

## REVIEW ARTICLE

## OPEN ACCESS

## Updated Review on Tendinopathy

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### Abstract

Overuse disorders of tendons, or tendinopathies, present a challenge to sports physicians, surgeons, and other health care professionals dealing with athletes. The Achilles, patellar, and supraspinatus tendons are particularly vulnerable to injury and often difficult to manage successfully. Inflammation was believed central to the pathologic process, but histopathologic evidence has confirmed the failed healing response nature of these conditions. Excessive or inappropriate loading of the musculotendinous unit is believed to be central to the disease process, although the exact mechanism by which this occurs remains uncertain. Additionally, the location of the lesion (for example, the midtendon or osteotendinous junction) has become increasingly recognized as influencing both the pathologic process and subsequent management. The mechanical, vascular, neural, and other theories that seek to explain the pathologic process are explored in this article. Recent developments in the non-operative management of chronic tendon disorders are reviewed, as is the rationale for surgical intervention. Recent surgical advances, including minimally invasive tendon surgery, are reviewed. Potential future management strategies, such as stem cell therapy, growth factor treatment, and gene transfer, are also discussed.

**Keywords:** Tendon, ligaments, collagen, tendinopathy, management.

## INTRODUCTION

Tendinopathy, also known as tendinitis or tendonitis, is a type of tendon disorder that results in pain, swelling, and impaired function. The pain is typically worse with movement. It most commonly occurs around the shoulder (rotator cuff tendinitis, biceps tendinitis), elbow (tennis elbow, golfer's elbow), wrist, hip, knee (jumper's knee), or ankle (Achilles tendinitis). Causes may include an injury or repetitive activities. Groups at risk include people who do manual labour, musicians, and athletes. Less common causes include infection, arthritis, gout, thyroid disease, and diabetes. Diagnosis is typically based on symptoms, examination, and occasionally imaging. A few weeks following an injury little inflammation remains, with the underlying problem related to weak or disrupted tendon fibrils. Treatment may include rest, NSAIDs, splinting, and physiotherapy. Less commonly steroid injections or surgery may be done. About 80% of people get better within 6 months. Tendinopathy is relatively common. Older people are more commonly affected. It results in a large amount of missed work.[1] Tendons are the tough, fibrous cords that attach muscles to bones. Healthy tendons are made of

straight, parallel fibres of collagen. Common symptoms of Tendinopathy include stiffness in the joint, persistent pain, and localised burning pain and swelling. [40 41] Tendinopathy occurs when tendons degenerate, meaning that they begin to break down. Tendons may have small tears or disorganized collagen fibres instead of straight collagen fibres. This condition is most common in the elbow, shoulder, knee, hip, and Achilles heel tendons. Tendinosis may be linked to other underlying conditions, such as tennis elbow and swimmer's shoulder.[41]

### Epidemiology of tendinopathy

Tendon injury and resulting tendinopathy are responsible for up to 30% of consultations to sports doctors and other musculoskeletal health providers. [32] Tendinopathy is most often seen in tendons of athletes either before or after an injury but is becoming more common in non-athletes and sedentary populations. For example, most patients with Achilles tendinopathy in a general population-based study did not associate their condition with a sporting activity. In another study the population incidence of Achilles

tendinopathy increased six-fold from 1979-1986 to 1987-1994. The incidence of rotator cuff tendinopathy ranges from 0.3% to 5.5% and annual prevalence from 0.5% to 7.4%. [39]

### Sign and Symptoms of tendinopathy

Tendinopathy refers to hardening, thickening, and scarring of the tendons. This causes pain and a loss of flexibility in the joint. [12-13]

#### Common symptoms of tendinopathy are:

- localized burning pain and swelling around the tendon
- pain that gets worse during and after activity
- stiffness in the joint
- restricted joint movement
- pain that persists for several months

### Causes of tendinopathy

Repeated stress on the tendons may cause tendinosis.

Tendinosis is usually caused by an overuse of the tendon. It can also be caused by physical trauma, such as a fall or sports injury.

Hobbies or professions that require putting repeated stress on the tendons can cause tendinosis. Athletes and manual laborers, for example, are more prone to this disorder.

Tendon problems are more common in older adults because the joints become less flexible as a person ages. People with joint conditions such as arthritis may also be more prone to tendinitis. [3-4]

### Pathophysiology of tendinopathy

As of 2016 the pathophysiology is poorly understood; while inflammation appears to play a role, the relationships among changes to the structure of tissue, the function of tendons, and pain are not understood and there are several competing models, none of which had been fully validated or falsified. Molecular mechanisms involved in inflammation includes release of inflammatory cytokines like IL-1 $\beta$  which reduces the expression of type I collagen mRNA in human tenocytes and causes extracellular matrix degradation in tendon. [43-44]

There are multifactorial theories that could include: tensile overload, tenocyte related collagen synthesis disruption, load-induced ischemia, neural sprouting, thermal damage, and adaptive compressive responses. The intratendinous sliding motion of fascicles and shear force at interfaces of fascicles could be an important mechanical factor for the development of tendinopathy and predispose tendons to rupture. Obesity, or more specifically, adiposity or fatness, has also been linked to an increasing incidence of tendinopathy. [34]

The most accepted cause for this condition however is seen to be an overuse syndrome in combination with intrinsic and extrinsic factors leading to what may be seen as a progressive interference or the failing of the innate healing response. Tendinopathy involves cellular apoptosis, matrix disorganization and neovascularization. Classic characteristics of "tendinosis" include degenerative changes in the collagenous matrix, hypercellularity, hypervascularity, and a

lack of inflammatory cells which has challenged the original nomenclature "tendinitis". [33]

Histological findings include granulation tissue, micro-rupture, degenerative changes, and there is no traditional inflammation. As a consequence, "lateral elbow tendinopathy or tendinosis" is used instead of "lateral epicondylitis". [1] Examination of tennis elbow tissue reveals non-inflammatory tissue, so the term "angiofibroblastic tendinitis" is used. Cultures from tendinopathic tendons contain an increased production of type III collagen. [45] Longitudinal sonogram of the lateral elbow displays thickening and heterogeneity of the common extensor tendon that is consistent with tendinosis, as the ultrasound reveals calcifications, intrasubstance tears, and marked irregularity of the lateral epicondyle. Although the term "epicondylitis" is frequently used to describe this disorder, most histopathologic findings of studies have displayed no evidence of an acute, or a chronic inflammatory process. Histologic studies have demonstrated that this condition is the result of tendon degeneration, which causes normal tissue to be replaced by a disorganized arrangement of collagen. Therefore, the disorder is more appropriately referred to as "tendinosis" or "tendinopathy" rather than "tendinitis." [42]

Colour Doppler ultrasound reveals structural tendon changes, with vascularity and hypo-echoic areas that correspond to the areas of pain in the extensor origin. Load-induced non-rupture tendinopathy in humans is associated with an increase in the ratio of collagen III:I proteins, a shift from large to small diameter collagen fibrils, buckling of the collagen fascicles in the tendon extracellular matrix, and buckling of the tenocyte cells and their nuclei. [48]

### Treatment of tendinopathy

Tendons usually take a long time to heal, so the treatments for tendinosis aim to speed up the body's natural healing processes. [2,3,4,5] Doctors often recommend the following at-home treatments:

- **Resting** the tendon and avoiding repetitive movements. This may include taking a break every 15 minutes when doing repetitive activities, such as typing.
- **Stretching** the tendon to increase its range of movement and flexibility and to promote circulation.
- **Massaging** the affected area to promote circulation.
- **Strengthening the muscles around the tendon** with exercises to reduce daily strain on the injured tendon.
- **Using braces or tape** to protect the tendon from further injury.

Initial research has also suggested that vitamin C and curcumin supplements may help to promote collagen production and speed up healing.

A doctor may also recommend the following treatments:

- **Extracorporeal shockwave therapy (EWST)**, which involves applying pressure waves to the surface of the skin. This may promote the regeneration of tissue and speed up the healing process. EWST has been shown to be effective for some lower limb conditions.

- **Surgery** can remove damaged tissue to relieve pain and allow the tendon to heal.
- **Corticosteroid injections** around the tendon can reduce short-term pain and swelling. However, they may also make relapse more likely and can sometimes impair collagen production.
- **Platelet-rich plasma (PRP) injections**, involve injecting plasma from the person's blood into areas around the tendon. The platelets promote cell repair and healing.

### CONCLUSION:

Tendinopathy is a clinical syndrome characterized by the combination of pain, swelling, and impaired performance. The etiology of tendinopathy is multifactorial including intrinsic and extrinsic factors. The histological studies demonstrate an increased number of tenocytes and concentration of glycosaminoglycans in the ground substance, disorganization and fragmentation of the collagen, and neovascularization. The sources of pain in tendinopathy are very complicated. The pain may originate from multiple factors. There are variable conservative and surgical treatment options for tendinopathy. However, there is no gold standard of the treatments because of the controversial clinical results between various studies. In the future, more new level I researches are needed to prove the effect of these treatment options.

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