

LEGG CALVE PERTHES DISEASE



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Synonyms:

- Perthes disease
- Pseudocoxalgia
- Coxa plana
- Osteochondritis deformans coxae juvenilis

Definition:

- It's a disorder affecting the capital femoral epiphysis
- It's the most common form of osteochondroma.
- Loss of blood supply to the head of the femur leads to its avascular necrosis.

Anatomy:

- Femur ossifies from one primary and 4 secondary centers.
- One of the secondary centers is the head of the femur also known as capital femoral epiphysis which appears after 1 year of the birth.

Capital femoral epiphysis:



Blood supply to femoral head:

- Birth to 4 years old

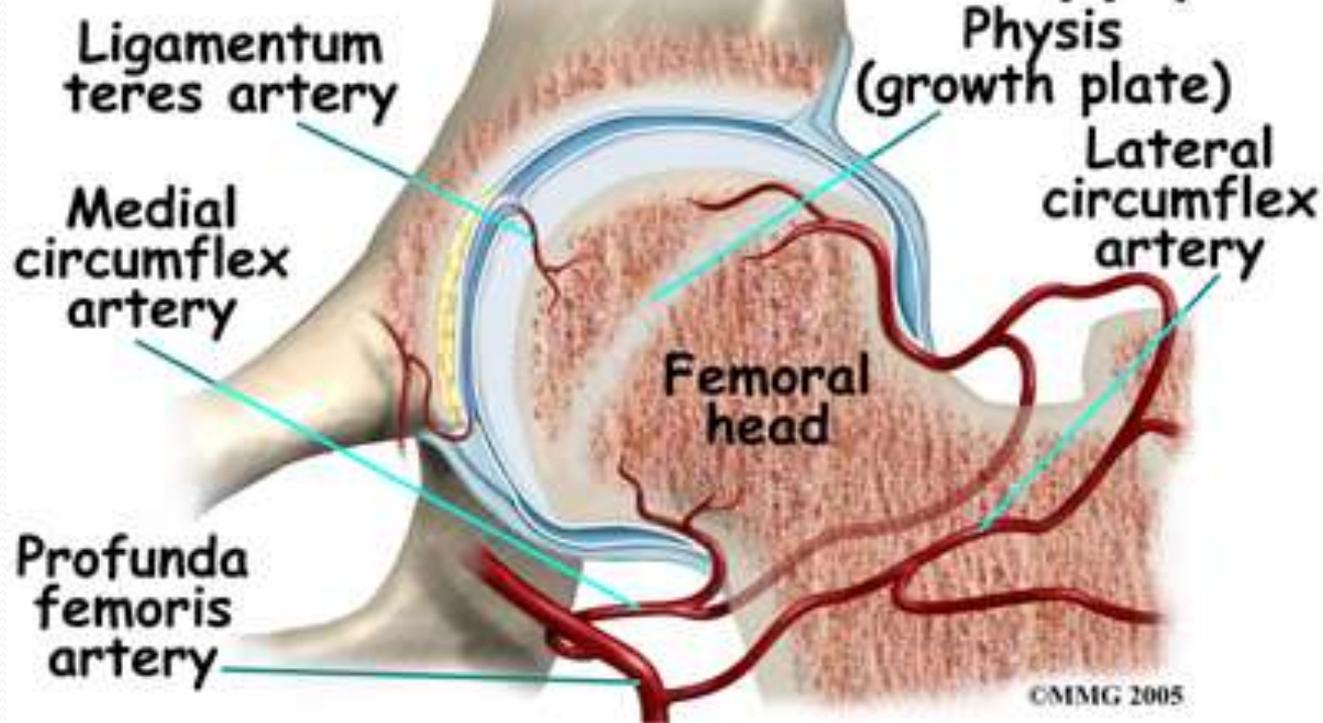
Mainly from transepiphyseal artery crossing the physis especially early phase of this age group.

Supply from retinacular artery which starts to develop later

- 4 - 7 years old
Solely from retinacular artery via posterior ascending branch of medial circumflex femoral artery.
Other name for retinacular artery are capsular and lateral epiphyseal arteries.
- Transepiphyseal artery fades away and no longer penetrates the physis to supply femoral epiphysis.
Artery from ligamentous teres just starts to develop at end of this age group
Insult during this age group has been postulated as theory for disturbance of blood supply to femoral head (retinacular artery) leading to AVN. But the real pathogenesis is still unknown.

- More than 7 years old
Artery from ligamentous teres
Retinacular artery.
- Adolescent
Retinacular artery.
Metaphyseal artery from metaphysis to
epiphysis since growth plate already fused.
Ligamentum teres artery.

Femoral Head Blood Supply



Etiology:

- Traumatic effusion – effusion following trauma increases the intracapsular pressure and may jeopardize the blood supply to the head of the femur as the lateral epiphyseal blood supply constrict under pressure.
- Inflammatory conditions: any inflammatory condition of the hip e.g. synovitis, septic arthritis.

- Epiphyseal dysplasia: irregular ossification
- A few medical conditions e.g. rickettsial infections, caisson's disease and gaucher's disease.
- Abnormal growth and development: its manifestation is of an unknown systematic disorder rather than isolated abnormality of the hip joint. Bone age of children with Perthes disease is typically lower than their chronological age by 1 to 3 years, as a result the affected child is shorter than normal.
- Nutritional factor: majority of them belong to the poor class.
- Sex ratio: 4:1 (Male: female)

Pathogenesis:

- Perthes disease is an osteochondrosis of the capital femoral epiphysis. Osteochondroses occur when the blood supply to the epiphysis is interrupted. In LCP disease, disruption of blood supply to the capital femoral epiphysis causes infarction of the bone (avascular necrosis) and subsequent cessation of growth of the ossific nucleus.
- The infRACTED epiphyseal bone softens, dies, and is gradually absorbed. Left untreated, the epiphysis will eventually collapse from the pressure of the body's weight.

- The body's reparative processes work to replace the dead bone with new bone and cartilage that grows in from the adjacent non affected viable bone (slow revascularization called as creeping substitution). Complete healing generally does occur, but it may take up to 3 to 4 years.
- The newly healed epiphysis may be left with residual deformity and never regain a totally normal shape and appearance. Residual deformity can lead to serious disability later in life. Some flattening of the epiphysis, referred to as "coxa plana," can occur.

- In more severe disease, complete collapse can occur, with the femoral head mushrooming around the femoral neck. Because younger patients have more growth potential for reformation and remodeling of bone, they tend to have better outcomes
- Vascular insufficiency in the form of recurrent episodes of ischemia to the proximal femoral epiphysis causes infarction and necrosis of bone.

- Certain metaphyseal changes are also seen such as

- Presence of adipose tissue
- Osteolytic lesion
- Disorganized ossification
- Extrusion of growth plate.

This therefore leads to altered longitudinal growth of the proximal femur, coxa vara, higher greater trochanter and shortening by 1 to 2cms.

- There has been much speculation recently that clotting abnormalities associated with vascular thrombosis may be responsible for the impaired blood supply in Perthes disease
- Some evidence suggests that affected children have a greater incidence of disorders that increase clotting (thrombophilias) or decrease the ability to dissolve clots (hypofibrinolysis)

Clinical presentation:

- It typically affects the short statured and active boys. (delayed bone age).
- Pain and limp are almost simultaneous.
- The pain may be mild or even absent initially, and the onset of limp is often insidious.
- In the acute phase, the child may have an antalgic gait (short-stance phase secondary to pain in the weight-bearing extremity)

On Examination:

- In long-standing cases, a Trendelenburg gait (downward pelvic tilt away from the affected hip during the swing phase), hip flexion contracture, or even atrophy of the thigh, calf, and/or buttock muscles can occur because of lack of use.
- Internal rotation test for hip shows decreased internal rotation.
- Abduction test – abduction is limited on the affected side.

- Log roll test – passive rotation of the lower limb is done to detect the muscle spasm as its positive in this case
- Thomas test reveals typically 15 degree fixed flexion deformity of hip.
- Plain radiographs remain the initial diagnostic test of choice when Perthes disease is being considered in any child with a limp.



- Flattened Rt. femoral epiphysis



Normal hip



Hip with perthes



Differential diagnosis:

- Hip dysplasia
- Legg-Calves-Perthes
- Slipped capital femoral epiphysis
- Osteomyelitis
- Septic arthritis
- Transient synovitis

- Juvenile RA
- Leukemia
- Sickle cell anemia.
- Caisson's disease
- Gaucher's disease.

Classification: Caterell's

- Catterall classified based on the radiolograpic appearance of femoral head which helps to plan the treatment.

Group	1	2	3	4
Epiphysis				
Ant.	-ve	part	+ve	+ve
Post.	-ve	-ve	+ve	+ve
Med.	-ve	-ve	+ve	+ve
Lat.	-ve	-ve	+ve	+ve

Salter-Thompson

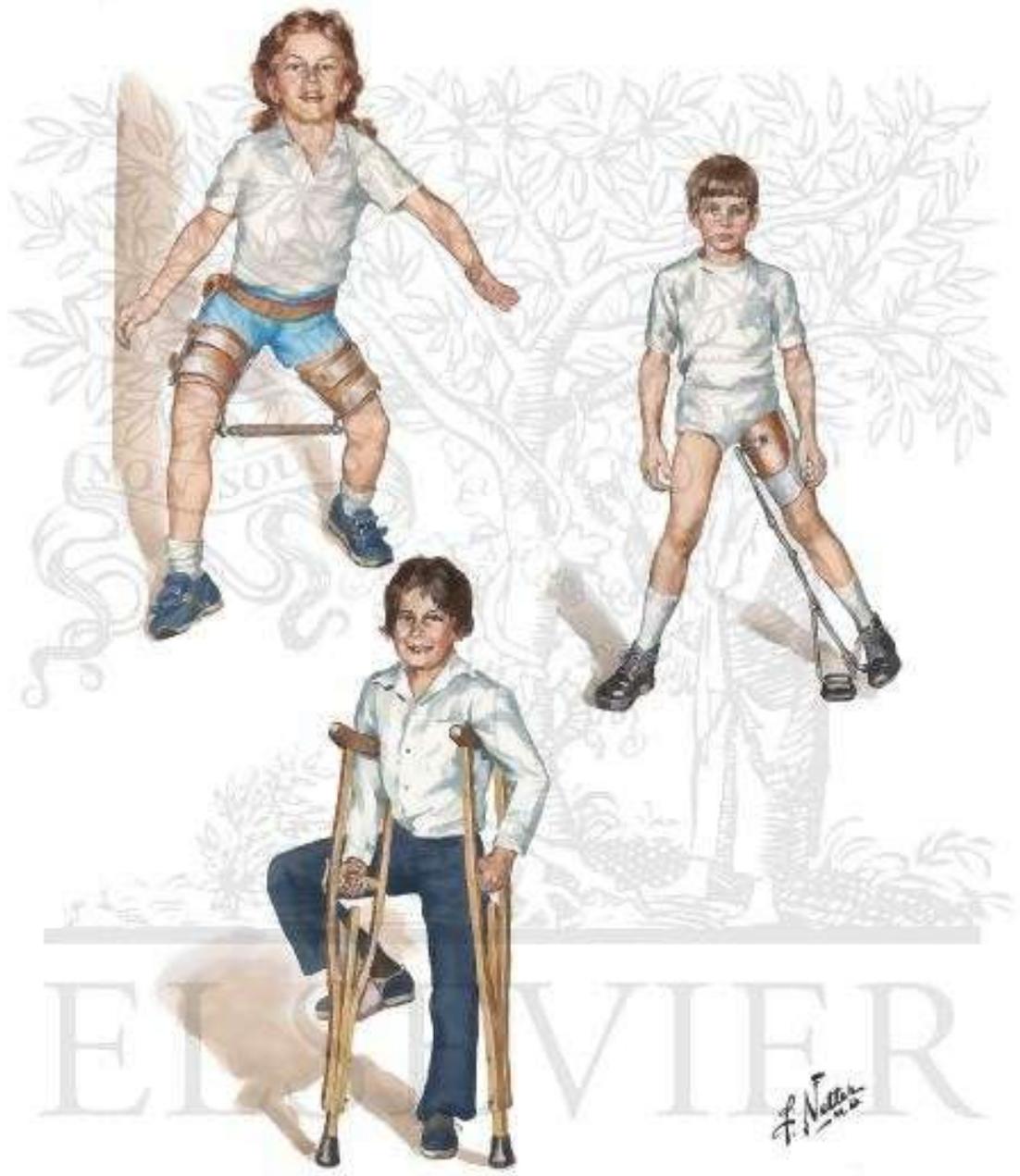
Classification:

- Its an accurate method to determine the prognosis.
- Its based on the presence of sub-chondral fracture (occurs due to trauma)
- Grade A (catterall grade 1 & 2) – less than half of capital femoral epiphysis involved.
- Grade B (catterall grade 3 & 4) – more than half of capital femoral epiphysis involved.

Treatment:

- It's a local, self-healing disorder of the femoral head.
- The main goal of the treatment is to attain a spherical femoral head either by Non-surgical or surgical methods.
- Containment can be achieved by holding the hips widely abducted in plaster or polythene splint
- The principle of containment is
 - To place the femoral head deep into the acetabulum.

- To avoid the acetabular rim pressure on the head.
- To equalize the pressure on the articulate cartilage.
- To diminish pressure on the acetabulum while walking.
- To promote formation of round head within a normal acetabulum.
- underlies the various nonsurgical and surgical methods for maintaining the femoral head within the acetabulum





ELSEVIER

F. Netter M.D.

Hip Abductor:



- खञ्ज –

वायुः कटयां स्थितः सक्थनः कण्डरामाक्षिपेधदा ।
खञ्जस्तदाभवेज्जन्तुः॥ (सु.नि.1/77)

- अस्थि गत वात –

अस्थिशोषं प्रभेदं च कुर्याच्छूलं च तच्छित्तः ।
(सु.नि.1/28)



Arthur T. Legg
1874-1939



Jacques Calvé
1875-1954



Georg C. Perthes
1869-1927

Thank U