Abstract

‘Tennis elbow’ is overuse injury caused by frequent repeated contraction of hand and fingers extensors resulting chronic stress muscles and tendons. The main symptom is pain that occurs on the outside of the elbow, but can be felt in the upper arm or the outer side of the forearm. The diagnosis of tennis elbow using computed tomography (CT), ultrasound, arthroscopy, magnetic resonance imaging (MRI) and clinical diagnosis, which is the basis and most important diagnostic method. Depending on the stage of disease and treatment is different. Great importance is given to kinesiotherapy, especially stretching exercises. Except stretching exercises, kinesiotherapy also include isotonic and isometric exercises. Indications for operative treatment is the existence of symptoms for more than six months, despite adequate treatment conducted non-operatively.

Key words: tennis elbow, prevention, non-operatively, operative treatment

Introduction

Tennis is played by millions of people of all ages around the world. It is a sport that is very interesting, exciting and usually do not cause serious medical problems. In the elbow, however, problems arise. Inflammation and degenerative changes in the elbow resulting in the medial and lateral humeral epikondil. Epicondylitis humeri is entenzitis that appears on the same starting point extensor hands and fingers on the lateral epikondil humerus, which is called the lateral (radial) epicondylitis (Grisogono, 1989). Inflammation of the lateral epicondyle, or more often referred to as a "tennis elbow" is one of the injuries of which suffer most sports and recreation (tennis) and pitchers (baseball) and cricket players, javelin throwers, handball players, etc. (dactilografi, shoemakers, dentists). Despite the name "tennis elbow", professional tennis players are an absolute minority, only 5 % of the total number of people with inflammation of the lateral epicondyle. Lateral epicondylitis (tennis elbow) occurs 7-10 times more than the median, is more common in men, usually occurs in middle aged between 30-50 years. The first description of symptoms suggestive of lateral epicondylitis gave back 1873rd the German doctor Runge & Morris (1882). Describing the symptoms of tennis introduces name tennis arm (Engl. lawn tennis arm), while a year later Major changed the name for tennis elbow, which is held to this day. Lateral epicondylitis is one of the most popular and also the most common overuse injuries of the locomotor system in humans, manifested by pain in the outer part of the elbow. Appears at the starting point caput commune extensor hands and fingers on the lateral epikondil. Damage of mioentensial apparatus is caused by repeated muscle contractions. The causes of pain are microscopic rupture tendon insertions. The pain occurs in the elbow and forearm. Because of injuries is reduced vascularization in the affected tendon perch and nervous endings are irritated and resulting inflammation. Repetition of movement can lead to a complete tendon rupture.

Etiopathogenesis of lateral epicondylitis

The disease is one degenerative process resulting from fatigue due to hamstring injuries, weaknesses and likely changes due to poor blood circulation. Regardless of the type of tissue response to injury is inflammation, which includes a number of changes in the final core networks, blood and connective tissue. Inflammatory reaction is a very complex reaction in which involved different types of cells, a number of enzymes, many physiologically active substances and other. Changes nerve causes severe pain in the area of the damaged tendon or handle the often subtle morphological changes. There comes to perineuritisa flange nerve sheath that subsequently compressed nerve.

Changes in the tendon can be seen in edema and necrosis of the tendon, and after only a short time in the damaged area accumulate inflammatory cells (Figure 1). The inflammatory phase of the regeneration of damaged tendons supplements with the growing binder, in the beginning of cellular which eventually becomes richer collagen fibers. Blood vessels multiply, but over time their number is decreasing. The scar is different than normal tendon irregularity layout and structure of bundles of collagen fibers, and it is often found more blood capillaries.

Figure 1. Changes that occur in the tendons due to lateral epicondylitis
(1. Ulna, 2. Humerus; m. extensor carpi radialis brevis; 4. m. extensor digitorum communis)
Changes tendon insertions can be seen in edema and hemorrhage, sometimes there is a tear of the tendon or bone, connective scar bronchial often degenerates, so most of the tendons, and often the periosteum, becoming almost acellular and imbued with a homogeneous mass of hyaline. These scars often spread to surrounding tissue structures by changing their appearance. Changes nerves causes severe pain in the area of the damaged tendon or her handle the often subtle morphological changes. There comes to perineuritis a flange nerve sheath that subsequently compressed nerve (Renström & Peterson, 2002). Risk factors for lateral epicondylitis can be divided into two groups: the use of inadequate equipment and the performance impact improper technique. Causal role play racket and his posture, tension mat on it, the size and weight of the racket, the width of the handle, the weight of the balls and hitting her mid racquet, type of terrain, the intensity of impact players. Improper impact improper technique (backhand shot) leads in connection with the development of lateral epicondylitis. Concentric contraction that occurs when the shot incorrectly performed shortens the muscles in order to maintain the tension needed to stabilize the wrist. As a result of shortness muscle maximum load occurs at the ends of the muscle or tendon. This creates a certain force that is transmitted along them to their starting point at the lateral epikondilus humerus. Such repeated contractions resulting in chronic stress of mioentesial apparatus, which therefore reduce vascularization and irritated nerve endings and the resulting aseptic inflammation.

**Aim**

The main objective of this paper is to highlight the benefits and importance of preventive measures in the development of "tennis elbow". Likewise, the goal of this paper is to describe the current methods of treatment of tennis elbow due to the stage of disease and therapeutic procedures in the treatment of tennis elbow.

**Prevention of ‘tennis elbow’**

Prevention of sports injuries, generally the primary task of a sports coach, a sports doctor and the athlete. More than half of the injuries can be avoided by proper dosing load to prevent fatigue and muscle fatigue in athletes. To ensure and implement prevention, ie to reduce the risk of overuse injuries, it is essential to know the risk factors and their possible effect and negative effect on the development of overuse injuries. From a theoretical point of view can be distinguished: general preventive measures and specific preventive measures. General preventive measures include: stretching as a leader in the prevention and treatment and strengthening - strengthening the muscles of the forearm to stabilize the wrist. Preventive measures for playing tennis are properly playing (technique) and avoiding asymmetric training techniques. According to Peterson (2002), while playing tennis should pay attention to the following items: 1) good footwork, so that the player is properly set up to the ball, 2) the ball should be in the right place at the right time to hit the racket, 3) on impact should be applied throughout the shoulder and body as when hitting the shuttle on the racket would not be disrupted paths, 4) it is very important foundation courses, which should be slow to reduce the speed of the balls, 5) the ball should be light; wet balls or balls with too little air pressure becomes severe, and 6) the right equipment - the racket should be selected individually, taking into account the technique of playing, 7) Great so. “swet spot” (center of the racket hitting the surface area on which generated the smallest torsion -twisting on impact balls). Hit balls out of the surface increases the vibrations.

**Treatment of ‘tennis elbow’**

Treatment can be nonsurgical and surgical.

**Nonsurgical treatment**

The objectives of non-operative treatment are: 1) Relieve pain and inflammation control mioentesial appliances; 2) Enhancing healing of mioentesial appliances; 3) Control further action; 4) Increase muscle strength and endurance of the muscles; 5) Restoring the proper range of motion; and 6) Restore maximum functional ability, and 7 Prevention of repeated movements on mioentesial apparatus (Kosinac, 2008; Grisogono, 1989). Treatment is important to start as early as possible, at the appearance of the first symptoms. Here are the most common and mistaken, because the first symptoms are usually not paid sufficient attention and continues with the activity unchanged intensity. Treatment is divided into three phases: 1) The first stage is the most important holiday of the working and sporting activities. The patient should avoid movements that cause pain, but it has to perform active movements of the rest of the limb to avoid stiffness and other complications. At this stage in the account comes Cryotherapy several times during the day. Cryotherapy reduces the pain lowering conductivity sensory nerves, reduces inflammation and the island of vasoconstriction and lowers levels of a chemical reaction. If the present endemic, it is necessary to raise the grip of your hand. It is recommended that you wear a brace for the wrist that held his fist in the forward position of the 200, which tendon release excessive tension, and allows full mobility of the fingers and elbow, 2) The second phase is characterized by the absence of pain at rest, or the appearance of increased pain when performing movements due to the increased load. At this stage continues cryotherapy and starts with the individual program of physical training. Of great importance are stretching exercises for increasing the length mioentezijskog apparatus at rest can be reduced by stretching and during the execution of certain movements. In addition to stretching exercises, at this stage, complementing the isotonic and isometric exercises.
From electrotherapy procedures used high-voltage galvanic stimulation current that creates the piezoelectric effect which helps healing of mioentesial appliances, improves its vascularity, and in some patients has an analgesic effect. In the second week can apply electrotherapy procedures: ultrasound, laser, magnetic therapy and analgesic power. When all provocative movements become painless, the patient returns to his daily activities. During these activities must wear inelastic forearm cuff deflation which has the function of secondary insertions of muscles which relieves tendon insertions on the lateral epikondilu (Figure 1); 3) In the third stage the patient is fully returned to their daily activities and sports. It is recommended to continue to carry out stretching and strengthening the affected muscles. In severe physical activities necessary to implement adequate preparation (warming) the affected muscle group, and if necessary apply cryomassage. To prevent recurrence in cases with professional disease etiology should reduce the weight of the working tool (racket) or frequency provoking stereotyped movements, and if it is not possible to increase the number and length of rest during operation to allow for relaxation of muscles and reduce the risk of re-injury. The use of corticosteroid injections should be delayed as long as possible and limited to cases that do not respond to nonsurgical treatment. Usually injected up to three injections deep in Manila recess which is sub-tendon positioned (Figure 2).

The downside is that steroid injections as the organism adapts over time, so the answer to the injection weaker and increases the risk of possible complications (subcut atrophy, weakening the surrounding tissue). The next day, after the injection, pain can be intensified, but by the next day pain decreases. Exercise 1: Stretching exercises of extensor muscles: the patient performs the movement can easily be seen from the 90=, then completely extends elbow and palmar inflecting hand while pressing the other hand increase the palmar flexion fists up to the occurrence of pain (Fig. 3). At this point, the maximum painless stretching patient keep stretching 15:25 s exercise should be repeated 4-5 times a day, 2 sets of 10 reps, but always only to the occurrence of pain. Exercise 2: Placing the patient in the position of full forearm pronation on the table so that his hands hanging over the edge of the table in this position performs the extension and flexion of the hand (Figure 4).
Figure 10. Padded hand grip

In the beginning, these movements are performed slowly, so that at the end of palmar flexion accommodates up to 6, and at the end of extensions to 3. Exercise 3: When the previous movements cease to be painful, the patient gradually increases the speed of execution and the external resistance. Resistance is achieved by a small weight or resisting physical therapists in the opposite direction of the movement that the patient performed (Figure 5). Exercise 4: The initial position is the same as in the previous exercise. Resistance is achieved by a small weight (Figure 6). Exercise 5: The patient is in a sitting position, and forearms and hands were laid on the ground in full pronation, while the fingers off base flexion in MCF joints per 900. The patient performs the movement extension of the fingers (Figure 7). Exercise 6: The patient was in the same position as in the previous exercise, only the resistance applied to the dorsal side of the fingers in the direction of flexion (Figure 8). Exercise 7: Elastic rubber is placed around the fingers and thumb, which are collected in the form of the tower (Figure 9).

The same exercise can be performed with an elastic band that is placed around the fingers and thumb, alternately making loops. Exercise 8: Position arm to the horizontal position (900), the elbow in extension. In a handful put blades, the patient alternately increased and decreased hand grip (Figure 10).

Surgical treatment
Indications for surgical treatment are the persistence of symptoms for more than six months with the inability to return to normal work and leisure activities despite adequately conducted nonsurgical treatment. Operative treatment is also carried out for recurrent cases where they diagnosed degenerative and calcification changes in muscle-tendon structures with the aim of removing the damaged tissue section affected muscle.

The operation proved to be always a part of musculus extensor carpi radialis brevis, and in 35% of cases musculus extensor digitorum communis (Niethard, et al., 2009). The downside of surgery is a rehabilitation treatment extended, and success is not always satisfactory. After the surgery elbow is immobilized for a week with steal rail in a position of 900. Exercises for strength and durability on resistance usually begins three weeks after the surgery. In 85% of cases it is achieved the disappearance of pain and restoration of the previous power. Studies have shown recurrence of 18-66%. The amount of pain before treatment allows most reliable prediction of recovery: the greater the pain, the greater the likelihood of treatment success. After the surgery should take 8-10 weeks before they started to play tennis again.

Discussion
Tennis elbow can be a big problem for players. The pain can be so intense that the disabled injured while performing work activities, or it may interrupt the sport. Because of the lengthy delay in sports activities it often lead to hypotrophy extensor muscles and the islands of the affected areas, and can lead to a decrease in joint mobility and mild degree of calcification. When we talk about prevention of tennis elbow, it is necessary to consider in detail the external and internal factors that participate in the realization of sporting activities, as well as their interactions, and the mechanisms of formation and the situation in which it comes to sports injury. Technically correct play is the most important preventive measure, while the asymmetric training techniques be avoided or reduced to necessarily play. Prevention of injury involves a series of measures such as: stretching exercises, strengthening, massage and other forms of activities that contribute to easier and faster recovery of the players. For early detection, diagnosis and appropriate treatment of overuse injuries is important knowledge of etiopathogenesis.
The first step in treatment is certainly absolute rest and abstinence from basic sports activities that led to the disease condition until symptoms are present (minimum recovery period is 7-10 days). Experience shows that the disease can be kept, so that treatment can extend sometimes months to complete resolution of all symptoms. It is important to emphasize that the pain in the elbow should not be underestimated or ignored, because in most cases they will not disappear by themselves. The basis of treatment is a stretching exercise affected muscle group, and after stretching exceeds the static and dynamic strengthening exercises with and without resistance. Physical procedures are used to reduce pain and improve circulation. A particular problem is the return of the sport or competitive activity after treatment. If this return so quickly and without a certain protection, the recurrence of pain is more than probable. When they return, it is advisable to continue to carry out activities that will help prevent injuries. It takes at least 5 to 10 minutes 'warm up' arms and shoulders gently moving and stretching before starting the activity. In addition, it is recommended to change the racquet, as to reduce the stress on the structure of the elbow and the forearm muscles to put the corset that their pressure on the muscles reduce their maximum power, and thus relieve elbow.

Conclusion

Epicondylitis lateralis humeri is the damage that occurs in the lateral epicondyle of the humerus, or in the grips forearm extensor muscle groups. The disease is one degenerative process resulting from fatigue due to hamstring injuries, weaknesses and likely changes due to poor blood circulation. Basic movement that causes overtraining is an extension of elbow flexion with simultaneous dorsal hands flexion and forearms supination from pronation position. The problem in the treatment of overuse injuries are daily load during training, which can lead to chronic stages. Proper selection of therapeutic procedures as well as early initiation of treatment will lead to a reduction of inflammatory conditions and alleviate.

However, for long-term success of therapy and avoidance of chronic changes necessary to educate athletes and coaches. Therefore, great attention is paid to prevention. More than half of the injuries can be avoided by proper dosing load to prevent fatigue and muscle fatigue. Good effect in preventing tennis elbow can be achieved: by changing the tennis equipment, sports mastered techniques and adequate fitness and trained coach with enviable knowledge of the basics of anatomy, physiology and kinesiology methodology.

References


PREVENCIJA I LIJEČENJE 'TENISKOG LAKTA'

Sažetak

'Teniski lakat' je sindrom prenaprezanja koji nastaje zbog čestih ponavljanih kontrakcija ekstensora šake i prstiju koje rezultiraju kroničnim naprezanjem mioentezijskog aparata. Glavni simptom je bol koja se pojavljuje na vanjskoj strani lakta ili vanjskoj strani podlaktice. U dijagnostici teniskog lakta koristimo kompjutoriziranu tomografiju (CT), ultrazvučnu dijagnostiku, artroskopiju, magnetsku rezonanciju (MRI) te kliničku dijagnostiku koja je osnovna i najvažnija dijagnostička metoda. Ovisno o stadiju bolesti liječenje je različito. Velika važnost pridaje se prevenciji i kineziterapiji koja obuhvaća vježbe isticanja, izometrijske i izotoničke vježbe. Indikacije za operativno liječenje je postojanje simptoma više od 6 mjeseci, unatoč adekvatno provedenom neoperativnom liječenju.

Ključne riječi: teniski lakat, prevencija, neoperativno liječenje, operativno liječenje

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