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# Limb Pain Syndromes

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## 10. Osteochondrosis (Synonyms: osteonecrosis, avascular necrosis)

### 10.1 What is it?

The word "osteochondrosis" means "bone death". It refers to a diverse group of diseases of unknown cause, characterised by interruption of blood flow to the ossification centre of the affected bones. At birth, bones are mostly made of cartilage, a softer tissue that is replaced over time by a more mineralized and resistant tissue (the bone). This replacement begins at specific sites within each bone, areas known as ossification centres, spreading out to the rest of the bone over time. Pain is the main symptom of these disorders. Depending on the bone affected, the disease receives different names.
The diagnosis is confirmed by imaging studies. X-rays show, in sequence, fragmentation ("islands" within the bone), collapse (breakdown), sclerosis (increased density, the bone looks "whiter" on the films) and, frequently, re-ossification (new bone formation) with reconstitution of the bone contour.
Although it may sound like a serious disease, it is quite common in children and, with the possible exception of extensive involvement of the hip, it has an excellent prognosis. Some forms of osteochondrosis are so frequent that they are considered a normal variation of bone development (Sever´s disease). Others may be included in the group of "overuse syndromes" (Osgood-Schlatter, Sinding-Larsen-Johansson diseases).

### 10.2 Legg-Calvé-Perthes Disease

### 10.2.1 What is it?

This disease involves avascular necrosis of the femoral head (the part of the thigh bone closest to the hip).

### 10.2.2 How common is it?

It is not a common disease, reported in 1/10,000 children. It is more frequent in boys (4/5 boys for every 1 girl) between the ages of 3 and 12 years and occurs particularly in children 4 to 9 years old.

### 10.2.3 What are the main symptoms?

Most children present with a limp and variable degrees of hip pain. Sometimes pain may not be present at all. Only one hip is usually involved but in about 10% of cases the disease is bilateral.

### 10.2.4 How is it diagnosed?

The mobility of the hip is impaired and may be painful. X-rays may yield normal findings at the beginning but later show the progression described in the introduction. Bone scans and magnetic resonance imaging detect the disease earlier than X-rays.

### 10.2.5 How can we treat it?

Children with Legg-Calvé-Perthes disease should always be referred to a paediatric orthopaedic department. Imaging is essential for diagnosis. Treatment depends on the severity of the disease. In very mild cases, observation may be sufficient, as the bone heals by itself with little damage.

In more severe cases, the goal of therapy is to contain the affected femoral head within the hip joint, so that when the formation of new bone starts, the femoral head recovers its spherical form.

This goal may be achieved to a variable degree by wearing an abduction brace (younger children) or by surgically reshaping the femur (osteotomy, cutting a wedge of bone to keep the femoral head in a better position) (in older children).

### 10.2.6 What is the prognosis?

The prognosis depends on the extent of femoral head involvement (the less, the better) as well as on the age of the child (better if under 6). Full recovery takes 2 to 4 years. Overall, about two-thirds of affected hips have a good long-term anatomical and functional outcome.

### 10.2.7 What about everyday life?

The limitations for daily activities depend on the treatment applied. Children under observation should avoid heavy impact to the hip (jumping, running). However, they should carry on with an otherwise normal school life and participate in all other activities that do not involve heavy weight bearing.

## 10.3 Osgood-Schlatter Disease

This condition results from repeated trauma to the ossification centre of the tibial tuberosity (a small bone crest present in the upper leg) by the patellar tendon. It is present in about 1% of adolescents and is more common in individuals who play sports.

Pain worsens with activities such as running, jumping, going up or down stairs and kneeling. The diagnosis is established by the physical examination, with a very characteristic tenderness or pain, sometimes accompanied by swelling, at the insertion of the patellar tendon into the tibia.

X-rays might be normal or show small fragments of bone in the tibial tuberosity. Treatment involves adjusting the level of activity to keep patients pain-free, applying cold packs after sports and rest. The condition resolves over time.

## 10.4 Sever´s Disease

This condition is also called "calcaneal apophysitis". It is an osteochondrosis of the calcaneal apophysis of the heel bone, probably related to the traction of Achilles tendon.

It is one of the most common causes of heel pain in children and adolescents. Like other forms of osteochondrosis, Sever´s disease is activity-related and more common in males. Its onset is usually around

7-10 years of age, with heel pain and occasionally a limp after exercise. The diagnosis is made by the clinical examination. There is no need for therapy other than to adjust the level of activity to keep the child pain-free and, if this approach does not work, to use a heel cushion. The condition resolves over time.

## 10.5 Freiberg´s Disease

This condition describes the osteonecrosis of the head of the second metatarsal bone in the foot. Its cause is probably trauma. It is uncommon and most cases involve adolescent girls. The pain increases with physical activity. The physical examination shows tenderness under the second metatarsal head and occasionally swelling. The diagnosis is confirmed by X-rays, although it may take two weeks from the beginning of the symptoms before changes are detectable. Treatment includes rest and a metatarsal pad.

## 10.6 Scheuermann´s Disease

Scheuermann’s disease or "juvenile kyphosis (roundback)" is an osteonecrosis of the ring apophysis of the vertebral body (the bone on the periphery of the top and bottom of each vertebra). It is more common in adolescent boys. Most children with this condition have poor posture, with or without back pain. The pain is activity-related and may be relieved by rest.
The diagnosis is suspected upon examination (sharp angulation in the back) and confirmed by X-rays.
To receive a diagnosis of Scheuermann´s disease, the child must have irregularities of the vertebral plates and anterior "wedging" of 5 degrees in at least three consecutive vertebrae.
Scheuermann´s disease usually does not require therapy other than to adjust the level of activity of the child, observation and, in severe cases, bracing.