Sports injuries - basic principles

The scope of this topic is vast but an attempt will be made here to cover the essentials. The aim is to help the generalist who does not have special expertise in sports-related injuries in the approach to diagnosis and management. The term 'sportsman' here includes all who partake in physical activity, both male and female, as a hobby or as a career.

Important basic issues for all sports injuries are prevention (eg, warming up, cooling down, stretches), and responding and seeking advice for early warning symptoms before any injury becomes more severe and much harder to resolve.

History[1]

- Find out exactly how the injury occurred. This is essential to understand the mechanism of injury.
    - Ask whether there was direct trauma.
    - If so, ask where, how and in what direction.
    - Try to assess the force of the impact.
    - Establish whether a rotating action was involved.
    - Establish the position of the joints when it happened.
    - Ask the athlete to explain exactly what was happening, especially if you are not familiar with the sport.
- Ask whether the athlete was able to continue the game.
- Ask how long ago the injury took place.

- Establish what has happened since. This may include marked improvement, little improvement or even deterioration. They may have attended A&E and been discharged after an X-ray revealed no fracture.
- Ask whether there has been a similar injury previously.

The next part of the history may be completed before examination or between diagnosis and discussing management:

- Note how often the athlete competes.
- Note at what level the athlete competes.
- Ask how often the athlete trains. This may include number of times a week and number of hours a week.

This will give an indication of how seriously the athlete takes their sport. It may also indicate over-training, a strain or an overuse injury related to the sport.

- Ask how long it has been a problem.
- Ask whether it has been progressive.
- Establish what brings it on.
- Determine the location of the pain.
- Ask about training regimes.
- Note whether the athlete has discussed it with their coach.

Poor technique predisposes to overuse or other injuries, or poor equipment may be at fault.

Examination of sports injuries[1]

Apart from the usual examination specific to the area in question (eg, a joint), assessment of sports injuries should include a functional examination and a biomechanical assessment.

Functional examination will be specific to the sports activity undertaken and may include agility, co-ordination, power and flexibility. The patient should be assessed through the full range of movements involved in participation of the sport.

The knee is very often injured and ability to examine the knee must include the ability to detect instability of ligaments and effusion. Shortly after an injury, especially if there is effusion or spasm of muscles due to pain, it may not be possible to detect instability.

The general principles of examining a joint are as follows:[2]

- Look at the area. Note where there is bruising or swelling. Note if there is any distortion.
- Put the joint through its full range of passive movements in all directions. Some joints have a great variety of movements - for example, the shoulder can flex, extend, abduct, adduct and internally and externally rotate.
- Ask the patient to perform that range of movement actively.
- Test active movement against resistance.
- Stress the joint to detect instability of ligaments.
- Palpate the joint and around it for local tenderness, swelling or effusion and muscle spasm.

If a cause for the pain has not been found, look elsewhere. For example, trouble in the hip can cause pain in the knee and, less often, vice versa. Pain from the back may be referred to the lower limb. Look at stance and gait.

A problem lower down may cause trouble higher up. Flat feet will cause hyperpronation and this may strain the ankle. It can also put a valgus strain on the knee and present as pain and effusion after running.

Inequalities of legs may cause back pain. Thus, correcting flat feet may solve many problems higher up.

- Look at the patient standing with both feet bare. Establish whether the stance looks normal.

- See if it is possible to get a finger under the medial longitudinal arch of the foot.
- Look at the heels from behind. Note whether the line of the Achilles tendon is straight. With hyperpronation it will curve out laterally as it descends.
- With the patient seated, inspect the soles of the feet. There should be callus over the first and fifth metatarsal heads and the heel. Callus over other metatarsal heads or elsewhere on the sole suggests flat feet.

If the patient is complaining of pain associated with running, it is helpful, if possible, to inspect the trainers that are used. If not, at least look at the current pair of shoes.

The sole of the shoes may show uneven wear with perhaps excessive wear on the lateral side of the shoe. Trainers may have a high heel tab that rubs on the Achilles tendon. The trainers may be worn out and may have lost their spring and resilience.

Investigations

- X-rays are mandatory if a fracture or dislocation is suspected but they are of little value otherwise, as they do not show soft tissue well. It is important to get the balance right between excessive requests for X-rays and missing fractures. It should be possible to reduce the number of ankle X-rays whilst not missing fractures by application of the Ottawa rules, as described in the separate Ankle Injuries and Ankle Fractures articles.
- Imaging for soft tissue injury will involve ultrasound, CT or MRI depending on the nature of the injury.[3] However, many injuries can be adequately diagnosed by thorough clinical assessment.

Sportsmen may also be subject to disease, as may anyone else and so other investigations may be indicated.

Sports injuries treatment and management

This article deals principally with the management of sports injuries in primary care. Management in secondary care is increasingly focused on the use of injectable agents under radiological control.[4]

Drugs

The list of banned substances in sport is such that, for the serious sportsman, prescription needs some consideration. There should not be any problem with paracetamol or the non-steroidal anti-inflammatory drugs (NSAIDs) but avoid any codeine-based substances. Topical NSAIDs may be a valid alternative.[5] See the separate Drugs and Sport article.

Acute injury

If a part is injured it will need to be rested; however, simply telling a sportsman to rest it until it gets better will lead to lack of compliance and risk of further injury. A discussion is needed about a programme of rehabilitation back to full activity again.

Active rehabilitation is applicable not just to sports-related injuries but should be part of any programme of rehabilitation.

The mnemonic RICE is well known (**R**est, **I**ce, **C**ompression, **E**levation). It is often extended to PRICER (beginning with **P**rotection - which may mean immobilising the joint - and ending with **R**ehabilitation). Another variation of the mnemonic is PRICEMMM in which the last three letters stand for:

- **M**edication requires NSAIDs or paracetamol for pain relief.
- **M**obilisation early on when pain-free to expedite return to play. Mobility should be graded.
- **M**odalities are exercise and proprioception training to prevent re-injury.[6]

Active rehabilitation

The basic objectives of rehabilitation are as follows:[7]

- Resolution of pain and inflammation.
- Restoration of range of motion.
- Restoration of strength.
- Proprioceptive training.
- Sports-specific activities.

Advice needs to be adjusted to the person and the injury but, as an example, specific advice to an athlete with an injured knee may go like this:

- For the next four or five days you need to keep off that knee as much as possible. Keep it elevated when you can. Take the anti-inflammatory painkillers. If you need to train then just do upper body work. (Similarly, if the upper body is injured, the sportsman may do lower body training and cardiorespiratory fitness whilst resting the upper body.) Static quadriceps exercises can be done at an early stage. Extend the knee to the horizontal position. Pull tightly with the quadriceps. Now invert the foot and feel how the tension moves to the lower vastus medialis. Keep any weights on the ankle light at an early stage.
- After that, it is possible to do some gentle lower body work but start with low intensity and short duration. Avoid running. Cycling or a step machine, cross-trainer or rowing machine in a gym may be satisfactory.
- About 10-14 days from the injury there will be some muscle wasting around the knee and this needs to be built up again. When exercising the muscles, keep movements slow and controlled. Build up the quadriceps but also, when building one group of muscles (agonists), work on the opposing group (antagonists) too. In this case it is the hamstrings.
- If the knee becomes painful or starts to swell, ease back on training again and then gradually build it up.
- Fitness training can be started again using cycling, step machine or cross trainer. Swimming may be possible but see how it goes and avoid breaststroke.
- You can start some gentle jogging about three weeks after the injury. Keep it slow and in a straight line.
- As you become more confident, build up speed. When you can sprint at full speed in a straight line you are about halfway through rehabilitation.
- Then start zig-zagging. Work on rapid changes in direction and twisting around. This builds up strength and position sense (proprioception - see below).

- Only when you can do all of this with great confidence is it safe to go back to active competition.

Proprioceptive exercises have been shown to improve function after ankle and knee damage and reduce the risk of future injury.[8] Proprioception is defined as the ability to establish a sense of position in space and proprioceptive exercises are designed to restore this function in a joint.

Sports injuries in children

Children often get injured in the fun and games of everyday playing and life and usually they heal very fast and without problem. For some children, sport is more than just some fun and they train very hard and long to a high standard.

This is particularly true of swimming, gymnastics and dancing. Children are still growing and the epiphyses of their bones have not yet fused. This makes them very vulnerable to overuse injury.[9] Injuries of the apophyses may also occur, particularly avulsion.[10] However, most diagnoses can be made clinically and most sports injuries in children respond to conservative management.[9]

Most overuse injuries in children involve the lower limbs, especially the knees, ankles and feet. The most typical are Osgood-Schlatter disease and Sever's disease. In both conditions, the tendons remain relatively short during the pubescent grown spurt.[11]

Weight training before puberty should be with the utmost caution, if at all. Beware of the coach who is pushing the child too hard. This is especially a problem if the coach is a parent.

Some people try to live their own frustrated ambitions through their children. The child may be under enormous pressure and whereas they can usually go home and moan about the coach, if the coach is a parent this outlet is closed.

Some children, especially boys, become very awkward and accident-prone at the growth spurt of puberty. This is because their bodies are growing so fast and muscles and proprioception have not yet caught up. Reassurance is required whilst the body catches up with its growth.

Complications

Proper rehabilitation is essential to enable the injury to heal and to reduce the risk of recurrence.

Prognosis

Sportsmen will work very hard to recover as quickly as possible but their impatience must be tempered by the need to achieve full recovery, especially before returning to competition. Different people recover at different rates but, generally, healing is slower with older age.

Sports injury prevention

The rules of sport are often designed or amended to help reduce the risk of injury.[12] There is a widely accepted dictum that warm-up before exercise and, to lesser extent, warm down and stretching after exercise, reduce the risk of injury. The level of evidence for this is poor but the dictum has not been shown to be untrue.[13] [14] One study found that stretching reduced the risk of some but not all injuries; it may, however, reduce soreness.[13]

Before engaging in sport it is important to have adequate training to ensure fitness, especially if sport is being taken up after a period of abstinence. Equipment, not just protective equipment, should be suitable and adequate.

Further reading

- Lin CY, Casey E, Herman DC, et al; Sex Differences in Common Sports Injuries. PM R. 2018 Oct;10(10):1073-1082. doi: 10.1016/j.pmrj.2018.03.008. Epub 2018 Mar 14.

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Authored by:	Peer Reviewed by: Dr Krishna Vakharia, MRCGP	
Originally Published: 20/11/2023	Next review date: 17/08/2023	Document ID: doc_1524

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