

A

Abduction

Refers to the legs moving apart as if to do a side-to-side split. This is a motion we will have a child perform while checking his or her range of motion.

Abduction Brace

Special device aimed at holding the legs in a spread position (similar in its basic concept to Petrie casting). Most common device used previously was the Atlanta Scottish Rite brace. Long-term (months to years) abduction bracing was widely used in Legg-Calve-Perthes disease, but now is rarely to never used as its effectiveness is questionable.

Acetabulum

The cup or socket of the hip joint. With respect to their growth and development, the acetabulum and the femoral head have an important inter-relationship such that if the femoral head is properly placed within the cup (especially one sized properly to accept the femoral head), the femoral head is more likely to grow and develop naturally.

Antithrombotic Factor Deficiencies

A coagulation factor is a substance in the blood essential to normal clotting / scab formation. For the most part, antithrombotic factor deficiencies are genetic conditions in which one or more blood clotting factors are abnormal in that the blood clots too easily.

Apophysiodesis

An apophysis is a special part of a bone where strong muscles usually attach. The most important apophysis around the hip joint is the greater trochanteric apophysis, a big bump on the outside part of the hip area that you can feel on most people when they wiggle their hips. In some L-C-P patients the apophysis of the greater trochanter is felt to be too big, and an apophysiodesis procedure may be needed. This is a surgery aimed at slowing the growth of the apophysis.

Arthrogram

An X-ray of a joint after the injection of a contrast medium (a special temporary fluid injected into the hip joint). This provides more detailed pictures of the anatomy of the hip joint.

Avascular Necrosis (AVN)

Temporary or permanent loss of blood supply to a particular area of a bone. Without blood, the bone tissue dies and the bone collapses and deteriorates.

B

Bisphosphonates

A class of drugs that prevent the loss of bone mass. Bone has constant turnover, and is kept in balance by osteoblasts creating bone and osteoclasts digesting bone.

Bisphosphonates inhibit the digestion of bone by osteoclasts.

Bone Scan

An X-ray of bone taken after injection of radioactive material that accumulates and reveals its structure

C

Calcification Lateral to Epiphysis

One of the five “head at risk signs” described by Catterall. This radiographic sign is indicative of a misshapen femoral head that is not ossifying in a normal fashion

Calve, Jacques (1875-1954)

French surgeon who in July 1910 published a paper describing 10 children with idiopathic avascular necrosis of the femoral head.



Catterall Classification

A system used to grade the radiographic extent of femoral head involvement:

- I. 0-25 percent
- II. 25-50 percent
- III. 50+ percent
- IV. 100 percent

Catterall’s Sign (also known as Gage’s sign)

One of the five “head at risk signs” described by Catterall. This is a radiolucent V-shaped defect in the lateral aspect of the epiphysis seen on X-ray.

Center Edge Angle

The angle formed by a line drawn perpendicular to a baseline that passes through the center of the femoral heads and a line connecting the center of the femoral head and the superior border of the acetabulum, used in radiographic evaluation of the hip joint.

Cold Bone Scan

A bone scan is an imaging test used to detect increased activity in bone. Bone scans detect changes in function before structural changes occur. The results of the test reveal “hot” and “cold” spots. Cold spots appear light and indicate the bone absorbed less of the tracing element.

Containment

To keep something from spreading. In the case of LCP, it means keeping the ball of the hip in the socket.

Containment Treatment

There are multiple treatment options – rest, decrease activities, cast and surgery – for containment of the ball of the hip in the socket.

Cornerstones of Treatment

The building blocks of treatment for a specific disease.

Coxa Breva

Femoral neck shortening.

Coxa Magna

Femoral head and neck enlargement by broadening and widening.

Coxa Plana

Flattening of the head of the femur.

Coxa Vara

Deformity of the hip with decrease in the inward angle of inclination between the neck and shaft of the femur.

Coxa Valga

Deformity of the hip with increase in the inward angle of inclination between the neck and shaft of the femur.

Crescent Sign

A sign seen on a radiograph that represents a pathologic fracture of resorbing femoral head.

D**Deformity**

A condition in which some part of the body is misshapen or malformed.

Degenerative Changes

Degeneration or breakdown of any joint due to wear and tear or trauma. These types of changes can be seen both on X-ray and MRI imaging.

E

Epidural Catheter

A catheter that allows injection of an anesthetic drug into the space between the wall of the spinal canal and the covering of the spinal cord. This is given to patients who will undergo a surgical procedure to help with pain control.

Epiphyseal Angle

This describes the orientation of the growth plate next to the femoral head (the ball of the ball-and-socket hip joint). If the angle is closer to horizontal, this is considered to be bad and it is one of the “head at risk signs” described by Catterall.

Extrusion

Something that bulges or projects from its surroundings. In L-C-P disease one of the bad things that can happen to the hip joint is that the ball (the femoral head) can begin to extrude from the socket (acetabulum).

Extrusion Index

A measurement that is done on X-rays to see the extent that the ball of the hip is moving from under coverage of the socket.

F

Factor V Leiden

The name given to a variant of human factor V that causes a hypercoagulability disorder (coagulation of the blood more readily).

G

Gage’s Sign (also known as Catterall’s sign)

One of the five “head at risk signs” described by Catterall. This is a radiolucent V-shaped defect in the lateral aspect of the epiphysis seen on X-ray.

Greater Trochanter

A large prominence of bone found at the top part of the femur. It is the place of origin and insertion of many muscles.

Growth Plate

An area of cartilaginous tissue near the ends of long bones, between the widened part of the shaft (the metaphysis) and the end (epiphysis) of the bone. The growth plate regulates and helps determine the length and shape of the mature bone.

H

Head at Risk Signs

A concept developed by Catterall aimed at helping to predict the future for patients with L-C-P. They are lateral subluxation of the femoral head, a radiolucent V in the lateral aspect of the epiphysis (Gage's sign / Catterall's sign), calcification lateral to the epiphysis, metaphyseal cyst and a horizontal physeal line.

Herring Lateral Pillar Classification

A classification system developed by Herring used to grade changes seen radiographically in the lateral pillar height. The classification has a strong correlation to the patient's long-term outcome. Group A patients do the best, Group B has intermediate outcomes and Group C the worst.

Hinge Abduction

An abnormal gait (walk) that may be present due to movement of the hip that can occur when a femoral head does not slide as it should within the hip socket.

Hydrotherapy

The use of water by means of physical therapy, both to promote relaxation and to relieve minor aches and pains.

I

Innominate Osteotomy

A surgical procedure performed on the pelvis to reposition the hip socket itself by cutting the pelvis and swinging the socket to a new orientation.

J

Joint Space Narrowing

Closing or narrowing of a joint space.

Joint Space Widening

Opening or widening of a joint space.

Joseph, Benjamin

An important L-C-P surgeon and one of the foremost authorities on the disease. His surgical approach to L-C-P has focused on proximal femoral osteotomy (cutting the upper part of the femur bone and holding it in a new position with a plate and screws).

K

Klein's Line

A radiographic line that is drawn along the superior aspect of the femoral neck to assess that the ball of the hip is staying properly aligned on the neck of the femur. This is to assess the growth plate and check that there is no slipping of the femoral head.

L

Lateral Subluxation

One of the five "head at risk signs" developed by Catterall. This is partial dislocation or movement laterally of the ball of the hip. The ball is becoming uncovered by the socket.

Leg Length Discrepancy

Difference in the length of one's legs.

Legg, Arthur Thornton (1874-1938)

American surgeon who in February 1910 published a paper describing five children with idiopathic avascular necrosis of the femoral head.



Lesser Trochanter

A small prominence on the proximal medial aspect of the femoral bone.

Ludloff Medial Approach

The approach that is made when performing the surgical medial release. It is an incision that is made on the inner thigh, which allows access to the tendons that will be cut to release the tight muscles.

M

Magnetic Resonance Imaging

A medical imaging technique most commonly used in radiology to visualize detailed internal structure of the body. Sometimes referred to as MRI.

Medial Release

A surgical procedure performed to the inner thigh of the affected leg. The tendons of the muscles that are tight and causing the restricted range of motion are cut, allowing an increase in the motion. The patient is then placed in a Petrie cast for six weeks after the surgery to allow for healing in a better position and to prevent retightening of the muscles.

Metaphyseal Cysts

One of the five “head at risk signs” developed by Catterall and seen on X-ray. It is a cyst noted on imaging near the metaphysis area of the proximal femur bone.

Mose Concentric Circle Method

A measurement that is performed to assess the roundness and sphericity of the femoral head.

Mushroom

The shape that the femoral head may take when remodeling begins to take place. The ball of the hip becomes wider and flatter, similar in appearance to a mushroom.

N**Natural History**

A description of the uninterrupted progression of a disease in an individual from the moment of exposure to causal agents until recovery.

Necrotic Bone

Dead bone that has reached that point by means of avascular necrosis, a process in which the blood supply to a particular area of a bone is reduced or cut off. Without blood, the bone tissue dies and the bone collapses and deteriorates.

Nihilism

An attitude or concept that was previously widespread regarding the treatment of patients with L-C-P disease. The nihilistic approach was to do virtually no surgery because it supposedly did not work for L-C-P patients.

O**Osteochondritis Deformans Juvenilis**

Osteonecrosis resulting from poor blood supply of the growth plate of the proximal femur.

Osteochondritis Dissecans

A condition that can occur as a late complication of a persistent articular surface defect remaining after primary healing of the Legg-Calve-Perthes disease. OCD, as it is known, is a fragment of bone in a joint that is deprived of blood and separates from the rest of the bone.

Osteonecrosis

Bone death resulting from poor blood supply to an area of bone. Also known as avascular necrosis.

P

Painless Limp

A limp or abnormal gait that is noted, but there is no accompanying complaint of pain.

Perthes, Georg Clemens (1869-1927)

German surgeon who in October 1910 published a paper describing six children with idiopathic avascular necrosis of the femoral head.



Petrie Cast

A cast that is placed on a child with L-C-P, usually after a surgical procedure, to allow for maximum abduction (spread of the legs). The cast will extend from the chest to the toes of both legs.



Physis

An area of cartilaginous tissue near the ends of long bones, between the widened part of the shaft (the metaphysis) and the end (epiphysis) of the bone. The growth plate regulates and helps determine the length and shape of the mature bone. Also known as growth plate.

Q

Quain & Catterall

These authors published an important paper in 1986 regarding one approach to the treatment of something that is considered to be a very bad thing in patients with L-C-P: hinge abduction. In a group of older children (average 13 years of age), Quain and Catterall reported successful results using an abduction extension osteotomy of the proximal femur. This amounts to cutting the bone and realigning things into a better position aimed at improving motion and diminishing pain.

Quotient / Epiphyseal Quotient

A value that is derived by comparing the height and width of the affected hip's epiphysis with the height and width of the unaffected hip's epiphysis.

R

Range of Motion

The distance that an extremity may move while attached to the body. Range of motion is checked during office visits to keep track of the patient's disease and how much impact is seen. Sometimes referred to as ROM.

S

Sagging Rope Sign

Used to describe the radiographic appearances that sometimes occur after Perthes disease. It indicates damage to the growth plate with a marked metaphyseal reaction.

Salter, Robert Bruce (1924-2010)

Canadian orthopaedic surgeon who made a major impact on Legg-Calve-Perthes disease through both basic science research (femoral head AVN in piglet model) and the surgical procedure that bears his name: Salter Innominate Osteotomy.



Salter Osteotomy

Surgical procedure that precisely cuts the pelvis to alter the inclination of the acetabulum. Most surgeons consider this to be one method of increasing containment / coverage of the femoral head in Legg-Calve-Perthes disease.

Salter-Thompson Classification

A classification system used to grade the radiographic extent of the femoral head involvement.

Secondhand Smoke

Cigarette smoke that is inhaled by an individual who is not smoking. It is a risk factor for Legg-Calve-Perthes disease: secondhand smoke exposure carries a five times higher risk than for those not exposed to smoke.

Shelf Arthroplasty

A surgical procedure to give added coverage to the ball of the hip by the socket.

Smith-Petersen Anterior Approach

A surgical approach to the hip that is often referred to as either an anterior approach or at times an anterolateral approach. While the precise "direction" used to describe this operation is open to interpretation, the path between muscles that is used to get to the hip joint is not open to debate. The superficial part of this surgical exposure occurs between the sartorius and tensor fascia lata while the deeper portion lies between the

rectus femoris and the gluteus medius. The approach is named for Marius Smith-Petersen, a Boston doctor. He developed the Smith-Petersen approach to the hip in 1917 to help minimize blood loss from the surgery.

Spica Cast

A cast that is placed on a patient with L-C-P after a surgical procedure. It is placed from the chest to the foot of the affected leg and to the knee of the unaffected leg. The legs are placed in a split position to enhance maximum abduction for a period of resting.



Stulberg Classification

A classification system that evaluates the shape and roundness of the femoral head, and should be used at the end of the disease process for outcomes at skeletal maturity.

- I. Normal
- II. Loss of height
- III. Elliptical
- IV. Flattening
- V. Flattening >1cm

T

Thrombotic Disorder

A complex mechanism causes blood to clot if a wound occurs. Under normal circumstances this is a desirable response that enables the body to heal itself, but under certain clinical conditions, called thrombotic disorders, this same mechanism can cause an unwanted clot or thrombus that can be life threatening.

Thrombophilia

A hereditary or acquired predisposition to develop blood clots due to an abnormality in the system of coagulation. Hereditary defects in one or more of the clotting factors can cause the formation of potentially dangerous blood clots (thrombosis). It is also referred to as a hypercoagulable state or hypercoagulability.

Triradiate Cartilage

A growth plate of the hip / pelvic bone.

Trochanteric Height

A radiographic measurement that is done to assess the height of the greater trochanter.

Trochanteric Apophysiodesis

A surgical procedure to slow the growth of the greater trochanter.

U

Upper Femoral Epiphysis

The growth plate of the femoral bone, which is closest to the hip.

V

Varus Osteotomy

A surgical procedure in which the bone is cut and re-angled to reposition the hip socket in such a way that the femoral head will have less tendency to become deformed.

W

Waldenstrom Classification

A classification system developed to determine through radiographs what stage the femoral head is in. The stages are initial, fragmentation, healing, growing.

Waldenstrom, Johan Henning (1877-1972)

A surgeon from Stockholm, Sweden. He first presented his L-C-P related work in 1909, one year before Legg, Calve or Perthes. He presented 10 cases and hypothesized (incorrectly) that tuberculosis was the cause. Waldenstrom proposed a useful staging system for the disease that is still used today (see Waldenstrom classification).



X

X-Ray

A radiograph that is taken of a body part so medical personnel can examine the bones and other structures. X-rays were discovered in 1895 by Roentgen and thus have been used quite safely in medical settings for more than 100 years.

Y

Yrjonen, Timo

A pediatric orthopaedist and clinical researcher from Helsinki, Finland. He has authored many important papers that focus on long-term outcomes realized by patients with L-C-

P disease. His published work has been characterized by unusually long periods of follow-up ranging from 35 to 47 years.

Z

Zemansky Jr., A. Philip (1900-1928)

Columbia Medical School graduate who practiced for a short time in New York City before dying at age 28 following a mastoid operation. Zemansky is remembered in the history of Legg-Calve-Perthes disease for his extensive review of early German literature as well as skillful analysis and presentation of the histopathology (microscope slides) of the disease.