

## Focus On Subspecialties

# Improper swaddling a risk factor for developmental dysplasia of hip

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Swaddling has many benefits and has grown in popularity among U.S. parents. However, traditional swaddling as practiced in many cultures with the legs fully extended and wrapped together can cause hip subluxation and dislocation (see Figure 1). This has been known for decades, long before swaddling was widely practiced in North America.

The AAP Section on Orthopaedics has teamed up with the Pediatric Orthopaedic Society of North America (POSNA) and the International Hip Dysplasia Institute (IHDI) to promote “hip-healthy swaddling.”

The IHDI has issued the following statement with support from POSNA, “It is the recommendation of the International Hip Dysplasia Institute that infant hips should be positioned in slight flexion and abduction during swaddling. The knees should also be maintained in slight flexion. Additional free movement in the direction of hip flexion and abduction may have some benefit. Avoidance of forced or sustained passive hip extension and adduction in the first few months of life is essential for proper hip development.”

A systematic review of swaddling noted that developmental dysplasia of the hip (DDH) is more prevalent when the legs are bound so they are not free to move (van Sleuwen BE, et al. *Pediatrics*. 2007;120:e1097-e1106).

Studies of Native American Indians prior to the 1950s demonstrated a very high prevalence of hip dislocation in tribes that carried babies on a “cradle board” with the hips and knees strapped in an extended and adducted position. The frequency of childhood hip dislocation decreased dramatically among Navajos after cloth diapers were introduced. This decrease was attributed to the slightly flexed and abducted position from the bulky cloth diapers even when the infants were strapped on the cradle board. As the frequency of cradle board use in Navajo society has diminished recently, the prevalence of hip dysplasia has further decreased from a rate of six times the U.S. average to a similar prevalence.



**Figure 1:** Traditional swaddling with the legs together and extended is associated with an increased risk of hip dislocation. **Figure 2:** Cultures that carry their children in the straddle position have very low rates of hip dislocation. **Figure 3:** Contemporary swaddling should allow ample room for hip and knee flexion with free movement of the legs.

A somewhat similar experience has been documented in Japan where the incidence of DDH was 1.5%-3.5% before 1965. Following implementation of a national program to eliminate swaddling with the hips and knees in an extended position, the incidence of DDH decreased to 0.2%. (Yamamuro T, Ishida K. *Clin Orthop Relat Res*. 1984;184:34-40).

A significant relationship between swaddling and hip dysplasia also was identified in Turkey (Kutlu A, et al. *J Pediatr Orthop*. 1992;12:598-602). Although the frequency of traditional swaddling has been reduced in Turkey, traditional swaddling during infancy still is the greatest risk factor for hip dysplasia compared to breech birth, family history or gender (Dogruel H, et al. *Int Orthop*. 2008;32:415-419).

Newborn infants have hip and knee flexion contractures because of their normal intrauterine position. These contractures resolve over time with normal development. Animal studies have shown that forced hip and knee extension in the neonatal period leads to hip dysplasia and dislocation because of increased tension in the hamstring and iliopsoas muscles that stress the hip capsule, which can have underlying laxity or instability (see previously cited paper by Yamamuro and Ishida in *Clin Orthop Relat Res*).

Comprehensive ultrasound screening during the immediate newborn period has demonstrated hip laxity in approximately 15% of infants (Rosendahl K, et al. *Pediatrics*. 1994;94:47-52). The combination of capsular laxity and abnormal muscle tension is the most likely mechanism of DDH for infants who are maintained with the lower extremities extended and wrapped together.

In contrast, cultures that carry their children in the straddle or “jockey” position, as seen in warmer climates (Figure 2), have very low rates of hip dislocation compared to cultures that wrap their children tightly with the legs together

and extended (Salter RB. *Can Med Assoc J*. 1968;98:933-945).

Harvey N. Karp, M.D., FAAP, has pointed out that contemporary methods of swaddling emphasize upper extremity wrapping while allowing ample room for hip and knee flexion (Karp HN. *Pediatrics*. 2008;121:1075-1076) (see Figure 3). However, that message may not have been clearly understood by parents

who swaddle their children or by nurses who instruct parents at discharge following birth.

Prevention of DDH should begin with encouragement of flexed and abducted hip positioning during early infancy. Infants who have been swaddled tightly with the hips and legs bound together in extension should have focused attention to their periodic clinical hip examination.

## RESOURCES

More information on hip-healthy swaddling and developmental dysplasia of the hip can be found on the International Hip Dysplasia Institute Web site, [www.hipdysplasia.org](http://www.hipdysplasia.org), and the American Academy of Orthopaedic Surgeons Web site, <http://orthoinfo.aaos.org/topic.cfm?topic=A00347>.



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