## Hip Dysplasia: Evaluation, Treatment and Outcomes

**Evaluation**

**Children under 6 months of age:** Beyond clinical screening exams, US (ultrasound) is the preferred technique. Though US screening of all infants is not advised, infants with identified risk factors or questionable exams should be routinely screened. With a normal exam, screening US should be delayed until at least four to six weeks, when hip maturation improves exam specificity. US is also used to document reduction and follow the improvement or maturity of a dysplastic hip following treatment.

**Children 6 months of age or older:** Plain radiographic evaluation is used. On an AP radiograph, lines which localize the femoral head in relationship to the acetabulum – Hilgenreiner's, Perkin's and the acetabular index – can be drawn and measured. The proximal femoral metaphysis should lie medial to Perkin's line, within the inner and lower quadrant of the resulting grid. In the dysplastic hip, the normal acetabular index (around 25 to 27 degrees) is increased. Other findings include disruption of Shenton's line, delay in epiphyseal ossification and/or a widened or delayed "teardrop" appearance. Plain radiographs and measurements are also used to follow hip development and maturation.

**Management of Hip Dysplasia**
Once DDH is identified, prompt referral to a pediatric orthopedist is suggested.

**Birth to 6 months:** Immature, stable hips (Barlow negative) that become normal do not need treatment. Hips that are Barlow positive at birth may also become stable in the first three weeks of life; therefore, treatment may be delayed. In both cases, close follow-up and routine physical exams are required, plus a later US to document normal hip stability and development.

With an unstable, Ortolani-positive hip, early treatment is required. Reduced hips are positioned in flexion and mild abduction to stimulate normal joint development, most commonly performed via the Pavlik harness, a dynamic brace which positions the thighs to allow and maintain hip reduction. Infants are followed bi-weekly for strap adjustment. Progress is monitored and reduction verified with subsequent US evaluations. Pavlik treatment continues until US parameters have normalized and the hip stabilized on exam, on average two to three months later. Follow-up through skeletal maturity is then emphasized.

**6 months to 1-2 years:** Children who present at this time or fail to stabilize with the Pavlik harness require general anesthesia, followed by closed or open hip reduction and spica casting.

**Over 2 years of age:** Older children may require extensive open surgical reductions with possible femoral and pelvic osteotomies (cutting and realigning the bones), followed by a spica cast.

**Outcomes of Treatment**
Treatment success depends on the child's age and the success of repositioning. Many cases treated in the first six months of life with a Pavlik harness recover and develop normally with no long-term problems. The older the child or less successful the reduction, the greater the possible need for repeated surgeries or eventual hip arthritis and subsequent replacements later in life.

For an urgent consultation, call the Physician Direct Connect Line at (614) 355-0221 or (877) 355-0221. To make a referral, call (614) 722-5175 or visit **NationwideChildrens.org/Orthopedics.**

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# Orthopedics

# Hip Dysplasia

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## Hip Dysplasia: Definition, Etiologies and Risk Factors

Developmental dysplasia of the hip (DDH) is a condition that includes any abnormality of a child's proximal femur or acetabulum. Most commonly, this refers to neonatal hip instability, but also may describe a stable hip with an underdeveloped or shallow acetabulum. A full spectrum of disease may be seen – from the newborn with an irreducible dislocated hip, to the adolescent with hip pain secondary to a mild "uncovering" of the femoral head. Prior to clinical or ultrasound hip screening, arbitrary estimates of 1 to 1.5/1000 births were suggested. With screening techniques, up to a 7 to 15 percent incidence in caucasian neonates has been reported.

Natural history studies suggest a significant relationship between DDH and early onset degenerative hip disease. Thus, early diagnosis and management are extremely important, in order to help prevent early onset arthritis and pain in the older patient.

**Other Common Terms Describing Developmental Hip Dysplasia**

- Hip dislocation: The hip is frankly dislocated at birth.
- Dislocatable hip: The hip is in place at birth, but dislocates fully when stressed.
- Subluxatable hip: The hip dislocates partially when stressed.
- Acetabular dysplasia: A shallow hip socket resulting in an unstable hip
- Developmental dysplasia (or dislocation) of the hips also covers cases where the hips are apparently normal at birth, but develop problems in the first year of life or thereafter.

**Etiologies and Risk Factors**

Etiology is multifactorial: Mechanical, hormonal, genetic and other various risk factors may all play a role.

- Intrauterine positioning or crowding:
  - Frank breech presentation has an estimated 20 percent risk, independent of vaginal or cesarean delivery.
  - Complete or footling breech presentation may only increase normal risk by 2 percent.
- Neonatal hip posture may also play a role: Infants held with extended and adducted hips while swaddled or wrapped are at increased risk of DDH.
- An abduction contracture of one hip may predispose the contralateral side to instability.
- Race: Higher incidence in caucasian neonates, especially in Canada, the United States, and in North American Indians and the Saami (Laplanders). Few cases in African-American, Chinese or Korean children.
- Gender: There is a higher incidence in females.
- Firstborn infants carry the highest risk, as the uterus is typically smaller with firstborns, resulting in limited movement room or more compression.
- Genetic studies suggest that approximately 5 percent of siblings of children with DDH also will develop pathology, more in females (10 percent) than males (1 percent).
- Twin studies show a 34 percent chance that if one identical twin has DDH, the other will as well; and 3 percent in fraternal twins.
- **Important:** All factors may contribute, sometimes cumulatively.

**Other Risk Factors for DDH**

- Torticollis (8 to 20 percent incidence)
- Clubfoot or calcaneovalgus feet (up to 25 percent)
- Metatarsus adductus (10 percent)
- Down syndrome
- Congenital knee dislocation
- Arthrogryposis
- Myelomeningocele
- Larson's syndrome

## Presentations of Hip Dysplasia

**Neonatal Hip Dysplasia**

Ideally, DDH is detected by routine history and physical examination in the neonatal period. Questions to the parents regarding risk factors can be important. Clinical screening is the gold standard for diagnosis with dynamic hip examinations carried out at birth and at subsequent pediatrician visits throughout childhood. The Ortolani test and Barlow maneuver should be done at each exam.

**The Ortolani Test:** The examiner's hands are placed over the child's knees with his/her thumbs on the medial thigh and the fingers placing a gentle upward stress on the lateral thigh and greater trochanter area. With slow abduction, a dislocated and reducible hip will reduce with a described palpable "clunk."

**The Barlow Maneuver:** This is done by guiding the hips into mild adduction and applying a slight forward pressure with the thumb. If the hip is unstable, the femoral head will slip over the posterior rim of the acetabulum, again producing a palpable sensation of subluxation or dislocation.

In infants, the degree of instability can be described as:

1) dislocated and reducible (+ Ortolani)
2) dislocated and irreducible (- Ortolani)
3) dislocatable (+ Barlow)
4) subluxed (a hip with mild instability or laxity with a – Barlow maneuver).

**Hip Dysplasia Presentations in the Infant 2 Months or Older**

After 2 to 3 months of age, the Ortolani test and Barlow maneuvers are less sensitive, but several other physical exam findings become more apparent:

- Unilateral dysplasia presenting as asymmetric shortening on the side of the dislocation (Galeazzi sign)
- The leg on the affected side may turn outward.
- Tight hip adductors/decreased hip abduction
- Asymmetric thigh or gluteal folds
- The space between the legs may look wider than normal.

**Hip Dysplasia Presentations in the Walking Child**

- Mild hip flexion contractures from bilateral dysplasia may produce hyperlordosis in the lumbar spine and a waddling type gait.
- Unilateral dislocations may produce a short leg gait and/or limp in the walking child.
- On rare occasions, early exams and screenings will not detect a developing dysplasia of the acetabulum and the femoral head will slowly slide out and not be detected until walking age when a limp or short leg is identified. As pain is not common in children, keen observation is required or diagnosis may be missed.

**Hip Dysplasia Presentations in Preadolescents and Adolescents**

- Presents with hip and leg pain which may be chronic and/or worsened by an injury
- If moderate to severe, can lead to degenerative hip disease and deformity if untreated

**Other Possible Late Presentations:**

- Late presentation growth disturbances
- Avascular necrosis
- Residual acetabular dysplasia or deformity