



Apophyseal Injuries of the Pelvis in Young Athletes

BY: **Bill Primos, MD**

The skeletal system in young athletes has unique characteristics which make these individuals more susceptible than adults to certain types of injuries. One of these unique characteristics is the presence of **apophyses** on certain bones. An **apophysis** is an area of growth cartilage found throughout a child's body and serve as attachment sites for muscles and tendons.

Sports injuries that occur to the apophysis can be either repetitive/overuse or acute/traumatic type.



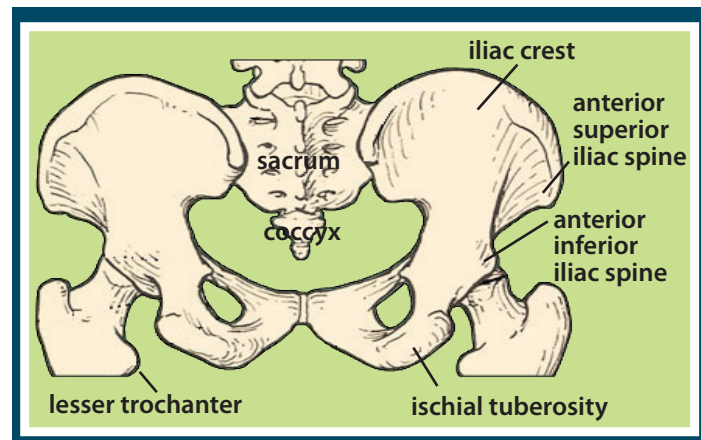
The overuse type of apophyseal injury is called **apophysitis**. In an apophysitis there is repetitive pulling of the muscle on the bone at its insertion site. This results in irritation and partial avulsion of the apophysis. In the past, it was felt that apophysitis was always due to inflammation of the area. Recent evidence suggests that apophysitis may be due to many small fractures similar to stress fractures.

Acute/traumatic injuries occur suddenly with a specific event. In an acute apophyseal injury, there is an avulsion fracture which occurs

when the muscle suddenly contracts and pulls a piece of bone from its insertion site.

There are several apophyses located in the pelvic and hip region that may be injured in young athletes. Some of the most commonly injured apophyses include the iliac crest, the anterior superior iliac spine, the anterior inferior iliac spine, the ischial tuberosity, and the lesser trochanter.

The iliac apophysis is located on the iliac crest on the upper pelvis. Muscles of the back, abdomen, and sides of the trunk connect to the pelvis at the iliac apophysis. Athletes who participate in



activities that involve repetitive activities, that involve twisting and bending of the trunk, are at risk of developing **iliac apophysitis**. This condition is especially common in distance runners.

Symptoms of iliac apophysitis include pain and tenderness over the iliac crest. Tenderness is often bilateral. Bending or rotating the trunk worsens pain. Radiographs are usually normal, but there may be widening of the apophysis.

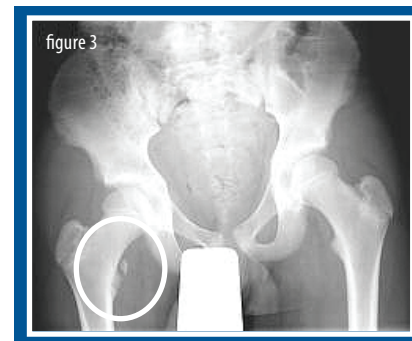
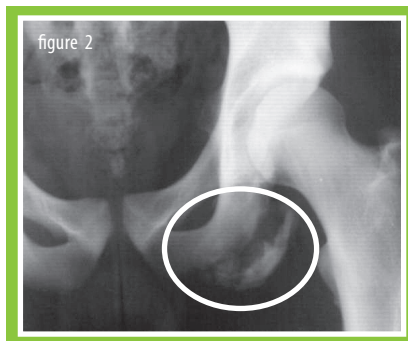
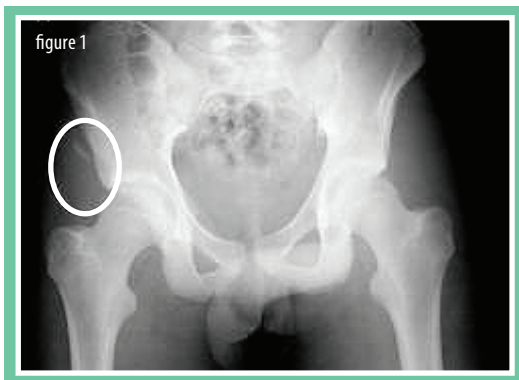
Treatment is rest, avoid painful activities, application of ice, and use of anti-inflammatory medication. Physical therapy with rehab exercises also helps recovery.

The anterior superior iliac spine is located on the anterior aspect of the upper pelvis. The sartorius muscle inserts at the anterior superior iliac spine or ASIS. An **ASIS avulsion fracture** (*figure 1*) occurs when there is a sudden contraction of the sartorius muscle such as when the hip is extended and the knee is flexed. This is common in sprinters and hurdlers.

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The rectus femoris muscle inserts on the pelvis at the anterior inferior iliac spine or AIIS. An **AIIS avulsion fracture** occurs when there is a forceful contraction of the rectus femoris. This may occur when a sprinter comes out of the blocks or when a person kicks.

An athlete with an iliac spine avulsion fracture usually experiences an acute onset of pain accompanied by a sudden pop. Symptoms include difficulty walking due to pain. Movement of the hip is painful. Hip flexion strength is decreased. There is usually tenderness of the anterior pelvis over the area of the avulsion.



Symptoms of a lesser trochanter avulsion fracture include pain in the anterior hip or groin, difficulty walking due to pain, and inability to flex the hip while seated.

Treatment of an avulsion of a pelvic apophysis is rest, with the hip in a relaxed position, to avoid pulling of the involved muscle. Crutches should be used to get around for the first two weeks. Then a rehabilitation program can help restore flexibility, strength and function. It may take 6 to 10 weeks before pain-free return to sports is possible. Some patients may need surgery if there is too much displacement of the fragment.

The ischial tuberosity is located on the lower pelvis at the inferior buttock where the hamstring muscle inserts on the pelvis. An **ischial tuberosity avulsion fracture** (figure 2) occurs with a sudden contraction of the hamstrings. This may occur with sprinting, long jumping, or performing a split.

Symptoms of an ischial tuberosity avulsion fracture include pain and tenderness of the inferior buttock, difficulty walking due to pain, and pain with stretching the hamstrings.

The lesser trochanter is located on the inner aspect of the upper thigh bone or femur where the iliopsoas muscle inserts. A **lesser trochanter avulsion fracture** (figure 3) may occur with sudden hip flexion during activities such as kicking, sprinting, and jumping.

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