OVERUSE SPORTS INJURIES: DIAGNOSIS & MANAGEMENT

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SUMMARY

This review on the topic of overuse sports injuries serves to give the family physician a better understanding of the mechanism of injuries such as rotator cuff tendinitis, patellofemoral pain and others. The review includes a description of factors predisposing to chronic overuse injury and brief outlines of a few common overuse injuries. It is hoped that with this better understanding, the family physician is better able to manage them and prescribe sound exercise-related advice.

Keywords

Sports Injuries, Family Physician, Overuse

Introduction

Lifestyle modification is paramount in management of cardiovascular disease, which is among the leading causes of morbidity and morbidity in this day and age. Sports activities have been promoted with much fervor since time immemorial by doctors and laymen alike. It is therefore not surprising that sports –related injuries form a sizable proportion of office consultations. Acute injuries as a result of impacts during sports are unexpected and often difficult to avoid. However in certain sports such as running, cycling, swimming, stair climbing and walking, most injuries are not the result of sudden catastrophes but rather, occur due to what is popularly termed 'overuse'.

These so-called sports injuries could also result from non-athletic activities. For example, epicondylitis (e.g. tennis and golfer's elbow) could occur in a housewife who manually wrings laundry or even simply carrying a heavy load of groceries. Lumbar strain could result from swinging a golf club as well as bending over for a long period. Thus the principles of sports medicine can be applied to treatment of all musculoskeletal injuries.

Sources of Information

This article will discuss factors that predispose to the development of overuse sports injuries, outline a general approach to their management and briefly discuss a few common overuse injuries.

In this review, the sources of information consulted were papers obtained via a search of the database Journals@Ovid Full Text, a medline search from 1984 to 2004, and monographs on sports medicine. These can be found in the references list.

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The keywords used for the search include "chronic", "overuse", "sports" and "injury". From the initial search results, the 17th Edition of the Merck Manual of Diagnosis and Therapy[1] and Clinical Sports Medicine, 2nd Edition, by Brukner and Kahn[14], were chosen as they provided a list of common overuse injuries.

Subsequent web and Ovid-database searches were made using keywords "overuse", "tendinitis", "patellofemoral syndrome", "Achilles" and "rotator cuff". Searches were limited to the following criteria: Ovid full text available and review articles. A further 13 references were selected and used as material for this article.

The Importance of Early and Correct Diagnosis

Patients with overuse sports injuries have often experienced their symptoms for a while and sought medical therapy on several occasions. Unless the multiple predisposing factors are addressed, overuse injury will continue to occur. Whereas no mortality has been associated with overuse injury, there is significant morbidity. Many overuse problems are associated with functional deficits, which may preclude an activity that is of either vocational or recreational interest. Chronic tendon inflammation may result in rupture. Chronic pain and loss of quality of life (QOL) may result if adequate treatment and activity alterations are not undertaken. Table 1 lists some sports activities that are related to common injuries that a family physician may encounter in daily practice.

Prevention of Chronic Overuse Injuries

Not withstanding that this paper in on diagnosis and treatment of sports injury, prevention is still better than cure. And for prevention of chronic overuse injuries, an understanding of the factors involved is pertinent. Overuse injuries may be the most common class of sports injuries encountered by primary care physicians[3]. A literature review reveals that 30% to 50% of all sports injuries result from overuse[4]. Overuse injuries are generally multifactorial in origin. The causes of overuse injuries are usually divided into extrinsic factors, such as training, surfaces, shoes, equipment and environmental conditions, or intrinsic factors, such as malalignment, leg length discrepancy, muscle imbalance, muscle weakness, lack of flexibility and body composition. In chronic tendon disorders, an interaction between intrinsic and extrinsic factors is common[6]. Possible factors involved in the development of chronic overuse injuries are listed in Table 2.

Table 1. Common Injuries and Related Sports Activities

Injury	Related Sports Activities
Golfers' Elbow	Golf, Racquet games (table tennis, badminton, tennis), Weights, Rowing, Tug-of-war, activities that lead to overuse or overload of wrist flexors that include non-sporting activities like wringing a dishcloth or carrying a heavy load.
Tennis Elbow	Tennis elbow is an overuse injury, involving repeated contraction of wrist extensors. The repeated motions injures the extensor tendons and lead to enthesopathy. As the name tennis elbow indicates, playing tennis, particularly, repeated use of the backhand stroke with poor technique, is a possible. However, a wide range of common arm such as using a screwdriver, painting, carrying heavy weights, gardening e.g. pulling weeds, knitting and typing may be causal.
Rotator-cuff Tendinitis	Activities requiring repeated over the shoulder arm motions e.g. competitive swimming, tennis and other racquet games, weights.
Achilles Tendinitis	Running, track and field, badminton and other racquet games, soccer.
Patello-femoral Pain	Running, repeated weight bearing impact e.g. soccer, athletics, basketball etc.
Metatarsal Stress Fractures	Running, track and field.
Posterior Femoral Hamstring Strain	Activities that require sudden violent contraction of the hamstring muscles e.g. Sprinting, Long Jump.
Lumbar Strain	Activities that require pushing against weight or sudden twisting of the trunk e.g. baseball, basketball, soccer, golf.

Table 2. Predisposing Factors to Overuse Injuries

Extrinsic Factors	Intrinsic Factors
Training errors	Malalignment
Excessive volume	Pes planus
Excessive intensity	Pes cavus
Rapid increase	Rearfoot varus
Sudden change in type	Tibia vara
Excessive fatigue	Genu valgum
Inadequate recovery	Genu varum
Faulty technique	Patella alta
Surfaces	Femoral neck anteversion
Hard	Tibial torsion
Soft	Leg length discrepancy
Cambered	Muscle imbalance
Shoes	Muscle weakness
Inappropriate	Lack of flexibility
Worn out	Generalized muscle tightness
Equipment	Focal areas of muscle thickening
Inappropriate	Restricted joint range of motion
Environmental conditions	Sex, size, body composition
Hot	Other:
Cold	Genetic factors, endocrine factors,
Humid	metabolic conditions
Psychological factors	
Inadequate nutrition	

Adapted from Brukner & Kahn. Clinical Sports Medicine 2nd Edition

An overuse injury may occur when training demands exceed physiologic ability[5]. Overuse injury may occur from not allowing at least a 48 hour recovery period after an intense workout, or ignoring pain that occurs with a certain activity. During a period of intense exercise, the glycogen stores in muscles are depleted and microinjury occurs to some muscle fibers. It takes at least 48 hours for fibers to heal and longer for glycogen to be replaced. Therefore, an adequate period of rest in between intense exercise, or exercising different parts of the body alternately is advised.

Inadequate warm up also predisposes to development of injury. Warming up involves exercising muscles at a relaxed pace for a few minutes prior to an intense workout. This raises the temperature of the muscles, increases blood circulation to the muscles and makes muscles more pliable and more resistant to injury.

Structural abnormalities may predispose a person to developing sports injuries. For example, patients with excessive pronation of the feet and resultant reduction in the medial longitudinal arch of the feet are at higher risk of developing Achilles Tendinitis. Patients who have excessive lumbar lordosis are at a higher risk of developing Lumbar Strain when they swing a golf club. As specific motions are often performed repeatedly in most sports, the risk of injury is high if these biomechanical factors are not addressed. The patient might report that pain is brought on by the same activity and abates once the activity is avoided.

Diagnosis

Diagnosis requires taking a comprehensive history on symptomatology with respect to mode of onset, whether acute or subacute, whether the pain was continuous or is experienced only following a certain activity, relieving or exacerbating factors.

Thorough assessment of the patient's sports activities, potential risk factors (Table 2), for example, training and technique, are paramount. History on vigourosity of training and number of rest days is important. In a recent study[15] lack of adequate rest days was a significant contributing factor to overuse injuries.

The cause may be quite evident, such as a sudden doubling of training quantity, poor footwear or an obvious biomechanical abnormality, or may be more subtle, such as running on an uneven surface. Recent changes in training regime with regards to length of exercise, place of training (e.g. hilly terrain instead of flat running track), type of activities, adequacy of warm-up and cool-down.

Type of footwear used during exercise and when not exercising (e.g women who usually wear high heeled shoes but change to flat heeled sneakers for an occasional exercise are prone to developing Achilles Tendinitis).

It is useful to know some differential diagnoses of pain at a particular site , taking into account the common causes of pain at a particular site, the less common causes and some

Table 3: Differential Diagnoses for Pain at Particular Sites

Presenting complaint in an athlete	Common causes	Uncommon causes	Causes not to be missed
Anterior Knee Pain	Patellofemoral syndrome Patellar tendinopathy Recurrent patellar subluxation	Pre-patellar bursitis Quadriceps tendinopathy Infrapatellar bursitis Tibial Tenoperiostitis Patellar Stress fracture Osgood-Schlatter disease	Referred pain from the hip Osteochondritis dissecans Slipped upper femoral epiphysis Perthes' diseaseTumor (especially in the young)
Shoulder Pain	Rotator cuff Tendinitis Glenohumeral subluxation Referred pain from: Cervical spine Thoracic spine Soft tissues AC joint sprain Other muscle strains Pectoralis major Long head of biceps	Rotator cuff Tear Calcific tendinopathy Adhesive capsulitis Fracture Neck of humerus Stress fracture of coracoid process	Tumor (bone tumors in the young) Referred pain from: Diaphragm Gall bladder Perforated duodenal ulcer Heart Spleen (left shoulder pain) Apex of lungs Thoracic outlet syndrome
Pain in area of Achilles Tendon	Achilles Tendinitis	Achilles bursitis Referred pain from lumbar regions	Achilles tendinopathy from inflammatory arthritis

Adapted from Brukner & Kahn. Clinical Sports Medicine 2nd Edition

Referral to a sports physician for various selected tests (e.g. plain x-ray, bone scan, arthroscopy) may be considered.

causes that should not be missed, e.g. gall bladder pain referred to the shoulder or tumours in adolescents. More examples of these are illustrated in the following table (Table 3).

Careful examination may reveal which anatomical structure is affected. It is often helpful to ask patients to perform the manoeuvre that produces their pain. Physical examination of the painful area as well as that of the distal and proximal joint should be performed. Besides looking for swelling, tenderness and range of motion, other points to be noted would include underlying predisposing anatomical factors, for example limb length discrepancy, excessive joint laxity or plantar hyperpronation.

General Principles of Treatment

Initial management includes pain relief and rest of the injured part (e.g. immobilizing the affected area by splinting). For almost all injuries, the immediate treatment would be the RICE regime (Rest, Ice, Compress, Elevate). Rest minimizes injury and reduces pain associated with movement. Ice chips in a bag applied on a towel over the injured area reduce inflammation and pain. Compression with crepe bandage and elevation limits oedema.

The patient should be advised to immediately discontinue any activity that produces symptoms. An alternative sport that does not stress the injured part or cause pain should be encouraged and this will help prevent loss of fitness. The patient should also be advised on the importance of adequate warm-up prior to intense exercise.

Controlling or suppressing inflammation is one of the primary goals of overuse injury treatment and the classic approach is RICE (rest, ice, compression, and elevation)[3] Oral Non-steroidal Anti-inflammatory Drugs (NSAIDs) are useful.

Local corticosteroid injections, administered peri- or intra-articularly relieves pain and reduce swelling. However, they also inhibit fibroblast function and collagen deposition and thus can delay healing. Corticosteroid injections also reduce tendon blood supply, which can cause necrosis, thereby increasing the risk of tendon rupture. Steroid injections should be close to but not into the tendon.

If there are underlying anatomical factors that predispose to the injury, these should be addressed. Excessive pronation is often treated with orthotics (shoe inserts). Type of footwear worn during exercise should addressed. Good running shoes should have a rigid heel counter and not excessive heel padding to stabilize the rearfoot and a saddle to hyperpronation.

If there is significant injury to the muscle fibres or tendon, a period of rehabilitation may be required before usual activity may be resumed. On rare occasions, surgical intervention such as tendon repairs may be required.

Diagnosis and Treatment of Common Overuse Sports Injuries

The common sports injuries discussed in this article are shown in Table 4.

Table 4. Some Common Sports Injuries

Tendinitis and Tenosynovitis o Lateral Epicondylitis o Medial Epicondylitis o Rotator Cuff Tendinitis o Achilles Tendinitis
Patellofemoral Pain
Metatarsal Stress Fracture
Posterior Femoral Muscle Strain / Hamstring Pull
Lumbar Strain

Tendinitis And Tenosynovitis

Clinical Features and Diagnosis

Inflammation of a tendon (tendinitis) and the lining of the tendon sheath (tenosynovitis), usually occurring simultaneously. The synovial lined tendon sheath usually is the site of maximum inflammation, but the enclosed tendon may also be inflamed.

The involved tendons are usually painful on motion; their sheaths may accumulate fluid and be visibly swollen or may remain dry but cause friction, which is felt or heard with a stethoscope when the tendon moves within its sheath. Along the tendon, localized tenderness of variable severity is present; it may be severe and associated with disabling pain on movement.

Treatment

Symptomatic relief is provided by rest, application of heat for chronic inflammation or cold for acute inflammation (whichever benefits the patient should be used), local analgesic drugs, and NSAIDs. Controled exercise several times daily (becoming progressively more active with tolerance) is indicated, especially to prevent frozen shoulder, after acute inflammation is controlled. Corticosteroid injections of the tendon sheath may be helpful, depending on severity and site. Care should be taken not to inject directly into the tendon as it may be weakened and rupture. Rest of the injected part is advisable to diminish risk of tendon rupture.

Lateral Epicondylitis / Tennis Elbow

Clinical Features and Diagnosis

This overuse syndrome is caused by continued stress on the grasping muscles (extensor carpi radialis brevis and longus) and supination muscles (supinator longus and brevis) of the forearm, which originate on the lateral epicondyle of the elbow.

The first symptom is pain along the lateral epicondyle when the wrist is extended against resistance (e.g. in manual screwdriving or when a tennis player hits a backhand shot) If the symptom is ignored, with continued stress the pain becomes constant and may extend from the lateral epicondyle to the wrist. On examination, pain is brought on when the wrist is extended against resistance and there may be tenderness at the lateral epicondyle.

Treatment

Management involves rest and avoidance of any activity that causes pain to the area. Stretching and strengthening exercises at low intensity is recommended. Generally, exercises to strengthen the wrist flexors should also be performed.

Medial Epicondylitis / Golfers' Elbow

Clinical Features and Diagnosis

Forceful wrist flexion and pronation can damage the tendons that attach to the medial epicondyle. Activities implicated include sports such as gym work, tennis (e.g. when serving), pitching in baseball, throwing the javelin and non-sports activities such as carrying a heavy bag. Presentation is that of pain felt in the flexor pronator tendons and in the medial epicondyle when the wrist is flexed or pronated against resistance. There may be tenderness at the medial epicondyle.

Treatment

Management is the same as that for lateral epicondylitis.

Rotator Cuff Tendinitis

Clinical Features and Diagnosis

The Rotator cuff is a conjoint tendon which arises from four muscles; the subscapularis, supraspinatus, infraspinatus and teres minor;) It serves to stabilize the glenohumeral joint. Fractures, dislocations, sprains, and tendon ruptures could result from falls and collisions in contact sports. Chronic injury is related to overuse and these are most prevalent in overhand throwers or sports requiring the arm to be moved over the head repeatedly (e.g. in swimming, weight lifting and racket sports). The supraspinatus tendon is particularly susceptible to impingement and degeneration due to its location between the acromion and the glenohumeral joint.

Shoulder flexion causes the humeral head to abut the acromion and coracoacromial ligament, which in turn is rubbed by the tendon of the supraspinatus. Chronic irritation can cause subacromial bursitis, inflammation, and erosion of the tendons.

The symptoms of rotator cuff injury include pain,

weakness, and limitation of active motion. Pain tends to be located in the anterior, superior, and lateral aspects of the shoulder[6]. Initial presentation is that of intermittent mild pain with overhead activities. Patients with chronic inflammation of the rotator cuff have persistent, moderate pain with overhead activities; there may be pain at rest, but much less than with overhead activities.

Treatment

This includes rest, avoidance of aggravating activities and controlled strengthening exercises. Surgery may be necessary if the injury severe e.g. complete tear of the rotator cuff.

Achilles Tendinitis

Clinical Features and Diagnosis

The Achilles tendon, an extension of the soleus & gastrocnemius muscles, runs down the back of the lower leg and attaches to the calcaneus. It does not have a true synovial sheath but is surrounded by a paratenon (fatty areolar tissue that separates the tendon from its sheath). The occurrence of Achilles tendinopathy is highest among individuals who participate in middle and long-distance running, track and field, tennis, badminton, volleyball, and soccer[7].

By understanding simple mechanics involved in related sports, the family physician can take a more detailed history and give appropriate advice when encountering a case of Achilles tendinitis. During running for example, the calf muscles lower the forefoot to the ground after heelstrike and raise the heel during toeing off. When running downhill, the forefoot strikes the ground with greater force than on level ground because it drops further and has more distance to accelerate. During uphill running, the heel is much lower than the forefoot, so the calf muscles exert a greater force to raise the heel before toeing off.

Training errors have been reported to be involved in 60% to 80% of runners who have tendon overuse injuries[2]. The most common errors include running a distance that is too long, running at an intensity that is too high, increasing distance too greatly or intensity too rapidly, and performing too much uphill or downhill work[7,8,9].

Improper footwear also predisposes to injury. For example when high heels are worn and the ankle is plantar flexed for prolonged periods, Achilles tendon and calf muscles adapts by shortening. Subsequently switching to sneakers or flat shoes during exercise forces the Achilles tendon to stretch further than it is accustomed to and it becomes inflamed. It is therefore prudent to avoid constant wearing of high heels. Excessive padding of the heel counter allows excessive movement of the heel in the shoe. The rearfoot is less stable, and the Achilles tendon has to pull on a wobbly insertion, placing uneven stress on the tendon and increasing the chance of injury. Stiff-soled shoes that do not bend easilly just behind the first metatarsophalangeal joint increases the amount of stress on the Achilles tendon just before toeing off.

The early pain of Achilles tendinitis is caused by injury to the paratenon rather than to the tendon itself. Pain is often more intense on rising in the morning and improves with continued activity, as the tendon moves more freely inside the paratenon. Similarly, pain increases when exercise is begun and often improves as exercise continues. If ignored and activity is continued, the tendon becomes inflammed. Pain is then constant and exacerbated by movement. In severe cases, tendon rupture may occur. On examination, the Achilles tendon is tender when squeezed between the fingers.

Treatment

General principles of management is as outlined earlier. If symptoms do not abate with rest and NSAIDs, or recur on resumption of activities, the patient should be prescribed a flexible ankle cast and crutches. At this juncture, referral to the orthopaedic surgeon should be considered. Subsequent wearing of low heel shoes is advised. Proper warm-ups, avoiding sudden increases in intensity of exercise for example hill running and proper footwear (flat heeled shoes) should be advised as preventive measures against Achilles tendinitis.

Patellofemoral Pain

Clinical Features and Diagnosis

Patients often report anterior knee pain, which is typically activity related and worsens when a patient negotiates stairs or runs over hilly terrain. It usually increases after the prolonged knee flexion that occurs during long car rides or sitting in class or a movie theater[11].

During pronation, the lower leg twists medially, while the three quadriceps pull the patella laterally and the vastus medialis pulls the patella medially. The most common treatable cause is a combination of excessive pronation and lateral pulling of the patella, which causes the patella to rub against the lateral condyle of the femur.

Factors which predispose to development of patellofemoral pain include a congenitally high-riding patella (patella alta), tightness of the vastus lateralis, iliotibial tract, and lateral retinaculum and weakness of the vastus medialis. If the patella faces upward when the patient sits with the knee bent at 90°, patella alta is usually present.

Pain is often anteromedial and anterolateral to, and behind, the patella. It usually presents when the patient runs downhill but later occurs during all running and eventually even when the patient is not running (especially when walking down steps).

Treatment

Running should be stopped for time being and an alternative

form of exercise, e.g. riding a bicycle, should be advised. The alternative exercise should not cause pain. Predisposing factors should be addressed. Stretching the hamstring and quadriceps muscles, using arch supports to reduce plantar hyperpronation and performing certain exercising to strengthen the vastus medialis may help.

Metatarsal Stress Fracture

Clinical Features and Diagnosis

A great stress is placed upon the metatarsal heads, especially the first two on toeing off during running. The 2nd, 3rd, and 4th metatarsals are unusually susceptible to fracture because of their thin diaphyses. Patients with a cavus foot are at risk as the ankle has a very high arch and there is reduced pronation when the foot strikes the ground. Pronation helps prevent injury by distributing the force of impact with the ground. Therefore cavus feet usually are poor shock absorbers, thereby increasing the risk of stress fracture in the bones of the feet and legs.

Other factors include running on hard surfaces, shoes with inadequate shock-absorbing qualities and underlying osteoporosis. Pain is usually felt in the forefoot, is initially brought on by exercise and relieved at rest. As severity increases, pain occurs earlier in exercise and may progress until it prohibits exercise and persists even at rest. The forefoot may be swollen and tenderness may be felt at the affected metatarsal heads. The plain X-Ray usually does not diagnose the fracture until a callus forms 2 to 3 weeks after the injury. The stress fracture will often show up as hot spots on technetium bone scan.

Treatment

This includes rest, running on soft surfaces and wearing of proper shoes. Healing usually takes 3 to 12 weeks. Recurrent stress fractures should prompt assessment for underlying osteoporosis.

Posterior Femoral Muscle Strain / Hamstring Pull

Clinical Features and Diagnosis

The hamstring muscles refers to a group of 3 muscles that run down the back of the leg and these include the semimembranosus, the semitendinosus, and the biceps femoris, the major actions of which are knee flexion and hip extension.

Hamstring injuries are common in sports that require bursts of speed or rapid acceleration, such as soccer, track and field, football, and rugby[12]. Factors contributing to hamstring injury include inadequate warm-up and the type of activity undertaken. Sports which involve sprinting, jumping and instances in which the muscles contract suddenly and violently (e.g. when a sprinter takes off from the starting blocks or a high jumper takes off from the pit) may cause injury to this muscle group. Frequently there is a muscle strength imbalance. Burkett reported in 1970 that hamstrings were more prone to injury when they were less than 60% as strong as the Quadriceps.

Clinical presentation is that of pain in the posterior aspect of the thigh, especially when the hamstring muscles contract. Differential diagnosis includes sciatica, herniated disk, and deep posterior femoral pain due to stress fractures of the femur which often can only be diagnosed by bone scanning. Point tenderness of the hamstring muscles is noted and the pain extends below the knee, unlike in sciatic pain.

Treatment

Management of acute injury includes the RICE regime and subsequently physiotherapy to strengthen the hamstring muscles. Adequate warm-up, stretching exercises to maintain flexibility and strength training of the hamstrings help precent this injury.

Lumbar Strain / Weight Lifter's Back

Clinical Features and Diagnosis

This refers to injury to muscles or tendons that attach to the vertebral column at the lumbar spine. This occurs commonly in sports that require pushing or pulling against great resistance (eg, weight lifting, football) or sudden twisting of the back (eg, basketball, baseball, golf).

Risk factors for injury include heavy lifting and twisting, poor conditioning and intrinsic factors such as an exaggerated lumbar lordosis, a forward-tipped pelvis, inflexible and weak paraspinal muscles, tight inflexible hamstrings, weak abdominal muscles, and an intrinsically weak lumbar structure (e.g. secondary to lumbar spondylosis, spondylolysis, spondylolisthesis, herniated intervertebral discs, tumor etc).

Clinical presentation is that of sudden onset low back pain while twisting, pushing, or pulling. The pain is aggravated by back movement, particularly bending forward. Physical examination reveals tenderness and paravertebral muscle spasm of lumbar region, aggravated by any movement.

Treatment

The overall goal is to restore normal lumbar spine function and promote safe and independent return to activity[13]. Management of lumbar strain includes bed rest, ice, and compression. Bed rest should be limited to no more than 2 days for nonspecific LBP as prolonged inactivity produces a number of deleterious effects, including decreases in muscle strength, flexibility and cardiovascular fitness[13].

Subsequently, the patient may benefit from back strengthening exercises such as back extensions and postural exercises, as well as those to strengthen abdominal muscles.

Since exaggerated lumbar lordosis increases stress on the muscles and ligaments that support the back, exercises that decrease lumbar lordosis such as rectus abdominis resistance training, and hamstring or quadriceps stretching are helpful.

CONCLUSION

The take home messages are as follows:

- Overuse sports injuries are common and preventable.
- Evaluation of overuse sports injuries require an understanding of which sporting activities are commonly implicated, mechanism of some common injuries, as well as the multiple intrinsic and extrinsic factors that predispose an athlete to development of overuse injuries.
- Training errors, including lack of adequate rest days in between training sessions, significantly contribute to overuse sports injuries.
- Diagnostic imaging and arthroscopy may sometimes be necessary for further evaluation.
- Treatment includes RICE therapy for acute pain, analgesia and rehabilitation.
- Predisposing factors should be addressed and patient education is paramount.

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Multiple Choice Questions

Answer True or False to the following questions

1. The following statements are true for sports injuries.
   a) Sports injuries could result from non-athletic injuries.
   b) Overuse injuries account for up to 50% of sports injuries.
   c) Exercising at a relaxed pace prior to a period of intense exercise predisposes to chronic overuse injuries.
   d) Overuse injuries are often related to a major predisposing factor.
   e) Intrinsic structural abnormalities predispose a person to overuse injuries.

2. The following statements refer to tendinitis.
   a) Rotator cuff tendinitis is least prevalent in sports that require frequent overhead arm movements.
   b) Exercises to strengthen both the wrist flexors and extensors are useful in management of epicondylitis.
   c) Tenosynovitis (inflammation of the tendon sheath) usually occurs independent of tendinitis.
   d) If ignored, the pain, which is initially felt with during the offending activity, becomes persistent and may occur at rest.
   e) Local injections of corticosteroids should be administered directly into the inflamed tendon for best therapeutic effects.

3. The following statements refer to Achilles Tendinitis.
   a) Running on flat ground (e.g. a running track), as opposed to a hilly terrain, predisposes a runner to Achilles Tendinitis.
   b) In the history, it is also important to note the type of footwear worn while not participating in sports activities.
   c) Extra padding at the heel and stiff-soled shoes which do not bend easily behind the metatarsal joints are recommended for patients with Achilles Tendinitis.
   d) The pain may be felt when activity commences and improves as activity is continued.
   e) Early pain is often due to injury of the paratenon rather than the tendon itself.

4. The following statements pertain to knee and thigh injuries.
   a) Patellofemoral pain is typically activity related and worsens when a patient negotiates stairs or runs over hilly terrain.
   b) Factors which predispose to development of patellofemoral pain include a congenitally high-riding patella (patella alta), tightness of the vastus lateralis, iliotibial tract, and lateral retinaculum and weakness of the vastus medialis.
   c) Patellofemoral pain may be relieved by prolonged knee flexion, for example when sitting in a theatre or taking long bus rides.
   d) Differential diagnosis of hamstring strain includes sciatica, herniated disk, and deep posterior femoral pain due to stress fractures of the femur.
   e) Hamstring strains are more likely to occur if the hamstring muscles are as strong as the quadriceps muscles.

5. The following statements refer to metatarsal stress fractures.
   a) The 2nd, 3rd, and 4th metatarsals are unusually susceptible to fracture because of their thin diaphyses.
   b) Patients with a cavus foot are at risk as the ankle has a very high arch and there is reduced pronation when the foot strikes the ground.
   c) Recurrent stress fractures should prompt assessment for underlying osteoporosis.
   d) Pain is usually felt referred to the ankle, is initially brought on by exercise and relieved at rest.
   e) The diagnosis can only be made via Technetium Bone Scanning.

ANSWERS: 1a - True; 1b - True; 1c - False; 1d - False; 1e - True
2a - False; 2b - True; 2c - False; 2d - True; 2e - False
3a - False; 3b - True; 3c - False; 3d - True; 3e - True
4a - True; 4b - True; 4c - False; 4d - True; 4e - False
5a - True; 5b - True; 5c - True; 5d - False; 5e - False