Chapter 7

The Thigh, Groin, Hip and Pelvis

THIGH AND GROIN

In athletics, certain parts of the body are more likely to suffer a specific anatomical injury. For example, ankle injuries are often ligament sprains. Finger injuries, on the other hand, can be to the ligaments, tendons or bones.

In the case of the thigh and groin, most injuries the student athletic trainer sees will be to the muscles.

Anatomy

The muscles in this area control the leg movements of flexion, extension, adduction and abduction.

The strongest muscle group in the body is located on the front of the thigh. Known as the quadriceps group, it is composed of four muscles:

1) Vastus medialis
2) Vastus intermedius
3) Vastus lateralis
4) Rectus femoris

All of these muscles originate on the femur, except for the rectus femoris. It originates on the pelvis.

The quadriceps group converges to form the body's thickest tendon, the patellar tendon. This tendon encases the patella, or knee cap.

On the back of the thigh is another powerful muscle group, the hamstrings. Like the quadriceps, the hamstrings are actually four separate muscles:

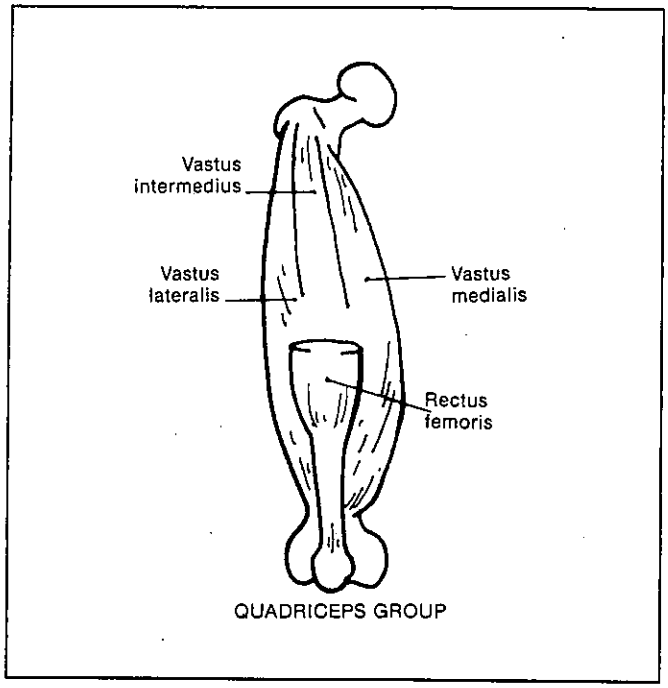
1) Biceps femoris (long head)
2) Biceps femoris (short head)
3) Semimembranosus
4) Semitendinosus

While three of the four quadriceps muscles originate on the femur, the opposite is true for the hamstrings. Only one muscle, the short head of the biceps femoris, originates on the femur; the other three muscles originate on the pelvis.

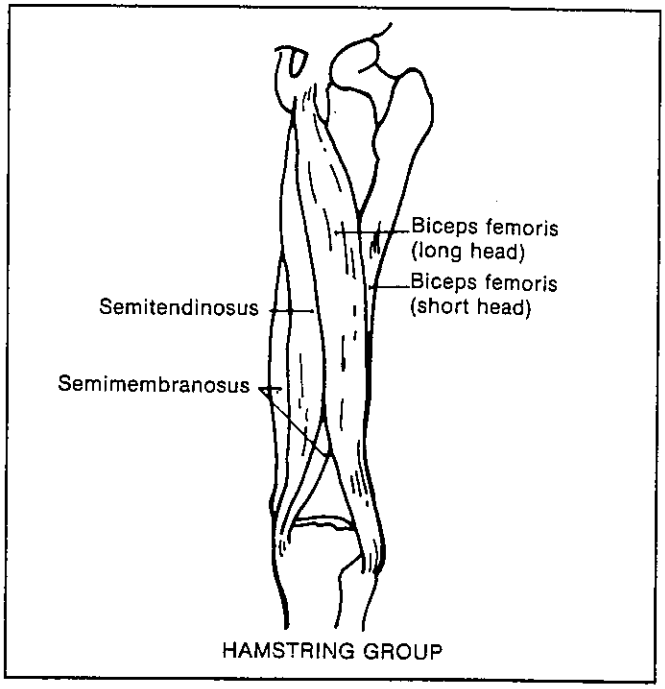
The hamstrings attach to the tibia and the fibula of the lower leg.

The area between the thigh and abdomen is called the groin. The muscles of the groin are:

1) Iliopsoas, or hip flexors
2) Adductor group
3) Rectus femoris



QUADRICEPS GROUP



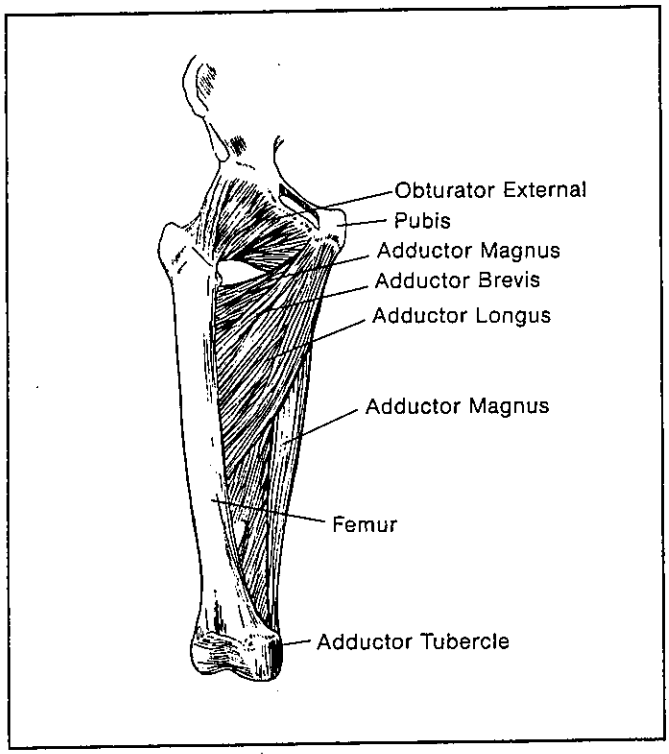
HAMSTRING GROUP

Injuries to the thigh are usually muscular — strains and contusions. The quadriceps muscles, on the front of the thigh, are most likely to be contused because they are so prominent. The hamstrings, on the back of the thigh, are more likely to be strained. (Source: **Modern Principles of Athletic Training,** *5th Edition, Arnheim, 1985.)*

Injuries to the Thigh and Groin

As was stated at the beginning of this chapter, injuries to the thigh are usually muscular — strains and contusions.

On the front of the thigh, the quadriceps are more likely to be contused than strained. This is because they



The deep muscles of the thigh.

are so prominent; the quads can receive blows ranging from minor to severe.

On the back of the thigh, the hamstrings are more likely to be strained than contused. This is because most sporting actions are face to face, making direct blows to the back of the thigh rare. Also, muscle strains are often the result of imbalance between opposite muscle groups. Since the hamstrings are usually underemphasized in strength (and flexibility), they are often much weaker than the muscles performing opposite movements (the quadriceps) and are more likely to be strained.

Thigh Contusions

Often called a charleyhorse, the thigh contusion can be very painful because of the smashing of muscle against the femur. Because the muscles are damaged, the thigh contusion can also be very disabling. (The mechanism and implications of this injury are similar to a contusion of the upper arm — see Chapter 9.)

A player who has suffered a moderate to severe thigh contusion should be removed from the game for treatment. Since the quadriceps group is essential for knee support, an athlete who continues to participate with a thigh contusion is susceptible to a more serious knee injury.

Another reason that a player with a thigh contusion should be removed from the game is the chance that the injury, left untreated, will develop into a crippling condition known as myositis ossificans. Myositis ossificans is formation of calcium, or bone, in the muscle mass during the healing process. Naturally, this formation creates pain and loss of strength.

The minor thigh contusion is one of the many athletic injuries that an athlete may disregard initially and not report until swelling takes place. This is unfortunate because immediate treatment could shorten recovery time, and even prevent myositis ossificans.

To treat thigh contusions, have the athlete sit on the training table with the knee of the injured leg bent. This will keep the quadriceps in a stretched position and help relieve muscle spasm. Insulate the skin with a compression wrap, then place cold packs on the injury. Hold them in place with another elastic wrap. The athlete should rest in this position for about 20 minutes; several cold treatments should be given daily.

In addition to applying an elastic wrap after the cold treatment, a piece of felt or foam rubber can be wrapped directly over the injury for additional compression. If the athlete has a severe enough thigh contusion to cause a limp, crutches should be used. Walking will further stress the damaged muscle, prolonging healing time and causing other problems.

Cold treatments should continue until heat therapy and massage are approved by the physician. Premature use of heat could start the hemorrhage again and increase the chance of calcium formation.

Vocabulary

abduction *— moving a body part away from the midline of the body*

adduction *— moving a body part toward the midline of the body*

charley horse *— thigh contusion caused by the smashing of muscle against the femur*

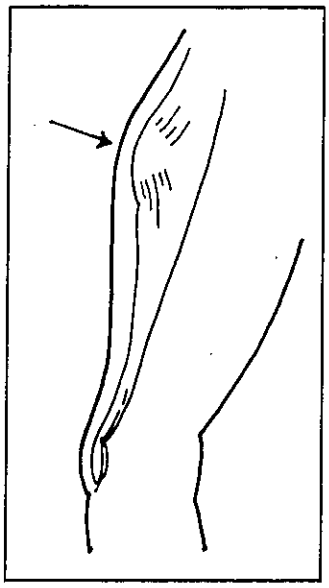
extension *— straightening a joint or increasing the angle between two bones*

flexion *— bending at a joint or decreasing the angle between two bones*

myositis ossificans *— formation of calcium within muscle tissue*

prone *— facing downward*

supine *— facing upward*



The thigh contusion, often called a charleyhorse, is a painful and sometimes disabling injury. (Source: **Modern Principles of Athletic Training,** *5th Edition, Arnheim, 1985.)*

While many athletic injuries can be treated aggressively, the thigh contusion must receive conservative treatment and rehabilitation. A gradual increase in exercise will be allowed by the physician as pain permits. Additional protective padding is recommended to prevent re-injury.

Hamstring Strain

The hamstrings are usually weaker than the quadriceps. If the strength imbalance is too great, a hamstring strain can eventually result. Other reasons for this common muscular strain are fatigue, inflexibility and uneven strength between the left and right hamstring groups.

The hamstring strain can be a nagging injury that takes a long time to heal. It can range from mild to severe. Even moderate strains can keep an athlete out of action for 1-3 weeks; severe strains can require surgery, resulting in disability for the entire season.

First aid includes compression and cold treatments. Pain-free range of motion and flexibility must be established before weight training or sprinting is begun. Taping or wrapping the thigh to provide support of the hamstrings is often helpful in providing comfort. However, the wrap should not be so tight as to restrict blood flow.

Because of the chance of long-term exclusion from sports, an athlete will want to work to gain the strength and flexibility needed to ward off muscle strains to the important hamstring group.

Groin Strain/Hip Flexor Strain

Originating on the hip, running through the groin area and inserting on the femur are the muscles that control adduction of the leg and hip flexion. Actions controlled by the groin muscles include changing directions while running.

Early-season practices, when the muscles are weak and inflexible, is the time when many groin strains occur. Sudden slips on wet turf or a dusty court can also strain the muscles.

Groin injuries are difficult to manage, as they are awkward to treat and support. In addition, they are slow to heal.

Before treating groin strains, the student trainer or coach must conduct functional tests to locate and identify the injured muscles. Once the injury site is located, treatments and support can be concentrated on that area.

Most groin strains in sports are to the adductor muscle group.

In the first test, called the adductor test, the athlete lies supine on the training table with the leg on the injured side abducted. Against the student trainer's hand resistance, the athlete attempts to adduct the leg. Pain will indicate the area of damage.

In the second test, the athlete sits on the edge of the training table and attempts to raise the hip on the injured side. Hand resistance is applied to the top of the knee. Again, pain will indicate the area of muscle strain.

As with all muscle injuries, first aid calls for immediate cold and pressure with a spica wrap. The wrapping technique is pictured.

When the trainer and physician are sure that internal bleeding has stopped, heat treatments may be recommended before exercise. Cold should always be used immediately after practice or exercise.

In order to rehabilitate the groin/hip flexor strain, the athlete must perform gentle stretching and strengthening exercises.

One exercise that stretches the adductor muscle is as follows: The athlete sits on the floor with feet together and knees bent. The arms are used for assistance as they gently push the knees toward the floor.

An athlete who is just coming off a groin strain will be unable to attain the complete stretch position at first. Pain should limit the stretch; sharp pain means the athlete is overdoing the stretch.

In order to strengthen the adductors, the athlete can use both isometric and resistance exercises. The movements are the same as in the two functional tests described earlier.

As an isometric exercise, the athlete can sit on the floor with legs spread and try to adduct both legs against an object, such as the legs of the training table. Objects of different widths should be used to strengthen the adductors at various points throughout the range of motion. Manual resistance from the student trainer can also be used to strengthen the muscles.

During the early stages of rehabilitation, the athlete can wear the spica wrap for comfort. However, do not let the athlete rely on this wrap as a psychological crutch.

It is important that the wrap be removed very shortly after the rehabilitation phase has begun. Removal of the wrap will also allow increased circulation, helping to remove the waste products from the injury and renew the area with fresh tissue through the natural healing process.

HIP AND PELVIS

Athletic injuries to the hip and pelvis are rare. A student athletic trainer will rarely see any other injuries besides a painful, limiting contusion known as the hip pointer.

Anatomy

One reason there are few sports injuries involving the hip is the strength of the area. Its strong arrangement of bones, muscles and ligaments makes the hip joint the strongest in the body.

The hip joint is a classical ball and socket joint. It is formed by the spherical head of the femur fitting into the deep socket of the hip.

There are three parts of the hip: the ilium, the ischium and the pubis.

The hip and two sets of fused vertebrae make up the pelvis. These vertebrae are called the sacrum and coccyx.

You will remember that some of the muscles that move the leg attach to the pelvis. Also attached to the pelvis are groin muscles and various muscles involved in supporting and bending the trunk.

The Hip Pointer

Mechanism of Injury

Some of the muscles that control trunk movement attach to the anterior iliac crest. There is little natural protection over this area. Because of this, the muscles can be bruised from a direct blow, such as from a football helmet, from a kick, knee or elbow, or from falling on the floor.

If the force is severe, the muscles can be pinched against the crest of the ilium; bruising or shearing can take place. This injury is called a hip pointer, and it can range from mild to severe.

With all hip pointers, there is immediate pain; swelling may or may not be present. Any movement requiring involvement of the trunk will result in more pain. Severe hip pointers are quite limiting because of the common functions of the damaged muscles.

Evaluation

The history of this injury may reveal a direct blow to the area; or, repeated instances of contact may be revealed, such as a volleyball player having repeatedly dived for low balls.

Swelling may be immediate and progressive; a lump of fluid may eventually appear at the injury site. When the student trainer palpates the injury, the pain will be very localized around the bony prominences of the hip. Any twisting or bending of the trunk may produce pain from the damaged muscles. A moderate to severe hip pointer will eventually produce discoloration and muscle spasm.

Because swelling and pain may spread rapidly, an evaluation should be done immediately. Tenderness on the iliac crest is an indication that muscle has been sheared. No tenderness on the iliac crest is probably a sign that the injury is less severe. By determining the injury's severity, the athletic trainer may be able to determine probable disability time.

Treatment

Regardless of the severity of a hip pointer, there will be immediate hemorrhage. The student trainer can help control this with pressure and cold.

Use a wet 4″ or 6″ double-length elastic wrap around the pelvis to provide initial compression. Then, apply cold for 20 minutes every hour. Maintain compression using a felt or foam pad at all times; the athlete should remove the wrap before going to sleep, however. The athlete should avoid any form of heat during the early treatment period, including the direct spray of a hot shower.

The first thing the next morning, the athlete should apply compression and cold again. Continue cold treatments at least until hemorrhage has stopped. Internal bleeding may last several days, depending on the injury's severity.

Follow-up treatments can be in the form of cold or heat. Heat treatments are often in the form of hot towels or hot packs. Cold should always be used after practice until healing is complete.

Prevention

Although hip pointers cannot be completely prevented, perhaps the severity can be minimized if you will take time to check your athletes' hip pads. Make sure that football players are wearing pads and that they are in the correct position. Hip pointers can also be prevented in volleyball if players wear pads.

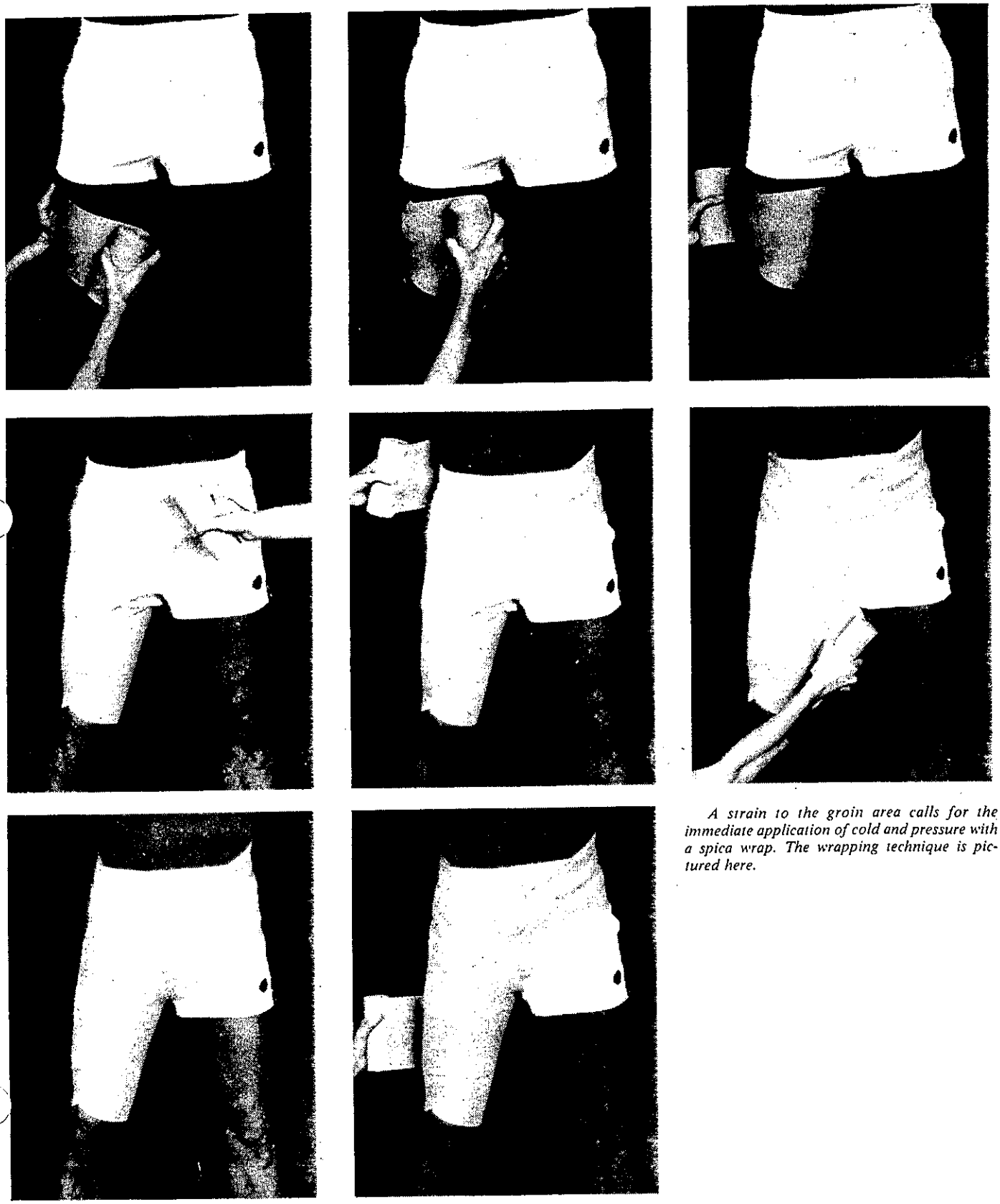
One final note on hip pointers. A blow severe enough to cause a hip pointer may also be strong enough to cause damage to an internal organ. The student trainer should watch for signs of such an injury. (See Chapter 8.) If any of your athletes suffers from a hip pointer, take action immediately with ice and compression and protect the injury until all soreness has ceased.

Other Injuries

Injury to the coccyx

The four fused vertebrae on the lower end of the spine are called the coccyx, or tail bone. Often, this area is bruised from falling on a hard surface.

Most injuries to the coccyx will be contusions,



A strain to the groin area calls for the immediate application of cold and pressure with a spica wrap. The wrapping technique is pictured here.

although severe trauma could cause a dislocation or fracture. Contusions, of course, are treated with cold.

Pelvic Fractures

Fractures of the pelvis in athletics are extremely rare. To fracture the large, strong bones of the pelvic region requires a tremendously forceful impact.

As with any fracture, the athlete should be treated for shock and transported to the hospital. Because of the great force required to cause a fracture, damage to internal organs should be suspected.

Hip Dislocation

A hip dislocation is a dangerous condition that should only be handled by emergency medical personnel.

In most cases, the athlete will be lying on his or her back. The leg on the injured side will be flexed and externally rotated.

Never attempt to reduce such a dislocation. Nerves and blood vessels could become permanently damaged by the head of the femur.

Trauma to the Genitalia

Although female athletes can suffer trauma to the reproductive system, those injuries are extremely rare when compared to injuries to the male genitalia. This area has a good supply of blood and nerve endings. A direct blow could cause excruciating pain and temporary disability.

A contusion to the testes will produce the same physiological tissue reaction as contusions to other body parts. There is hemorrhaging, fluid effusion and muscle spasm. One method of relieving this spasm is to have the athlete lie on the ground and flex his thighs to his chest.

A cold pack should be applied to the area.

Review Questions — Part One

1. The strongest muscle group in the body is the _____ group. The four muscles that compose this group are the _____ _____, _____ _____, _____ _____ and _____ _____.

2. The muscles of the groin are the _____, the _____ group and the _____ _____.

3. The mechanism and implications of the thigh contusion injury are similar to a contusion of the _____ _____.

4. The formation of calcium, or bone, within the muscle mass during healing is known as _____ _____.

5. A _____ is the bruising and destruction of soft tissue cells as a result of a direct blow.

6. The hip joint is formed by the spherical head of the _____ fitting into the deep _____ of the hip.

7. Before treating groin strains, _____ _____ must be conducted to identify the injured muscles.

8. The groin muscles control hip flexion and _____ of the leg.

9. The _____ joint is the strongest in the body.

10. With a hip pointer, there is also a danger of injury to an _____ _____.

Review Questions — Part Two

1. Are the hamstrings more likely to be contused or strained? Why?

2. Are the quadriceps more likely to be contused or strained? Why?

3. Why should a player who has suffered from a thigh contusion be removed from the game?

4. Describe the proper treatment of a thigh contusion.

5. Name the four hamstring muscles.

   1. 3.

   2. 4.

6. List four common causes of hamstring strains.

   1. 3.

   2. 4.

7. Define these terms:

   prone

   supine

   medial

   lateral

   distal

   proximal

   abductor

   flexion

   extension

8. Describe two tests to determine the extent of an injury to the abductor muscles.

9. Explain why the hip joint is the strongest in the body.

10. What is the purpose of functional tests?