Developmental Dysplasia of the Hip (DDH)

By Sushila Ladumor, MD [2]

Developmental dysplasia of the hip (DDH) is a dislocation of the hip joint that is present at birth. The condition is found in babies or young children. A hip that is truly dislocated in an infant should be detected at birth, but some cases are mild and symptoms may not develop until after birth, which is why multiple exams are recommended.

Developmental dysplasia of the hip (DDH) is a dislocation of the hip joint that is present at birth. The condition is found in babies or young children.

The definition of DDH is not universally agreed upon. Typically, the term DDH is used when referring to patients who are born with dislocation or instability of the hip, which may then result in hip dysplasia.

A broader definition of DDH is simply abnormal growth of the hip. Abnormal development of the hip includes the osseous structures, such as the acetabulum and the proximal femur, and the labrum, capsule, and other soft tissues. This condition may occur at any time, from conception to skeletal maturity. The author prefers to use the term hip dysplasia because it is a simpler and more accurate term. Internationally, this disorder is still referred to as congenital dislocation of the hip.

More specific terms are often used to better describe the condition:
• Subluxation — This is incomplete contact between the articular surfaces of the femoral head and acetabulum.
• Dislocation — This refers to complete loss of contact between the articular surface of the femoral head and acetabulum.
• Instability — This consists of the ability to subluxate or dislocate the hip with passive manipulation.
• Teratologic dislocation — This refers to antenatal dislocation of the hip.

Causes

The hip is a ball and socket joint. The ball, called the femoral head, forms the top part of the thigh bone (femur) and the socket (acetabulum) forms in the pelvic bone. In some newborns, the socket is too shallow and the ball (thigh bone) may slip out of the socket, either part of the way or completely. One or both hips may be involved.

The cause is unknown. Low levels of amniotic fluid in the womb during pregnancy can increase a baby's risk of DDH. Other risk factors include:
• Being the first child
• Being female
• Breech position during pregnancy, in which the baby's bottom is down
• Family history of the disorder
DDH occurs in about 1 out of 1,000 births.

Pathophysiology

DDH involves abnormal growth of the hip. Ligamentous laxity is also believed to be associated with hip dysplasia, although this association is less clear. DDH is not part of the classic description of disorders that are associated with significant ligamentous laxity, such as Ehlers-Danlos syndrome or Marfan syndrome.

Children often have ligamentous laxity at birth, yet their hips are not usually unstable; in fact, it takes a great deal of effort to dislocate a child's hip. Therefore, more than just ligamentous laxity may be required to result in DDH. At birth, white children tend to have a shallow acetabulum. This
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may provide a susceptible period in which abnormal positioning or a brief period of ligamentous laxity may result in hip instability. However, this characteristic is not as true for children of black descent, who have a lower rate of DDH.

**Symptoms**

There may be no symptoms. Symptoms that may occur can include:
- Leg with hip problem may appear to turn out more
- Reduced movement on the side of the body with the dislocation
- Shorter leg on the side with the hip dislocation
- Uneven skin folds of thigh or buttocks

After 3 months of age, the affected leg may turn outward or be shorter than the other leg.

**Exams and Tests**

Pediatric healthcare providers routinely screen all newborns and infants for hip dysplasia. There are several methods to detect a dislocated hip or a hip that is able to be dislocated.

The most common method of identifying the condition is a physical exam of the hips, which involves applying pressure while moving the hips. The healthcare provider listens for any clicks, clunks, or pops. Ultrasound of the hip is used in younger infants to confirm the problem. An X-ray of the hip joint may help diagnose the condition in older infants and children.

A hip that is truly dislocated in an infant should be detected at birth, but some cases are mild and symptoms may not develop until after birth, which is why multiple exams are recommended. Some mild cases are silent and cannot be found during a physical exam.
Healed Salter Osteotomy
Case 2, 10-week-old female, bilateral DDH
Numerous radiographic measurements have been used to assist in the evaluation of DDH (a typical radiographic evaluation is described in the image below). From an anteroposterior radiograph of the hips, a horizontal line (Hilgenreiner line) is drawn between the triradiate epiphyses. Next, lines are drawn perpendicular to the Hilgenreiner line through the superolateral edge of the acetabulum (Perkin line), dividing the hip into four quadrants. The proximal medial femur should be in the lower medial quadrant, or the ossific nucleus of the femoral head, if present (usually observed in patients aged 4 to 7 months), should be in the lower medial quadrant. The acetabular index is the angle between the Hilgenreiner line and a line drawn from the triradiate epiphysis to the lateral edge of the acetabulum. Typically, this angle decreases with age and should measure less than 20 degrees by the time the child is 2 years old. The Shenton line is a line drawn from the medial aspect of the femoral neck to the inferior border of the pubic rami. The line should create a smooth arc that is not disrupted. If disrupted, it indicates some degree of hip subluxation is present.

Treatment

Salter innominate osteotomy (SIO) has been widely used for the treatment of DDH in patients under 10 years old, so as to change the direction in which the dysplastic acetabulum develops. When the problem is found during the first six months of life, a device or harness is used to keep the legs apart and turned outward (frog-leg position). This device will usually hold the hip joint in place while the child grows. This harness works for most infants when it is started before age 6 months, but it is less likely to work for older children. Children who do not improve, or who are diagnosed after 6 months often need surgery. After surgery, a cast will be placed on the child's leg for a period of time.
Contraindications

Relative contraindications to surgery include older age (more than 8 years old for a unilateral hip dislocation or more than 4 to 6 years old for bilateral hip dislocation, especially if a false acetabulum is not present). Other contraindications to surgery include a neuromuscular disorder, such as a high myelomeningocele or spinal cord injury, or cerebral palsy in a patient who has had a hip dislocation for longer than one year.

Outlook (Prognosis)

If hip dysplasia is found in the first few months of life, it can almost always be treated successfully with a positioning device (bracing). In a few cases, surgery is needed to put the hip back in joint. Hip dysplasia that is found after early infancy may lead to a worse outcome and may need more complex surgery to fix the problem.

Possible Complications

Avascular necrosis. Bracing devices may cause skin irritation. Differences in the lengths of the legs may persist despite appropriate treatment. Untreated, hip dysplasia will lead to arthritis and deterioration of the hip, which can be severely debilitating.

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References

http://emedicine.medscape.com/article/1248135-treatment#a28

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