

Option 3: Sports Medicine

Research Report – Basketball Injuries



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Basketball Injuries

Basketball is a team sport where the aim is to shoot a ball through a basket to score points while following a set of rules and procedures. It consists of two teams of five players on a rectangular court with baskets at each end. Basketball is a very popular sport, with 1.8 million people in Australia playing it, however it is also one of the most dangerous team sports. Due to its fast-paced, high intensity nature and minimal use of protective equipment, basketball can be dangerous. Basketball injuries are commonly caused by falls, contact with other players, awkward landings, sudden changes in directions and being hit by the ball.



In Australia from July 2000 to June 2004 there were 50090 basketball-related hospital admissions with the average age of patients being 22.2 years, 71.5% male. As shown in the figure 1 graph below, the number of hospital admissions due to basketball injuries in 1998 was 49000, making it the second highest after cycling. However, there has been a decrease in the placing of basketball with other injuries which can be seen in figure 13.21 as it's rank has decreased from second highest to 11th. Although, this is not to say that Basketball injuries have decreased as they have actually increased to 90000 in males due to the number of people playing increasing.

The most common types of injuries in basketball that can be seen in the graph to the right include:

- Lower body injuries, such as a sprained ankle, ACL tear in the knee or thigh contusion.
- Upper body injuries including lacerations and damage to the teeth.
- Hand injuries including finger injuries such as a fractured finger and mallet finger.
- Overuse injuries for example Achilles tendonitis and patella tendonitis or "jumpers knee".

Body Parts	(n)	(%)
Abdomen/trunk	6	7.6
Eyes	5	6.3
Face	8	10.1
Hip/thigh	5	6.3
Head	7	8.9
Neck	4	5.1
Shoulder	2	2.5
Arm	2	2.5
Forearm	1	1.3
Elbow	1	1.3
Wrist & Finger	6	2.5
Leg	2	2.5
Knee	11	13.9
Ankle	19	24.1
Total	79	100.0

The five most common injuries in basketball will be discussed in this report including their classifications, preventative measures available, as well as the correct management procedures that should be performed. These common injuries are a sprained ankle, finger injuries, a torn ACL, Achilles tendonitis and a thigh contusion.

Figure 13.21: Hospitalisation rate per 100 000 population due to sport and recreation injury, by sex, Australia, 2002-03
 (Source: *Hospitalised Sports Injury, Australia 2002-03*, cat. no. INJCAT 79, AIHW, Canberra, March 2006, p. 13.)

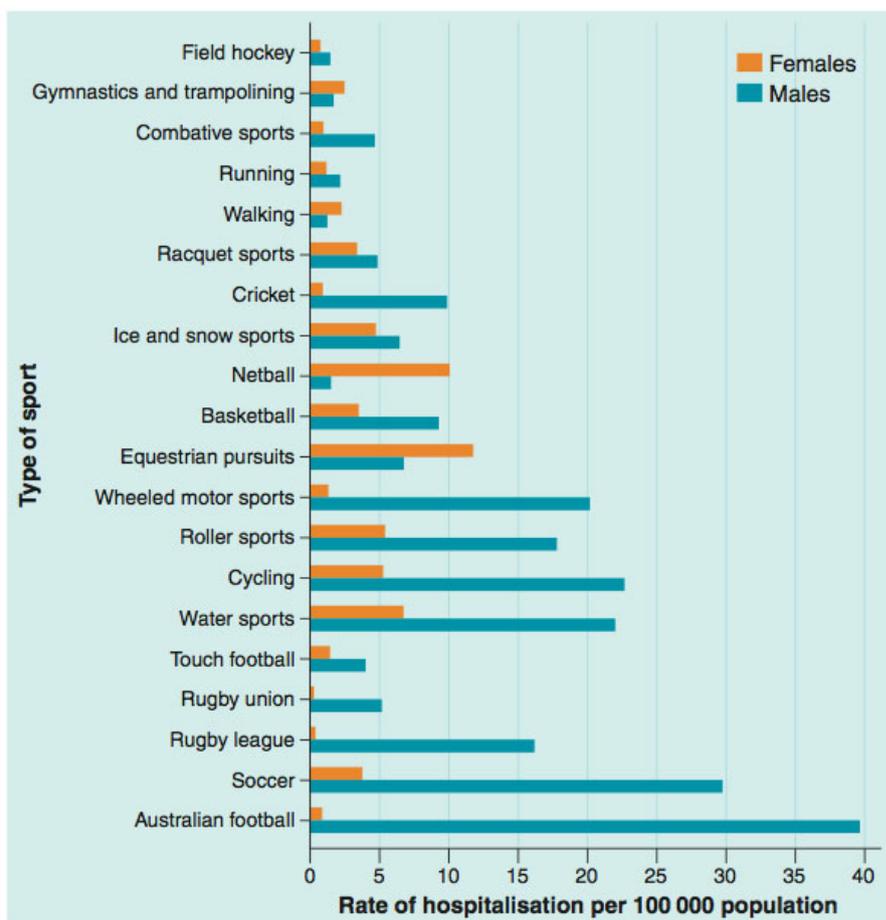
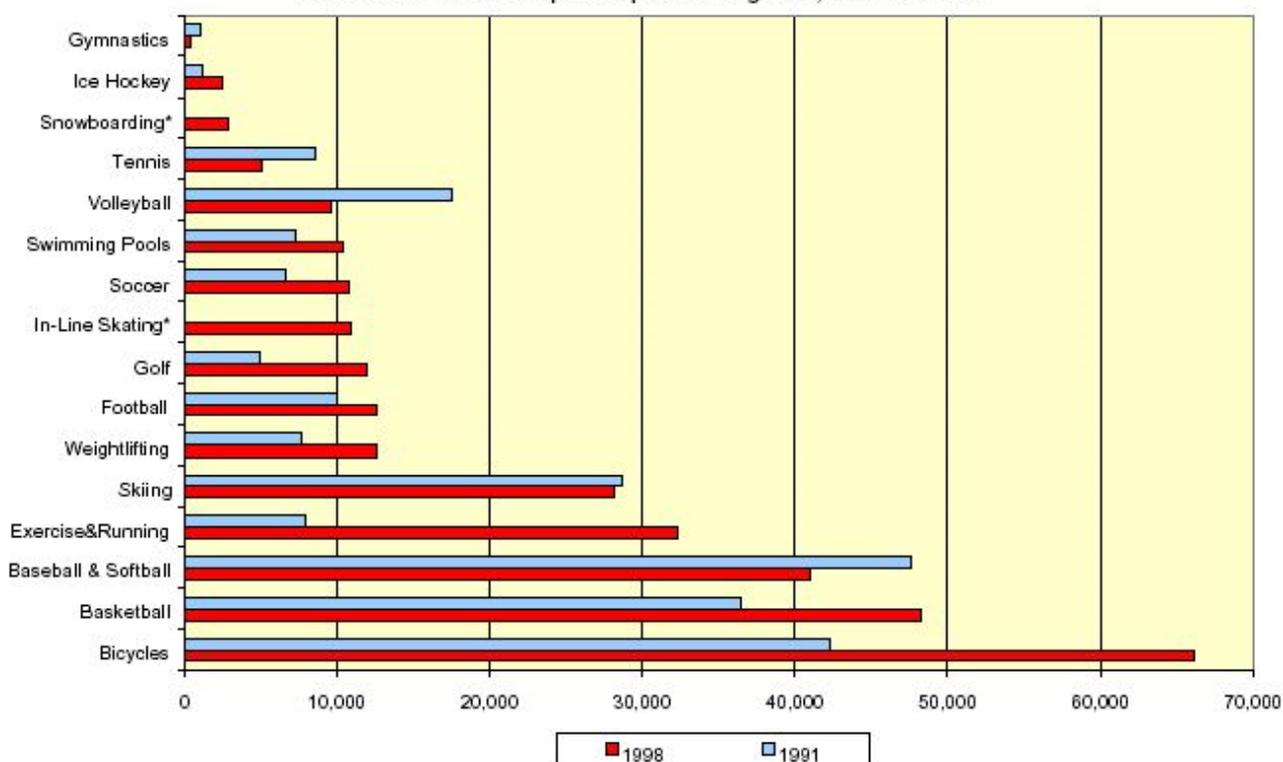


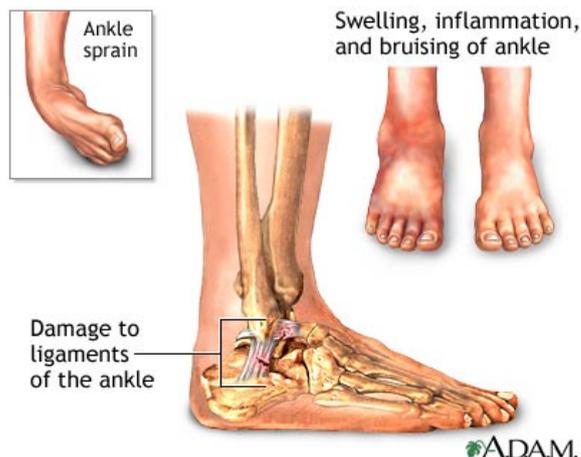
Figure 1. Estimated Number of Emergency Room Treated Injuries Among Persons 35 - 54 Years of Age Associated with 16 Popular Sports Categories, 1991 and 1998



Sprained Ankle

Classification

The most common injury in basketball is a sprained ankle. This can be classified as a soft tissue, direct, acute injury. It is a soft tissue injury as it is damage to the ligaments, it is direct due to the injury being a result of an external force such as the ground or another player, and it is also an acute injury due to the occurrence being sudden. 42% of injuries in basketball occur in the ankle, with the most common type of injury being sprains (43%).



Ankle sprains can be classified into three grades according to severity. A grade one sprain results in some stretching or minor tearing of the ankle ligaments and can result in mild pain, minimal or no joint instability, minor swelling and some stiffness in the joint as well as difficulty walking or running. Grade two sprains involve a moderate tear to the ligament fibres and results in some instability of the joint as well as moderate to severe pain, making walking difficult. Swelling, stiffness and minor bruising is also present in the ankle joint as a result of a grade two sprain. A grade three sprain is a total rupture of a ligament that results in extreme instability of the joint, severe pain, swelling as well as extensive bruising.

Preventative Measures

Many basketball players and other athletes use preventative measures to try and prevent the occurrence and extremity of a sprained ankle. Examples of these types of measures include tape, braces and balance training. Tape and braces can reduce the incidence of ankle sprains and can also reduce the severity of the sprain. It appears that braces effectively prevent ankle sprains more than tape; the picture to the right is an example of an ankle brace. The use of proprioceptive or balance training appears to reduce the incidence of ankle sprains in those who have already experienced a sprain to the same level of those who haven't. Wearing the correct shoes is another preventative measure athlete's use, for example a basketball player is recommended to wear basketball shoes as they provide ankle support, therefore minimising the risk of injuring it.



Management Procedure



The treatment of a sprained ankle can be separated into first aid and long-term rehabilitation. The immediate management procedure for a sprained ankle is T.O.T.A.P.S (talk, observe, touch, active



movement, passive movement and skills test), then R.I.C.E.R (rest, ice, compression, elevation, referral). Rest is important for reducing pain and preventing further damage, the use of crutches is often necessary, the length of time on them varies according to the extremity of the sprain. Ice and compression helps ease the pain, reduce swelling and initial bleeding as well as encourage blood flow. It is recommended that ice be applied immediately after the injury for 15 minutes and to repeat this every 2 hours. Examples of compression include a Louisiana wrap bandaging technique and an ankle support. Elevation also helps reduce bleeding and swelling by flushing away fluids from the injured area through the use of gravity by raising the leg.

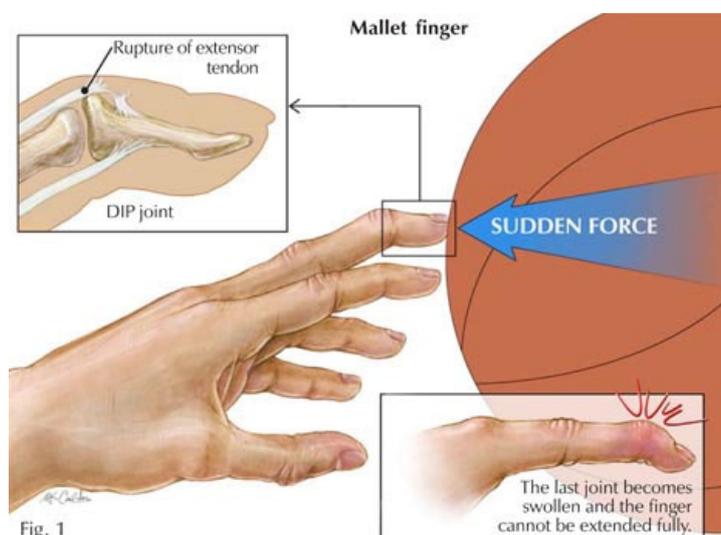
Referral to a doctor, orthopedic surgeon or physiotherapist is recommended as they can determine the type of injury and how to treat it. They may prescribe anti-inflammatory medicines, for example ibuprofen, to help with pain and swelling. Specialists may also perform an ultrasound and laser treatment to reduce pain, inflammation and enable healing. Physiotherapists may also use cross friction massage to reduce scar tissue development and promote healing. Long-term rehabilitation includes a range of motion exercises for example ankle circles with the leg elevated and stretching the calf muscles which have been tightened as a result of the injury to help maintain movement at the joint and reduce swelling. A wobble balance board (pictured below) is also a significant part of rehabilitating ankle sprains and preventing further incidences.



Finger Injury

Classification

Finger injuries are another common injury caused by basketball. Fractures and “Mallet finger” (as shown in the picture to the right) are the most common finger injuries in basketball due to the force of the ball impacting on the finger joint or bone. A fractured finger can be classified as hard tissue, direct, acute injury. It is a hard tissue injury as it involves damage to the bone, direct because it is caused by an external force such as the ball or another player and is acute due to its nature of occurring suddenly. Fractures are the most common injury in basketball



with 46.8% (2384) hospital admissions from 2000-2004, with most fractures occurring in the hand and therefore fingers. Unlike a fractured finger, mallet finger is classified as a soft tissue injury as it is damage to the joint not the bone; it is similarly a direct and acute injury due to the same reasons as a fracture. Symptoms include pain, swelling and stiffness; signs are deformity and changes in position.

Preventative Measures

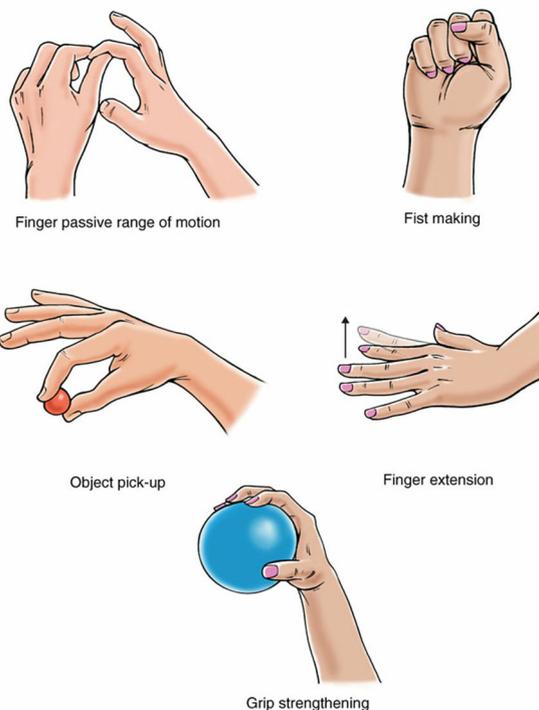
To minimise the risk of suffering from an injured finger there are many preventative measures available. These include learning the correct technique in sports for example in basketball learning how to catch the ball correctly. Eating a diet rich in calcium and vitamin D as well as performing weight-bearing and strengthening exercises as shown in the pictures are other ways to prevent finger injuries as they help build strong bones, ligaments and muscles. Tape is another technique often used by athletes who have recently damaged their finger and wish to prevent further damage or reoccurrence of the same injury. Recognising hazards such as another player colliding into you or a fast ball which you are not ready to catch and responding by performing a closed fist is another way to prevent finger injuries.

Management Procedures

The key to managing finger injuries is to correctly assess the damage to determine the type of injury and apply treatment as soon as possible. It is important for an orthopedist or hand specialist to determine the injury and how to treat it correctly. A physical examination and x-ray are the main ways to assess and diagnose the finger injury accurately. Ultimately this should be done within the first 24-48 hours after the occurrence of the injury.

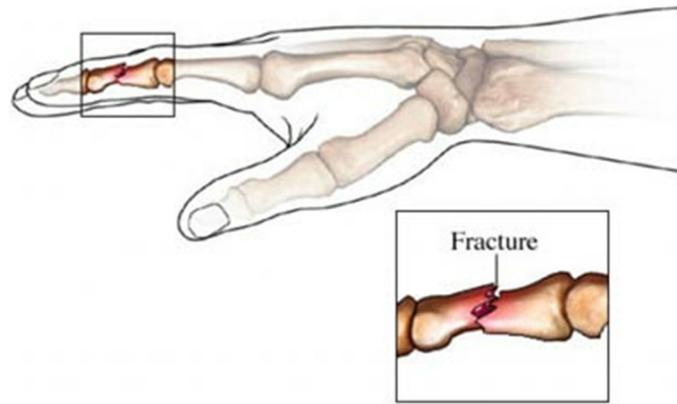
The R.I.C.E.R principle should be applied immediately as well as immobilisation with a splint (pictured right) for all finger injuries. The time for which the finger should be immobilised varies and can be determined by a doctor from the results of an examination and x-ray, as for some injuries, immobilisation is not necessary and may lead to stiffness. An athlete with a misplaced, swollen finger should have an x-ray.

Finger Fracture Rehabilitation Exercises



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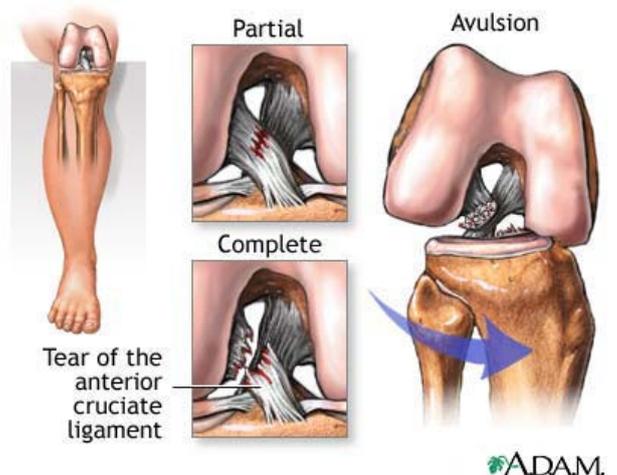




Torn Anterior Cruciate Ligament (ACL)

Classification

A torn ACL is classified as a soft tissue, direct, acute injury. Similarly to a sprain, it is a soft tissue injury because it is a ligament that is damaged not teeth or a bone. This injury is caused by an external force such as another player or object, therefore making it a direct injury. The instant occurrence of this also makes it an acute injury. The ACL is a stabilising ligament of the knee; it is one of four that work together in order for the knee to function correctly. The Femur is attached to the knee by the ACL at the back of the joint and goes down the knee joint to the upper, front part of the tibia. The ACL goes across the knee joint diagonally while the posterior cruciate ligament (PCL) passes in the opposite direction, therefore forming a cross shape or cruciate. The ACL helps prevent the tibia from moving forward and underneath the femur, while the PCL helps prevent it from moving in a backwards direction. Therefore, these two ligaments work together in stabilising the knee joint which is especially important for contact sports such as basketball that require fast changes in direction, twisting and pivoting movements.



ACL tears are categorized according to the extremity of the injury into three grades. Grade one is a mild injury with only a microscopic tear of the ACL which does not affect the ability of the knee joint to support weight, grade two is a moderate injury where the ACL is partly torn and can be unstable, grade 3 is a severe injury where the ACL is completely torn and the knee is very unstable. A rupture of the ACL was a common diagnosis of injured basketball players as it accounted for 354, (7%) basketball related admissions with the average age suffering from it being 25.5 years. Symptoms for an ACL tear include a pop or crack at the time of injury, initial instability, extreme pain, swelling, restricted movement and tenderness.

An ACL injury is often caused by a twisting force applied to the knee while the knee is firmly planted on the ground or from a direct force to the knee, for example a collision with another player. This injury is 2-8 times more common in women than men, reasons are still unknown, however the effect of oestrogen on the ACL is the current believed cause as well as the difference in muscle balance.

Preventative Measures

There are many preventative measures athletes can perform in order to try and prevent a torn ACL or minimise the extremity of the injury. Warming up and stretching before participation in activities as well as performing knee muscle strengthening exercises helps prevent a torn ACL. Other preventative measures that can be performed to avoid this injury include: avoiding sudden increases in intensity of training, wearing a knee brace such as the one pictured to the right when training and competing, as well as wearing supportive, comfortable shoes that fit your foot and sport correctly such as basketball shoes for a basketball player as they enable correct foot alignment which reduces the risk of a twisted knee.



Management Procedures

The R.I.C.E.R procedure should be performed as soon as the injury has occurred. Once referred to a doctor, the knee joint can be properly accessed and x-rayed for confirmation on the injury and whether there are any additional injuries. If required the doctor may refer the patient to another specialist for ACL surgery such as an orthopedic surgeon. A number of factors determine whether or not to operate, such as, age, lifestyle, sporting involvement, occupation, and degree of knee instability. For example, an elderly person who is not very active who suffered the injury from a fall instead of sport is less likely to undergo surgery, whereas a young, fit person who regularly plays sport are more likely to get surgery.

If the ACL is completely ruptured, surgery is required and a pre-surgery rehabilitation program takes place to strengthen the knee as well as reduce the swelling to prepare for surgery. The surgery usually involves either reconstructing or repairing the torn ACL ligament. If the tear is in the middle of the ligament, stitching it back together repairs it. If the bone and ligament have been detached the bony fragment is reattached. Reconstruction can involve either one of two methods; these are with an extra articular technique or an intra articular technique. The extra articular technique involves replacing the ligament with a structure outside the joint capsule such as a portion of the hamstring tendon, whereas the intra articular technique involves taking a part of a structure with in the knee such as a fraction of the patella tendon to replace the ACL. The length of time that the individual is out of action varies on the surgeons approach to rehabilitation. Some recommend an accelerated rehabilitation which enables the athlete to return to competition within 6 months, whereas others may recommend a 9-month rehabilitation period.

Achilles tendinitis

Classification

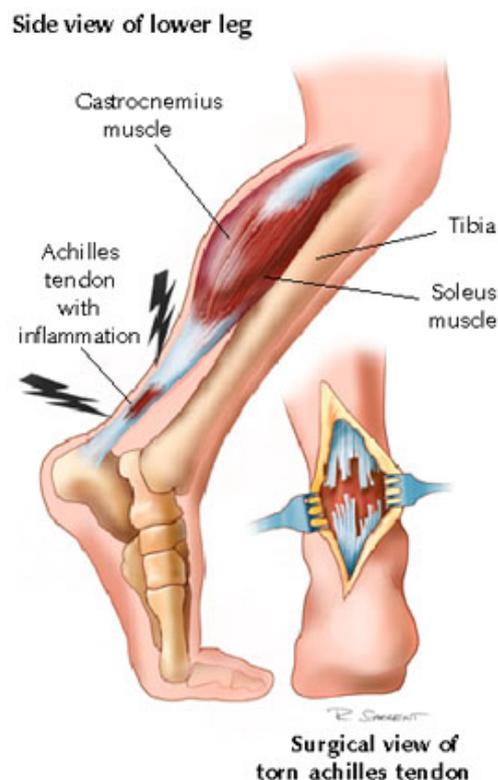
Achilles tendinitis can be classified as an overuse, soft tissue, chronic injury that is caused by constant stress on a particular area. This along with patellar tendonitis “jumpers knee” is common in basketball players. The Achilles tendon connects the back calf muscles to the heel bone and with Achilles tendonitis pain is felt in the back of the leg just above the heel. It is an overuse, chronic injury because it is caused by overuse of the joint over a long period of time from running, changing direction suddenly and landing on hard ground. It is a soft tissue injury because it is damage to the tendon not bone or teeth. Achilles tendonitis is another common injury in basketball, with 381, 7.5% of basketball players admitted into hospital due to this injury with the average age being 35.8.

Preventative Measures

There are many preventative measures individuals can take to prevent Achilles tendonitis, these include; being prepared, wearing the right clothing and equipment, checking the environment is safe as well as knowing yourself and the sport.

Being prepared requires attending training in order for your body to be ready for competition, warming up and stretching before competing as well as cooling down after playing. Wearing the right clothing and equipment involves competing and training in the correct gear for a particular sport. For example in rugby, a mouth guard must be worn at all times and preferably should be custom fit to the athlete’s mouth. Basketball shoes are recommended for basketball players as they provide the correct support around the Achilles tendon for the actions that occur in the sport, such as quick changes in direction and impact of the hard ground on the joint. For instance wearing ‘running’ shoes instead may lead to an overuse injury as they do not provide adequate support for a game of basketball as they are designed to fit the needs of runners. Players who have had previous injuries and are instructed by a doctor or physiotherapist often wear appropriate bracing or protective gear to minimise the impact of continual stress being placed on the tendon.

Another important preventative technique for Achilles tendonitis is to check the environment is safe by removing hazards, for example hard objects on the court such as other balls, rocks and water. Having baskets and boundary lines away from walls is also important as it minimises the impact of coming to a stop quickly which when repeated adds to the risk of developing Achilles tendonitis. The protecting measure of knowing yourself and the sport includes choosing actions suited to your fitness level as overexertion leads to overuse injuries such as Achilles tendonitis. This action can be used in basketball by selecting drills that are reachable at your current fitness level and does not result in excess strain being placed on the joints. Using the right techniques when landing also helps prevent this injury as through knowing how to land in the correct way the impact on the tendon is limited as much as possible. Other products such as heel cups, arch support and custom orthotics can help prevent Achilles tendon injuries.



Management Procedures

There are many management procedures available for the treatment of the Achilles tendon. Rest, ice, immobilisation and nonsteroidal anti-inflammatory medications are ways to decrease swelling and allow healing, however, these are not effective long term because Achilles tendonitis is an overuse injury and can be ongoing problem.

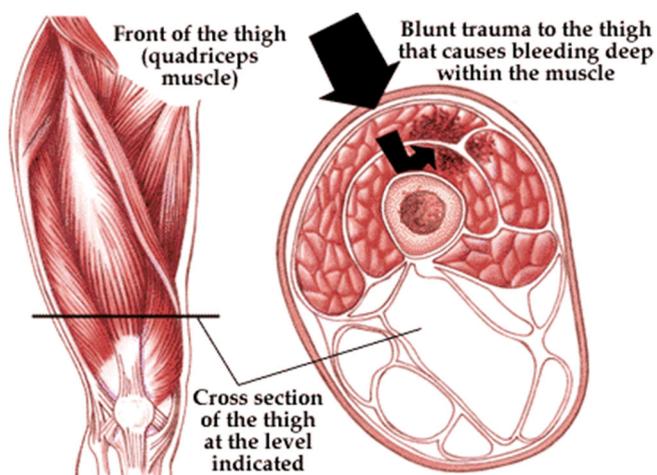
A relatively long-term management procedure is shoe inserts, these minimise the stress placed on the Achilles tendon in basketball, they can come in the form of a heel wedge and can be placed in both athletic and work shoes. The lifting of the heel decreases the amount of force being placed on the Achilles tendon, therefore if worn overtime may limit the effects of Achilles tendonitis. Topical anti-inflammatory medications are a new type of medication applied for the treatment of Achilles tendonitis and can provide long-term relief from inflammation and pain caused by this overuse injury.

Another management strategy proving to be effective for chronic tendon problems is physical therapy. It incorporates stretching and strengthening exercises that promote flexibility and strength of calf muscles and the tendon. Injections such as PRP and Cortisone are also managing Achilles tendonitis symptoms, however because of possible complications and limited effectiveness these injections are sometimes avoided. After all these management procedures have been exhausted which can provide relief to some people, however not to everybody, surgery becomes an option. Surgery can include removing the damage part of the tendon, moving the tendon attachment or lengthening the tendon.

Thigh Contusion

Classification

A thigh contusion is another common injury in basketball; it is usually the result of a direct blow to the quadriceps muscles and in extreme cases the femur, from an external force, therefore making it a direct injury. Compression of the muscle tissue against the femur occurs as a result of the force causing bleeding and muscle tissue damage. Contusions to the thigh are also regularly known as “charley horse” or a “corked thigh”. The four quadriceps muscles are responsible for hip flexion and knee extension therefore damage to these muscles can result in difficulty to perform. Due to their location at the front of the thigh, these muscles are commonly at risk of injuries. A thigh contusion can be classified as a soft tissue, direct, acute injury as it is damage to the muscle however it sometimes can be a hard tissue injury as contusions can penetrate deeply and bruise the bone. It is an acute injury due to the injury occurring instantly.



There can be serious physiological effects after a deep thigh contusion, including hematomas into the injured area and/or hip and knee dysfunction due to crushed muscle tissue. If a hematoma goes into the muscle tissue, myositis ossifians can occur which causes substantial pain and instability for the athlete. A thigh contusion can be categorised into three degrees according to the severity. A first degree contusion results in minimal pain, swelling and tenderness of the muscle. Second degree contusions involve moderate pain and swelling as well as difficulty to flex. A third degree contusion includes severe pain and tenderness with the inability to flex.

Preventative Measures

Preventative measures of thigh contusions in a basketball game can include wearing protective gear such as a thigh sleeve or protective padding as well as performing strengthening exercises (as pictured right) for the thigh muscles such as stretching and flexing the quadriceps often. However, it is almost impossible to prevent this injury from occurring. Although, prevention of myositis ossificans development is possible through correct treatment by a professional, massage or heat being applied to the injury site and allowing the injury heal completely before returning to participation.

Management Procedures

A medical professional, with the use of present signs and symptoms can diagnosis quadriceps contusions. A physician may order an x-ray, MRI or ultrasound if a myositis ossificans is suspected. Initial treatment is necessary in order to minimise the extent of contusion. In the event of a possible thigh contusion, the athlete should be brought immediately out of participation.

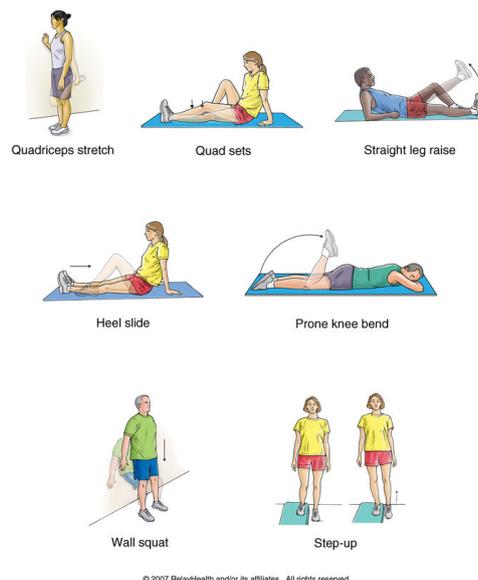
The R.I.C.E.R management procedure should then be utilised with focus on the application of ice for reduction of bleeding and swelling in the muscle tissue. Positioning of the athlete is important to conserve the flexibility of muscle group, therefore, maintaining its functional integrity. The athlete should be placed with the knee bent to their maximal flexion then the ice is to being applied. After ice is applied, a compression wrap should be used around the thigh with slight overlapping circles beginning at the knee then working up the thigh without being too tight. This will enable the swelling to keep out of the muscle tissue. For second and third degree contusions, which make walking difficult, crutches should be used for the first 24-48 hours. To help control hemorrhaging, isometric exercises can be performed as well as stretching. On return to play a thigh sleeve or “donut pad” are helpful for recovery.

A basketball player may return to play when given the right by a sports medicine professional and have completed the ‘return-to-sport criteria’ which includes; Painless full range motion of the hip and knee, equal strength as the uninjured quadriceps and completion of training.



An example of a thigh contusion about to happen with another player’s knee being the external force being applied to the quadriceps.

Quadriceps Contusion (Thigh Bruise) and Strain Rehabilitation Exercises



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