

Approach to injuries in active people

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ABSTRACT

OBJECTIVE To review the basic principles underlying treatment of injuries in active people.

SOURCES OF INFORMATION Basic science texts and reports of observational and randomized trials on treatment of musculoskeletal injuries were retrieved during previous exhaustive systematic reviews published by the author on a variety of musculoskeletal injury topics.

MAIN MESSAGE After an injury, further damage or re-injury can be prevented either by decreasing the stress on the tissue or increasing the stress the tissue can withstand. Regardless of the type of injury, clinicians should aim to restore function; aim to increase activity without increasing pain; recommend that patients start slowly and increase activity gradually; revisit diagnosis and treatment if patients are not responding; and treat the patient, not the condition.

CONCLUSION Most musculoskeletal injuries in the general population can be managed effectively by family physicians. Management should follow the basic principles of exercise training.

RÉSUMÉ

OBJECTIF Faire le point sur les principes fondamentaux qui sous-tendent le traitement des blessures chez les gens actifs.

SOURCE DE L'INFORMATION Différents textes de sciences de base et rapports d'études d'observation et d'essais randomisés colligés par l'auteur lors d'une précédente revue systématique exhaustive portant sur divers sujets concernant les lésions musculo-squelettiques et ayant fait l'objet d'une publication.

PRINCIPAL MESSAGE Pour empêcher qu'une blessure s'aggrave ou récidive, on peut soit diminuer les contraintes sur le tissu ou augmenter la résistance du tissu au stress. Quelque soit le type de blessure, le médecin devrait chercher à rétablir la fonction; promouvoir une augmentation d'activité sans augmentation de la douleur; recommander au patient de débiter lentement et d'augmenter graduellement l'activité; remettre en question le diagnostic et le traitement s'il n'y a pas d'amélioration; et traiter le patient, et non le problème.

CONCLUSION La plupart des blessures musculo-squelettiques dans la population générale peuvent être traitées adéquatement par le médecin de famille.

This article has been peer reviewed.
Cet article a fait l'objet d'une révision par des pairs.
Can Fam Physician 2006;52:727-731.

More than 70% of people have had musculoskeletal injuries, and 37% of those injured have residual disability.¹ Musculoskeletal injuries are the reason for up to 15% of all visits to family physicians' offices.² Because physical activity is associated with better physical and mental health³⁻⁵ and because injuries limit people's ability to be physically active, it is important to prescribe treatment that will return patients to their activities as quickly as possible. This article reviews 6 theoretical cases that illustrate 6 basic principles for treating musculoskeletal injuries.

Sources of information

The information in this article is based on synthesis of both basic and clinical scientific data. Much of the information was obtained during previous exhaustive literature searches on the topics of stretching and injury,⁶ treatment of ankle sprains,⁷ Achilles tendonitis,⁸ and the effects of injury on risk of osteoarthritis.⁹ Other sources of information include literature reviews done for original research¹⁰⁻¹² and literature searches done for teaching and presentations.

Studies cannot be carried out on every combination of injury, age, sex, activity, competition level, and so on. Astute clinicians will understand the basic principles underlying treatment approaches and use these principles to treat various conditions.

Levels of evidence

Level I: At least one properly conducted randomized controlled trial, systematic review, or meta-analysis

Level II: Other comparison trials, non-randomized, cohort, case-control, or epidemiologic studies, and preferably more than one study

Level III: Expert opinion or consensus statements

Main message

All injuries and re-injuries occur when the stress on a tissue exceeds the stress it can absorb. Preventing further damage or re-injury depends on either decreasing the stress on the tissue or increasing the stress the tissue can withstand. The former is possible through assistive devices, such as canes, and also through stretching, strengthening, and proprioceptive (balance and position sense) exercises. For example, strengthening weak hip

extensors reduces the load on injured lumbar muscles. To increase the stress tissues can stand, patients need to strengthen the injured tissue.

The 6 principles of treatment are as follows.

- Aim to restore the lost range of motion (ROM), strength, and proprioception that accompanies the injury.
- Use results of physical examination to choose appropriate rehabilitation exercises.
- Recommend undertaking activity that does not increase pain.
- Suggest starting activities slowly and increasing them gradually.
- If treatment is not working, change the treatment.
- Treat the patient, not the condition.

This article discusses basic principles only. A discussion of surgical conditions and specific exercises for particular injuries are beyond the scope of this paper. Few physicians likely have the experience or training to prescribe exercise programs: this article is not intended to teach all the important aspects of exercise prescription. That being said, the general principles behind prescribing exercises are not difficult to learn.

One objective of this article is to demystify the process and encourage physicians to develop skills in assessing injuries and prescribing exercises. In the absence of such skills, physicians are encouraged to refer patients to colleagues who are knowledgeable in this area. Because the treatment of elite athletes requires specialized exercise programs and often requires sophisticated physical therapy techniques, family physicians should consider referring such patients to appropriate sports medicine physicians immediately. Developing a network of colleagues to manage musculoskeletal injuries is as important as developing a network of colleagues to manage psychological conditions, geriatric conditions, and other specialized conditions.

Case 1

Shelley, a 16-year-old hiker, sprained her ankle 1 month ago while shopping. Bruising on the ankle and toes appeared several days later. After 3 weeks, she can walk in the city without pain, but is still unable to hike. On examination, there is slight swelling and tenderness over the lateral ankle and a small decrease in plantarflexion. The anterior talofibular and calcaneofibular ligaments are somewhat unstable. Resisted muscle testing shows there is weakness in dorsiflexion, eversion with the foot in dorsiflexion, and eversion with the foot in plantarflexion. What treatment will you prescribe to help her return to her activities?

Restore normal function

Most injuries cause loss of ROM, strength, and proprioception. An inversion ankle sprain occurs because

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the everters of the foot are unable to absorb a given force, and therefore, both the ankle everters and the lateral ligaments are immediately injured. Protective muscle spasms and joint effusions restrict ankle movement. The original damage is aggravated by disuse-induced restricted ROM and muscle atrophy. Finally, the nerves from neuromuscular spindles and ligaments that provide proprioceptive information¹³ are usually also damaged at the time of injury.^{14,15} Various exercises are used to restore ROM, strength, and proprioception. Randomized controlled trials have shown that strength and proprioceptive exercises enhance recovery and prevent re-injury.⁷

Shelley in case 1 requires increased dorsiflexion hiking uphill and increased plantarflexion hiking downhill. The uneven ground she hikes on requires good proprioception. In a normal gait, the ankle is placed in slight supination (ie, the ankle is in a position of inversion and the foot is in plantarflexion).¹⁶ If the angle of supination at the heel strike increases slightly, body weight shifts lateral to the axis of the talocrural joint, and the everter muscles might not be able to prevent an ankle sprain. Shelley will remain at a higher risk of re-injury until these dysfunctions are resolved through appropriate strengthening and proprioceptive exercises.⁷

Case 2

Lawrence, a 45-year-old physician, ran into a car door 5 days ago while cycling and landed on his right shoulder. Results of x-ray examination were normal. The pain has lessened, but is still bothersome whenever he cycles or serves at tennis. Investigation of his ROM reveals some limitation in internal rotation and pain with extreme external rotation or flexion. Lawrence feels pain during resisted muscle testing of abduction and external rotation.

Physical examination guides choice of exercises

Choice of exercises is based on functional limitations rather than a specific diagnosis. In Lawrence's case, the fall likely caused both traumatic bursitis and tendonitis. The pain associated with movement, however, will cause reflex inhibition of other muscles, altering biomechanical function. Muscles contract in a coordinated fashion to produce movement, and this coordination must be restored. Lawrence should exercise to strengthen the tissues that are painful with movement (abduction and external rotation) and to increase the ROM of restricted areas (internal rotation and flexion). Proprioceptive exercises might help also.¹⁷

Case 3

Gail, a 50-year-old businesswoman, swims for 30 minutes every morning. She developed medial knee pain 3 weeks after she began training for a Masters

competition. She is willing to do whatever it takes to get better, but does not want to stop training. She would like to know what is safe and what should be avoided.

Activity without pain

When damaged tissues are stressed, pain increases. Occasionally, patients feel pain only after an activity due to a delayed inflammatory reaction. If pain does not increase during or after exercises, the exercises are at least not causing further damage. Absence of activity weakens not only muscles and tendons, but also ligaments.^{18,19}

Results of randomized controlled trials suggest that both painful²⁰ and painless²¹ eccentric exercises (resistance applied to muscles as they are lengthening, such as biceps that eccentrically contract to lower a weight) are effective for tendinopathy. More studies are needed to determine which approach is more effective.

Gail's medial knee pain is likely due to either patellofemoral syndrome or pes anserine tendonitis (tendonitis related to insertion of the sartorius, gracilis, or semitendinosus muscles on the proximal medial tibia). During swimming, knees are more stressed during the breast-stroke whip-kick or while treading water. Gail will likely be able to swim without pain if she uses the flutter kick for all strokes or if she places a float board between her legs and swims with her arms only. As she improves, she can alternate whip-kick with flutter kick for successive laps and gradually increase her use of the whip-kick.

Lawrence in Case 2 can also modify his activity. With careful questioning, a physician would learn that Lawrence's shoulder pain during cycling is due to vibrations transmitted to his shoulder while riding over the surface of the road and the potholes. This vibration will not be present on a stationary bicycle or while riding on designated bicycle paths and is minimized when less weight is transferred to the arms (eg, using upright posture on a hybrid bicycle).

Case 4

David, a 30-year-old ultimate Frisbee player, strained his hip adductor 3 months ago. It improved with 6 weeks' rest. He returned to play, but felt the muscle pull again during the third game of a tournament the following weekend. He wants to know when it will be safe for him to return to play.

Start slowly, increase gradually

If a person's strength is less than 80% of normal, risk of injury is generally thought to be increased.²² Evidence is limited, and there are no corresponding data for proprioception, ROM, or endurance. In addition, there are no readily available clinical tools for measuring these functions accurately. Clinicians should use the basic

principle of any exercise training: start slowly and increase gradually.

The FITT acronym aids in remembering how tissue stress can be minimized: frequency (times per week), intensity (resistance, speed, hills), timing (exercise duration), and type (of activity). There is no magic formula, but many sports medicine physicians suggest that increases in activity of more than 10% to 20% per week increase risk of injury or re-injury. Changing from 2 sessions to 3 sessions weekly is a 50% increase, so either the intensity or the duration should be reduced.

In an optimal world, David would complete each of the following stages without pain before progressing: walk long distances, jog, sprint, sprint and cut, practice drills, play one game every 2 days, and so on. David might decide, however, to play with an increased risk of injury if it is play-off time and the injury will not cause permanent damage.

Case 5

Marie Yvonne, a 70-year-old woman, walks for 45 minutes every morning. She was diagnosed with plantar fasciitis (heel spur) 9 months ago. The pain got worse, and she has not walked for 8 weeks. Stretching, physiotherapy, and night splints were all ineffective.

If it is not working, change the treatment

Sometimes a prescription fails, and physicians have to revisit a diagnosis or treatment plan. Although plantar heel pain near the calcaneal tubercle is almost always plantar fasciitis, the differential diagnosis does include tarsal tunnel syndrome, stress fracture, osteoid osteoma, and other conditions.

Assuming the diagnosis for Marie Yvonne remained plantar fasciitis, other treatments should be tried. Musculoskeletal injuries are multifactorial²³; the same injury in two different people often requires two different approaches. Other possible treatments include decreasing stress on the plantar fascia by using orthotics, exercises to strengthen the intrinsic muscles of the foot that also help support the arch, cortisone treatments, and surgery. In addition, Marie Yvonne has been in pain for 9 months so chronic pain pathways might have developed and need to be managed. Unstudied paramedical treatments can also be useful alternatives. Acupuncture was considered ineffective 30 years ago before it had been studied, but subsequent research suggests it is beneficial for at least some causes of pain.^{24,25} Clinicians and scientists have to remember that absence of evidence for an effect is not evidence of absence of an effect.

Case 6

Alex is a 13-year-old boy with Osgood-Schlatter disease. He plays competitive soccer, pick-up basketball,

EDITOR'S KEY POINTS

- Despite the proliferation of sports medicine clinics, family doctors should not succumb to "learned helplessness" when faced with activity-related injuries. Using basic principles, most family physicians can manage most sports injuries successfully.
- The 6 basic principles of injury management are to restore normal function; to use results of physical examination to choose appropriate exercises; to promote activity without pain; to start slowly and increase gradually; to change treatment if current treatment is not working; and to treat the patient, not the condition.
- Elite athletes or those with chronic or complicated injuries are appropriate candidates for referral to specialized clinics.

POINTS DE REPÈRE DU RÉDACTEUR

- Malgré la prolifération des cliniques de médecine du sport, le médecin de famille ne devrait pas s'avouer impuissant devant des blessures découlant de l'activité physique. En suivant certains principes de base, les médecins de famille peuvent traiter adéquatement la plupart de ces blessures.
- Les 6 principes fondamentaux du traitement des blessures sont: normaliser la fonction; utiliser les résultats de l'examen physique pour déterminer les exercices appropriés; encourager l'activité physique qui n'augmente pas la douleur; commencer lentement et augmenter graduellement; modifier le traitement si la méthode choisie s'avère inefficace; et traiter le patient, et non le problème.
- Les athlètes de haut niveau, ou ceux qui présentent des blessures chroniques ou compliquées, doivent être dirigés à des cliniques spécialisées.

and hockey. He limps after he plays soccer or basketball. After he plays hockey he feels pain but does not limp.

Treat the patient, not the condition

Alex's knee will likely be painful for a couple of years. Complete rest will reduce stress on the tibial apophysis, but the inherent weakness will continue, and the pain will return on resumption of activities. In Alex's case, enforced rest is likely to lead to other problems because he is a normally active child, and these problems are likely to be worse than the injury. Alex should be allowed to continue his activities. I personally prefer to leave the decision to the child, where possible, and suggest that if he or she does not limp after an activity, he or she has modified the activity responsibly. I also tell the child that if he or she does limp after an activity, parental supervision will be necessary.

Clinicians should understand that treatment also depends on patients' objectives. Marie Yvonne in case 5, once she is able to complete all daily activities without pain, would likely refuse to comply with the more extensive treatment plan required by David in case 4. Conversely, David would remain at high risk of injury if he stopped exercising once he achieved the minimum level of function required by Marie Yvonne (ie, walking).

Conclusion

Using these basic principles, family physicians can treat most musculoskeletal injuries of most patients seen in the office. More detailed knowledge of the activities required for a given sport allows for more specific recommendations. Patients with complicated problems that require additional treatment or problems that do not resolve using the basic principles of rehabilitation should be referred to appropriate specialists. All clinicians should aim to restore function; allow activity without increased pain; recommend starting slowly and increasing gradually; revisit diagnosis and treatment if patients are not responding; and treat the patient, not the condition.



Acknowledgment

Dr Shrier is currently funded by the Chercheur-Boursier Clinicien Senior program of the Fonds de la Recherche en Santé du Québec.

Competing interests

None declared

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