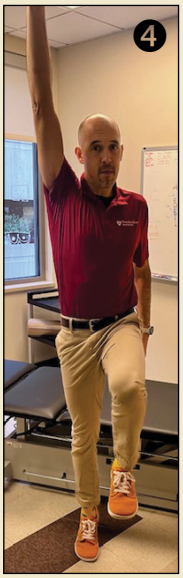


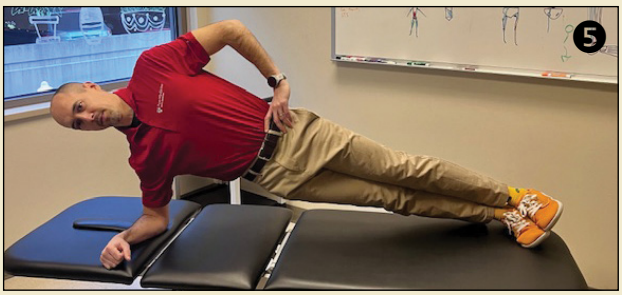
Table 1.

Examples of Components of Patient's Home Exercise Program.

(photos courtesy of the author)



1. Forward Lunge with Rotation
2. Forward T
3. Single Leg Bridge
4. Skip with High Knees
5. Side Plank on Elbow



improving the function of the weakest link in the kinetic chain.

The study included 30 healthy young females who had not been performing any kind of routine exercise. Participants were randomly placed into either a PNF, strength training, or control group. In the two exercise groups, participants completed the assigned workouts three times per week for eight weeks. All 30 individuals were assessed in their individual elbow extension and knee extension strength, their ability to throw a volleyball, and their vertical jump height.

The set and rep schemes of the two groups were the same — three sets of six reps — with a total of 24 workouts over an eight-week period. The strength training group performed bench and leg presses, with a load that could be lifted maximally six times and the level of resistance increased progressively over the course of the eight weeks.

The PNF group performed maximal resistance exercise throughout a full range of motion in an upper extremity or lower extremity pattern. The lower extremity pattern and sequential motions were toe flexion, ankle plantar flexion, foot eversion, knee extension, hip extension, abduction, and internal rotation. For the upper extremity, the pattern was finger and wrist flexion, elbow extension and pronation, shoulder extension, adduction, and internal rotation.

As one might expect, the control group did not improve; in some individuals, measures even declined. In the weight training group, all participants improved in all measurable ways. In the PNF group, all participants improved in all variables to a greater degree than did the weight training group; the greatest gains were in the performance measures of volleyball throw and vertical jump.

These findings suggest a "possible superiority of PNF to weight training as the better modality for athletic conditioning and injury rehabilitation [due in part to] enhanced muscle function."[2]

A study published in the *Journal of Occupational Medicine and Toxicology* raises awareness regarding hip dysfunction associated with Achilles tendinopathy in male runners.[4] The results show that the gluteus maximus and medius have impaired function in terms of delayed onset and shorter contraction durations.

Like the chicken and the egg, one might ask if the reduced strength in the hip led to an Achillies injury or if the Achilles pain led to a gait change and ultimately hip dysfunction. Regardless, it's important to note that there is often pathological neuromotor hip control in male runners with Achilles tendon pain.

Finally, a group of 433 firefighters was evaluated using the Functional Movement Systems, a screening tool to assess controlled movements and identify movement limitations and asymmetries. All participants enrolled in a training program designed by a team of occupational medicine physicians, therapists, and a health-and-safety officer.

Over a two-month period, the participants attended a single, three-hour seminar to learn about functional movement, spine stabilization techniques, and the consequences of poor posture and mobility. After all participants in the study completed the training session, injuries were compared to the prior year. The results showed a 62% decrease in time lost due to injuries and a 42% reduction in musculoskeletal injuries over a 12-month period compared to a historical control group.[5]

A RETURN TO THE CASE

The patient with foot pain eventually returned to pain-free running. It took weeks of work by both the patient and the therapy team. Her treatment consisted of various forms of soft tissue mobilization around her injury site to improve range of motion among her smaller joints. This included utilization of manually resisted lower extremity flexion and extension PNF patterns to generate greater strength and coordination in the injured limb.

Finally, her home exercise prescription consisted of exercises that challenged her proximal muscles beginning with, for example, side planks and marching bridges; later, she progressed to more complex exercises such as single leg deadlifts, as well as squat variations (see Table 1).

As the patient learned about proximal imperfections, she was more inclined to adhere to the prescribed hip and core exercise and coordination interventions, and she eventually experienced pain relief. While the patient had been initially cautious and concerned that the treatment plan might be focused on a site other than the foot, she was pleasantly surprised to find that as her proximal strength improved, her pain decreased.

CONCLUSION

A common theme in all the described research is that humans are amazing. To treat pain and injuries, we must bear in mind that our body parts make up a system. To effectively mitigate pain in one area, it can be useful to first identify what that area does for the system as a whole.

At the same time, directing treatment toward peripheral issues may not lead to the results we seek. Whether pain and dysfunction occur in the foot, hand, knee, or elbow, the cited evidence demonstrates that performance can improve when we pay attention to proximal joints and muscles. Individual parts of our complex bodies can positively adapt to the stressors applied to the system.

Humans are complex and their problems often require complex interventions. By evaluating patients with a systems approach and thoughtful frameworks, practitioners can address a wide variety of complex patient problems, isolating their origin and efficiently optimizing patient outcomes.

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