

Physician

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My doctor told me to stop running!" Bob exclaimed at our first meeting in the clinic. Bob is 32 years old, a relatively new runner who is training for his first Twin Cities Marathon. He had developed nagging right lateral hip and knee pain just eight weeks before the race. He was referred to me for evaluation and treatment—but I knew he really wanted to know how to salvage this race.

Bob is among the growing number of Americans taking up recreational running. American Sports Data, Inc. reports there are 37 million runners in the United States. Participation in regular endurance exercise like running aids in stress reduction and weight control and enhances cardiovascular fitness. But along with those benefits comes the risk of injury; 75 percent of all runners will sustain an injury serious enough to seek medical attention. My objective is to discuss the best method of returning runners to the road with less risk of re-injury.

Trauma versus overuse injuries

Running is a high-impact activity, but the etiology of most running injuries is not

Running injuries

Designing an appropriate rehab program

By Marie-Christine Leisz, DO

macrotraumatic, as in injuries sustained from a hard tackle in football or a hard check in hockey. The cause of running injury is microtrauma, or overuse. Each time a runner's heel strikes the ground, forces three to four times the body weight are transmitted through the lower extremities. If given enough time between runs, or if the intensity, duration, or frequency of training is advanced slowly enough, the lower extremity bones and soft tissues recover and strengthen. However, if training advances too fast, too hard, for too long, or with too little recovery time between sessions, overuse injury occurs. Another predictor of running injury is history of past injury, especially one that was not rehabilitated correctly, leaving the runner with biomechanical asymmetries in strength or range of motion.

Overuse injuries are more common in new runners. Injuries occur with changes in terrain. The most common running injuries

are tendonitis, muscle strains, and stress fractures; the knee is the joint most commonly affected.

Identifying the "victim" and the "culprit"

The first step in prescribing the appropriate rehab program is to obtain a detailed sport-specific history. To improve clinical efficiency, I mail athletes a sports injury history form in advance. At the clinic visit, I review the form, questioning the athlete in depth about old injuries and any changes made leading up to the injury. It's also important to ask how often the runner changes shoes, or if the runner changed the type of shoe prior to the injury. Did the athlete transition from treadmill to outdoor running, from trails to pavement, or from flat surfaces to hills? In Bob's case, he admits to increasing his speed and mileage more than his training program recommended.

For many years, the sports physical examination and rehab effort focused on

the symptomatic joint. If the runner complained of knee pain and there was no apparent internal derangement or arthritis visualized on imaging, the assumption was that the patient had poor tracking of the patella in the femoral groove due to weakness of the quadriceps, particularly the vastus medialis. The patient was referred to physical therapy for quadriceps-strengthening exercises. However, this regimen often failed to resolve the symptoms and/or achieve the desired outcome, leading researchers to question whether pain in the knee could be exacerbated by abnormal motion in the joints above and below it. As a result, a revolutionary paradigm shift in our thinking about running injuries has occurred. Ben Kibler, MD, a University of Kentucky sports orthopedist, describes this shift as identifying the "victim"—i.e., the painful tissue or structure—but also looking further to identify the "culprit"—the structure or biomechanical condition causing the pain. In other words, we now ask: Could the painful knee be the victim, and something happening at the hip or ankle the culprit?

As ability to image joints in motion during

weight-bearing conditions became available, Christopher Powers, PhD, PT, of the University of Southern California's Division of Biokinesiology and Physical Therapy, has produced landmark research validating this theory.

He studied the patellofemoral joint, the articulation between the patella and femur, in motion using kinematic MRI. Powers noted that the femur rotated underneath the patella, not the other way around, and theorized that we may have been treating the wrong side of the joint all along. He looked at hip kinematics of athletes with patellofemoral syndrome, finding hip and pelvic or "core" muscle weakness and poor ability to contract the muscles quickly. When the strength and speed of contraction were improved, knee pain resolved.

In Bob's case, I performed a careful examination of his knee but also looked for asymmetries in range of motion of the joints and strength in the major muscle groups of hip and pelvis. Bob's physical exam revealed a normal knee joint but tightness of the iliotibial band and tenderness at the subtrochanteric bursa and at the insertion of the iliotibial band at the lateral knee.

An essential part of the physical exam is to watch the injured runner run. I videotape the athlete running on a treadmill. Bob's running video viewed in slow motion, along with other testing, demonstrated dynamic weakness in the external rotators and abductors of the hip, some of the major core-stabilizing muscles. His right knee internally rotated during stance phase of gait and with single-leg-stand activities. If the core muscles, including the hip external rotators, are

Pearls

- Obtain a detailed history, including:
 - changes made in training or equipment
 - past injury history
- Watch the runner run
- Look for the "victim" and the "culprits"
- Find a way to allow the athlete to remain active

weak, the hip and knee will have increased internal rotation. The tensor fascia lata muscle, an internal rotator of the hip, becomes dominant. Its long tendon, the iliotibial band, becomes short and tight, causing friction at the lateral hip and knee joint. I suspected Bob's painful lateral knee and hip were "victims" and the tight iliotibial band and weak hip and pelvic muscles were "culprits."

Rehab, or "Let's Make A Deal"

Rehabilitating running injuries involves three phases: acute phase, recovery phase, and functional phase. I utilize physical therapists who understand sports and the psychology of the athlete.

Acute phase. The acute phase incorporates principles of the acronym PPRICE (Protection, Pain management, Relative rest, Ice, Compression, and Elevation), pertinent to the nature of the injury. Most of the elements of PPRICE are commonly known, but "relative rest" may be an unfamiliar concept. Relative rest means protecting injured tissues while avoiding deconditioning, and it can be key to compliance with rehabilitation. As Bob stated, the last thing a runner wants to hear is, "Stop running!"

It is important, both physiologically and psychologically, to allow the athlete to remain active. It is essential to explain why the injury occurred, acknowl-

edge the athlete's frustration, and negotiate a way to modify activity. I try hard to convince the runner that there will always be another race and I emphasize that the plan is to resolve the injury to allow future participation. If I believe the athlete can utilize a modified training schedule without increasing risk of injury, I allow him or her to do so. If the injury is more serious and running during this phase is not appropriate, I recommend low-impact exercise such as deep-water running or use of an elliptical trainer or stationary cycle. In addition, the PT may employ modalities such as heat, cold, and gentle therapeutic exercise to reduce inflammation and enhance healing. Bob's PT treated inflamed tissues with ultrasound, a deep-heating modality, and began a stretching program. When Bob could run up to five pain-free miles every other day, I altered his training schedule accordingly.

Recovery phase. The recovery phase begins when the tissues are nearly healed. At this stage, PT focuses on restoration of symmetric, pain-free range of motion, and improvement in muscle strength and proprioception. This can be the longest and most frustrating phase of the program. Bob learned therapeutic stretching and strengthening exercises that he did independently. I communicated with his PT and saw him in clinic frequently to advance physical therapy and his training program.

Bob's acute knee and hip pain improved as the weakness of the pelvic stabilizers and the tightness of the right IT band resolved.

Functional phase. The functional phase began when Bob's symptoms resolved and he was able to run pain-free. We reviewed his training program and addressed the errors that had contributed to the development of the injury. I reiterated the need to be patient, as his body could adapt physiologically to the stress of training only so fast. Therapeutic rest and recovery was built into his training plan by including walk breaks within runs, hard-easy days, and days off. He was reminded to stick to his schedule and resist the temptation to increase mileage or speed until he was ready.

Within weeks of his first visit, Bob was far enough along in the training program that I felt he could safely compete. I encouraged him to listen to his body during the marathon, modifying his race plan if his knee and hip began to bother him. I also noted that therapeutic exercise is like medicine, and that continuing his exercise program after the race and using sound training principles in the future would be integral to preventing new or recurrent injuries.

Bob's patience and perseverance were rewarded: He completed the Twin Cities Marathon—a little slower than he had planned, but injury-free! ❏

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