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Letter

Sprains

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DEAR EDITOR,

Injuries that damage joint ligament or capsule by a force that creates permanent elongation are commonly called sprains. The degree of elongation ranges from very small or less than 1% of the original length to complete disruption. The immediate effect on joints varies from a painful injury with no sequellae up to joint instability and long term consequences of mechanical symptoms leading to premature arthritis. A complete joint dislocation implies extreme elongation and most likely disruption of capsule and ligaments.

Human diarthrodial joints are very dissimilar in mechanics- they vary in range of motion, intrinsic architectural stability, joint reaction forces and dynamic (muscle) stabilizers. The least inherently stable major joint is the knee; the hip is the most stable. The shoulder is prone to instability while the ankle and elbow are relatively stable. The spine has facet joints which are very stable and the capsular structures have not been well studied for sprains, with greater attention paid to arthritic change of the joints in the spine.

Sprains are responsible for many thousands of emergency department and physician office visits per day in the US. Estimates of nearly 30,000 ankle sprains per day in the US, many not treated by healthcare professionals. Having an ankle sprain is a risk factor for having a future ankle sprain. The ligaments that are damaged 'heal' in the sense that the body's repair mechanism called inflammation will revert to the pre-injury state and all the chemotactic factors, cytokines and inflammatory cells will subside in a matter of weeks to months. Ligaments also have small nerves that are sensory in nature, which cause pain signals to be generated through the peripheral nervous system. There are special sensory nerves that provide position and force sense. These nerves may be damaged by the same mechanism that causes the elongation of the ligaments. Nerves do not heal in the same sense as dense connective tissue thus and elongation of a nerve may remain the source of pain and loss of position sense. A complete rupture of a ligament or capsule wills similar mean disruption of the nerves with the possibility of longstanding pain with or without permanent loss of position and force sense.

Ankles are relatively easy to understand from an architectural and mechanical standpoint. There is socket created by the distal tibia and fibula, and a rounded bone that sits deep inside this socket- the body of the talus. The distal tibia and fibula are bound by a series of ligaments that bind the tibia and fibular together, and prevent the two bones from separating under weight-bearing conditions such as walking. There are another set of ligaments that bind the talus to the ankle socket- the lateral ligaments are anterior and posterior talo-fibular and the medial ligaments are the superficial and deep deltoid. There is also a set of ligaments called syndesmotic ligaments that bind the tibia to the fibulas and a surrogate lateral ligament that attaches lateral calcaneus to fibula but is a primary stabilizer of the lateral talus. With elongation of the ligaments of the syndesmotic ligaments in conjunction with elongation of the deltoid ligaments, the force of the whole body produces instability of the talus within the ankle socket while walking, running and jumping. Elongation of the medial or the lateral ligaments allows an unnatural motion of the talus within the ankle socket, often this is painful.

Estimates vary from 10-15% of ankle sprains, do not heal without some element of pain and or functional instability. Functional instability is different than mechanical instability. Functional instability is the perception by the patient that the joint is not stable and will give-way, unlike mechanical instability where the ankle actually is unstable when force is applied. Most frequently mechanically unstable ankles will uncontrollably invert while walking or running. The lateral ligament group is much more commonly injured than the syndesmosis ligaments or the medial ligaments. Those persons with mechanical instability may have recurring sprains, which are sometime associated with ankle fracture or ankle arthritis.

Each joint has a different set of mechanical requirements that allow and preserve motion. The knee has the very strong internal ligaments- anterior and posterior cruciate- in addition to medial and lateral ligaments and a sturdy capsule. The joint between patella and distal femur has many challenging architectural features that predispose to damage to the ligaments that keep the patella tracking normally while the knee flexes and extends. This dual challenge of patella -femoral and femoral-tibial joints having great reliance on the supporting ligaments for normal function and stability. The knee comes under excessive mechanical stress during many athletic and work activities, and is prone to large shearing forces during motor vehicle collisions. Complete disruption of the cruciate ligaments has a guarded outcome and is the source of active investigation to optimize surgical and perhaps biological reconstruction. Damage to the medial and lateral knee ligaments has a better prognosis but 100% return of pain-free motion is not guaranteed. Instability of the knee in many animal models leads to degenerative joint disease and that outcome is assumed to be likely in humans as well.

The shoulder has a group of capsular ligaments that serve as static stabilizers, aided by balanced muscle forces. The shoulder is inherently unstable due to the shallow socket formed by the glenoid and peripheral labrum. Damage to shoulder ligaments often is cause for dislocation of the gleno-humeral joint and the younger patients are likely to develop recurrent dislocations, often necessitating surgical procedures to reduce joint motion to gain stability. Painful instability is sometimes manifesting as subluxation rather than dislocation of the gleno-humeral joint, which may lead to chronic pain with or without degenerative joint disease.

The sacroiliac joints are extremely sturdy yet injury can happen in high energy traumas such as motorcycle and motor vehicle crashes. Instability of the sacroiliac joints is recognized when there is diastasis, or widening of the joint, but there is little means to determine if the ligaments are damaged in situations where there is no observable displacement of the joint. This is an area of active investigation and possibly more will be forthcoming in diagnosis, though it is unlikely that surgical repair of the group of ligaments will be offered.

The prevalence of sprains around large and small joints is a public health issue and to date has received little recognition as such by the organizations that fund musculoskeletal research. There is a clear need for better biological and possibly surgical solutions to ligament and capsule injury that is painful as well as precursory to degenerative joint disease. The current situation in the United States concerning recognition and treatment of sprains is becoming diffused among non-orthopaedists. Emergency physicians, Family Medicine physicians, Nurse practitioners, Physician assistants, Chiropractors, Podiatrists and others are managing an untold number of sprains. The lack of uniformity in treatment is likely cause for some unfavorable outcomes and lack of meaningful tracking of injury and outcomes is adding to the less than favorable outcomes in a significant number of sprains. The argument that a large number of preventable outcomes that disable and impair people are the result of poorly treated sprains should be motivation to improve clinical research. In the current political and healthcare research environment there is not likely to be improvement of recognition and treatment of sprains in the near future. Fortunately, nature is kind and most who suffer a sprain will recover without loss of function or chronic pain.

Regards,

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