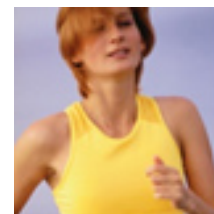
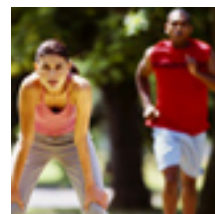
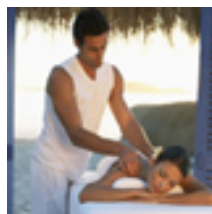
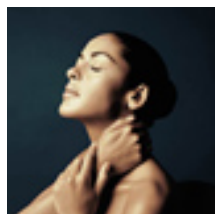




Massage und Sporttherapie



Tennis Elbow – Insertional Tendinopathy of the Elbow

T. Hach, P. Renström
Section of Sports Medicine, Tipskliniken, Karolinska Institutet, Stockholm, Sweden

Translated from an article in the
DEUTSCHE ZEITSCHRIFT FÜR SPORTMEDIZIN Jahrgang 52, Nr. 5 (2001)

Summary

Tennis elbow is one of the most common clinical problems. This disorder is still very much debated, because of the fact that with today's knowledge the management is still not optimal and takes a long time. It is generally agreed that the problem arises from tendinopathy in the tendon to the extensor carpi radialis brevis muscle insertion area. The diagnosis is rather easy, although there are some other differential diagnostic options. The treatment is based on a progressive controlled exercise program which is the key to stimulate the biological healing response.

The main part of this training program includes eccentric action and some stretching. Initially this exercise program needs supervision as it is difficult to dose correctly. Counterforce bracing has clinically some good effect. Among modalities acupuncture seems to be a possibility. Some people report good results with extracorporeal shock-wave therapy, but the scientific evidence is still not convincing. Cortisone injections are the last line of treatment and the effect is usually short lived. These injections should therefore be combined with some rest and gradually increased exercises. Surgery may be indicated in 5-10% of cases and consists of excision of the pathology in extensor carpi radialis brevis. The success rate is higher than 80%.



Introduction

There's a controversy in the discussion about problems with tendons. Although the therapy of tendon problems has highly improved in recent years, the terminology in this area is still quite confusing. We will therefore speak in this



overview about tennis elbow as insertional tendinopathy.

[...]

The tennis elbow is likely to be the most common insertional tendinopathy of the human body. But only 5-8% of the affected people are tennis players. Politicians shaking hands, violin players, surgery staff, secretaries and housewives can also develop a "tennis elbow". Most of the affected people get these problems due to their jobs. Regarding tennis, studies have shown that 30-50% of tennisplayers will have symptoms of a tennis elbow at some time. The highest rate is in people age 40 to 50. Moreover, amateur players are more affected than professionals, which could indicate a lack in technique.

It is commonly accepted that the etiology of a tennis elbow embraces repeated micro traumas and overstress of the wrist extensors, mainly caused by eccentric contractions. Most of the times the Extensor carpi radialis brevis is affected with tennis players, whereas the Extensor digitorum communis is affected in work-related damage. This correlates to the fact that while playing a backhand in tennis, the Extensor carpi radialis brevis is contracted more than other forearm muscles. Other possibilities for the development of pain in the elbow, like neurogene causes, are still being discussed controversially. Since other clinical symptoms, e.g. nerve-compression-syndromes, or cervical dysfunction, can show similar symptoms to the tennis elbow, a thorough diagnosis is necessary. A thorough and appropriate therapy is also recommended since many efforts for therapy of the tennis elbow remain without success.



Pathogenesis

The pathoanatomy of the tennis elbow concerns the extensors with their origin at the lateral epicondylus of the humerus. The M. extensor carpi radialis brevis has its origin at the most lateral part of the epicondylus, which is being most affected by stress in a pure wrist extension. The exact location of pathological changes is in the sequence between bone and tendon in the wrist extensors. Although the wrongly used name "lateral epicondylitis" suggests an inflammatory process, the pathogenesis of the tennis elbow is based on degenerative processes in the insertional areas of the tendons.

It is commonly accepted that the tennis elbow is the effect of overstress injury caused by repeated micro traumas. The insertional area of tendons adapts within biological boundaries to increased stress by a change in the extracellular matrix, the width of the collagen fibers and by the arrangement of the chondral fibers. As soon as the abilities to regenerate and to adapt are depleted, dysfunctional restore processes kick in with the result in degenerative changes. The age of a person is also an important factor which can lead to the degeneration of the tendon.

[...]

It is interesting that histological studies could not show inflammatory cells in the tissue. The causes of pain in the insertional areas of tendons could result from the general chemical structure in the matrix, in the development of granulating tissue, the irritation of free nerve endings or a change in activity in neuropeptides.



Diagnosis

Most of the times the symptoms develop continually, although sometimes risk factors can make them start abruptly (e.g. participation in championships after a previous inactivity).

Main symptoms of the tennis elbow are the pain and the sensitivity of the lateral epicondylus. The most sensitive location is slightly distal and to the front of the lateral epicondylus, mostly directly at the origin of the M. extensor carpi radialis brevis. This pain can radiate toward the forearm, in rare cases also upwards. Except in severe cases, the motionamplitude is not restricted. Functional tests have a high diagnostic value, e.g. coffee-cup test. Pain in the elbow at dorsal extension of the wrist or of the middle finger against resistance while the elbow is extended and the forearm rotated inwards are typical for a tennis elbow. The location of the pain describes the affected muscle. With an extended elbow and the arm rotated inward, pain also arises when flexing the wrist passively (elbow extension test). A pain restricted ability to make a fist is another indicator. The upper part of the arm and shoulders should be examined to exclude other causes for the pain. Also examination is necessary to exclude a compression of the N. interosseus posterior or a radial-tunnel-syndrome. X-rays of the affected elbow should be a standard. They normally don't show any abnormalities in the case of a tennis elbow. MR shows the situation of soft tissue and shows the degree of degeneration, which is needed to form a prognosis and an appropriate therapy.

[...]



Therapy

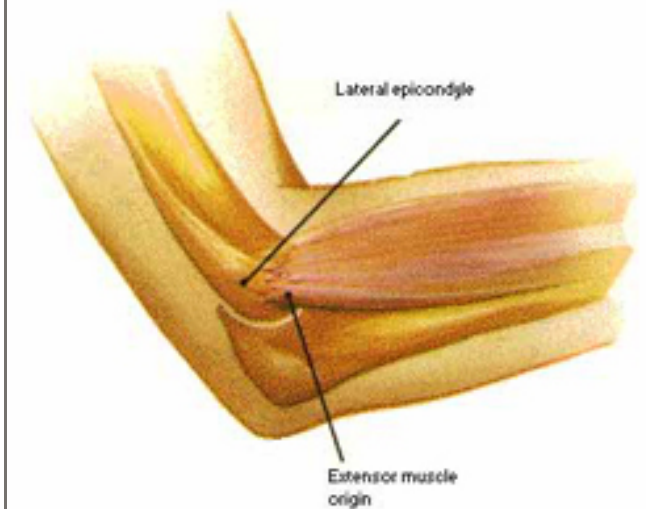
There are no scientifically based therapies for tennis elbow. Conservative and surgical measures do have excellent results but most of them are not verified scientifically. The non-surgical treatment still is an important and commonly accepted part of every therapy. The top priority here is to regain full functionality of the muscle-tendon-unit. Therapies treating the symptoms, as well as the injection of steroids and non-steroidal anti-inflammatory drugs have only limited success. A successful treatment depends on the healing process. Being without pain and being able to practice sports without pain is based on intact neural structures, a regular blood circulation in the affected areas and a stable collagen structure.

The treatment of the tennis elbow is a logical, step-by-step treatment. In an acute state it is treated the same way as an acute injury based on the PRICES-rules:

Protection, Rest, Ice, Compression, Elevation, Support. This, and non-steroidal anti-inflammatory drugs (NSAID) are common measures. NSAID only have a limited healing success for tendons and have side-effects and should therefore be used in limited cases. Physical therapies can support the training programme and can be of help in the course of stretching and strengthening techniques. Ultrasound and electrostimulation are other appropriate treatments of the tennis elbow. The scientific value of physical therapy is still unclear, but patients describe them as helpful and comfortable. Generally it is recommended to use heat in preparation of stretching and strengthening exercises, and to use cold to reduce ailments after an exhausting workout.



The key to stimulating the biological healing process is an increase in controlled strain. The workout should focus on the



©Copyright, Clinical Symposia, Ciba Pharmaceutical Company.



improvement of flexibility, strength, and endurance of the wrist, elbow and shoulder as well as the forearm. Pain is an important indicator for the progression in a strengthening workout. The exercises should be practiced until pain is felt. Thus the ability to endure strain can be improved until eccentric strain is possible. Eccentric strain is the most stressful strain for the tendon, and only when the tendon is strong enough to endure it, an injury or symptoms of the tennis elbow can be prevented. An appropriate rehab training should include following parts:

- [Flexing of the wrist](#) as well as [stretching of the wrist](#) while elbow is extended. This exercise should be done several times a day because the effects of the stretch don't last too long.
- Strength training with light resistance for forearm flexors and extensors, supinators and pronators. The number of repetitions and the intensity of resistance are to be increased gradually. Normally, the patients begin with no weights and increase the weight gradually up to 5 kg. The recommended number of repetitions is at 10-20. Both, number of repetitions and weight vary, depending on the initial strength. At the beginning concentric strain is recommended, but should be soon switched to eccentric forms of strain, which proves most effective.
- Fist-training with a rubber ball and finger extensions with a rubber band are also very effective exercises.
- Neuromuscular feedback and feedforward techniques should also be applied. An improvement of the proprioception is important to regain the full coordination of all structures in the kinetic chain.



to top

A good physical condition is important for the healing process, regain of the functions and to prevent new injuries. Bad compensation mechanisms of weak muscles have to be acknowledged and treated. With the tennis elbow a weakness in shoulder musculature can lead to compensation in forearm muscles, which can lead to further injuries in the insertional areas of the extending tendons. Therefore exercises are recommended which include the full kinetic chain, shoulder muscles and the rotators. An increase in blood circulation with aerobic training or an increase in strength and fitness in the adjoining areas results in a faster rehabilitation. To keep the improvements of a successful training it is important to watch out for wrong strain and to control wrong techniques and wrong movement.

- It was shown that counterforce-bracing helps stabilize the extending muscles while keeping the muscle balance. It minimizes the eccentric strain which affects the insertional area of the tendons, and reduces the angular acceleration. Moreover it appears that bracing distributes the strain in the affected area which reduces more damage in the tissue.
- The correction of a bad backhand technique is another way of treatment. A backhand being played with a flexed or extended wrist makes the extending muscles more vulnerable for overstrain. Most times strength is thus being compensated by ulnar rotation, when using strength from the wrist or the elbow, which can cause further microtraumas. The development of microruptures is the result of a stretch of the extensor tendon in the epicondylus. An analysis of the technique and its modification can reduce the symptoms in most cases.
- Also the size and weight of the racket influence the strain on the muscles. Tennis rackets, which are not flexible enough can increase the symptoms, because when the ball is hit outside the sweet spot, high vibration forces are transmitted into the arm, while the energy transmitted to the ball is reduced. Thus light rackets with a big sweet spot are recommended for players with tennis elbow symptoms.
- The grip size is also an important factor because too a grip being too small requires more strength in gripping the racket, while a grip being too large reduces the control over the racket.



[to top](#)

Acupuncture is an effective adjuvant therapy for the tennis elbow. Brattberg discovered that acupuncture has good results in 60% of the patients. Another study discovered that acupuncture has an analgetic effect on the pain in the elbow for almost 80% of the patients. Thus acupuncture seems to be another option in a conservative treatment of the tennis elbow without side-effects. It is important to keep up with the rehab training even if acupuncture seems successful, because the pathology can be improved only when the pathologically affected tissue is healed. The extracorporeal shock wave therapy has been successful with patients who didn't react to other conservative therapy methods. The success rate for insertional tendinopathies is estimated at 50-80% and should be preferred to a surgical treatment because of a good prognosis and very few side-effects.

Still more studies are needed to be able to give appropriate treatment recommendations. The extracorporeal shock wave therapy (ECSWT) seems promising. There are many studies which focus on its use for the tennis elbow, but until scientifically based standards can be stated, ECSWT can be used as an effective adjuvant therapy for otherwise therapy-resistant patients. The use of corticosteroidal injections should only be given when persisting pain prevents the patient to participate in the rehab training. Corticosteroidal injections should not be given before a championship, when acutely injured or when inflammatory processes take place in the body. [...]


[to top](#)

Surgery is indicated in 5-10% of the cases. Main indications are: persistant pain in the area of the epicondylus, which affects everyday life, persistant weakness and atrophy, no success with other therapy methods, no reaction to a well coordinated rehab training for a period of 6-9 months. The results in surgery are good to very good in 80% of the cases. This means, that surgery is the last option but a successful one.

New studies, which focus on neuropeptide activity and gene therapy for tendon disorders can evolve in a better understanding of the pathology and in finding new therapy treatments. New techniques like tissue engineering, create new options to improve the cure of tendons. The concepts are based on the manipulation of cellular and biochemical messengers, which influence the protein synthesis and improve the tissue structure.

[...]

The combination of cell therapy (implying stem cells into the healing area) and the application of growth factors through gene transfer allows new forms to improve the cure of tendons and ligaments.


[to top](#)

Conclusion

Tennis elbow is the most common disease of the elbow. It can affect anybody. Most of the patients can be treated with conservative methods. One of the most important therapies is a programme with stretching excercises and strengthening training. Main aspect is to stimulate the regeneration and healing process and thus prevent other injuries. For those

patients, who are not successful with a conservative treatment, there are surgical options with a high success rate. More studies in the field of therapy and its effects are necessary to be able to formulate commonly accepted and scientifically based therapeutical standards. Additionally, there are new areas being explored (like gene therapy or neuropeptide activity) which could have consequences for therapy in the future.



Copyright © by Adriane Polak 2001-2006