

The mechanical cause of congenital dislocation of the hip joint

Dynamic ultrasound study of 5 cases

Shigeo Suzuki¹ and Takao Yamamuro²

5 hip joints with untreated congenital dislocation of the hip were examined for hip movement by ultrasound. With the hip joint flexed, the direction of the dislocated femoral head was posterior to the acetabulum. The dislocated femoral head displaced more posteriorly when the knee joint was extended, with the hip joint held in flexed position. As the dislocated hip was extended, on the other hand, the direction of the dislocated femoral head was anterior to the

acetabulum. The dislocated femoral head displaced more anteriorly when the baby tried to bend the hip with the joint held in extended position.

These findings indicate that a fetal posture with the hip flexed and the knee extended predisposes to the development of CDH by the action of hamstrings, and that an infant posture with the hip extended is likely to provoke femoral head dislocation by the action of the iliopsoas.

¹Department of Orthopedics, Shiga Medical Center for Children, 120-6 Moriyama-cho, Moriyama, Shiga 524, and ²Department of Orthopedics, Faculty of Medicine, Kyoto University, 54 Kawara cho, Shogoin Sakyo-ku, Kyoto 606, Japan
Tel +81-775 82 6200. Fax -775 82 6304
Submitted 92-08-17. Accepted 92-12-03

We have suggested that fetal posture with the hip flexed and the knee extended predisposes to the development of congenital dislocation of the hip (CDH) (Suzuki and Yamamuro 1986). In order to confirm this possible mechanism, we studied the influence of movement of the position of dislocated hips by using ultrasound.

Patients and methods

5 girls aged 3–4 months with untreated CDH were selected. The diagnosis of CDH was done with both ultrasonography and antero-posterior radiographs.

Ultrasonography was done with a Shimazu SD machine and 7.5 MHz probe, based on a linear electronic scanning method. The images were obtained with the hip flexed, and then with the hip extended. A lateral approach was used while the dislocated hip was flexed (Figure 1). The probe was put on the hip joint transverse to the axis of the trunk and the section of unilateral hip joint was observed during knee motion. An anterior approach (Suzuki et al. 1991) was used in order to observe the femoral head motion with an extended hip (Figure 2).

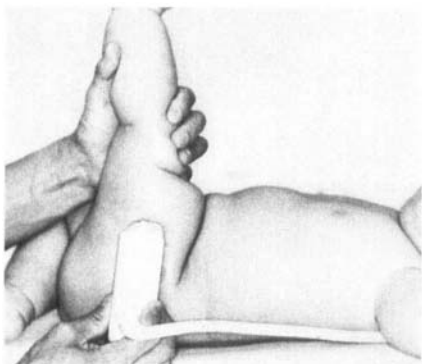


Figure 1. Ultrasonography via lateral approach with flexed hips.

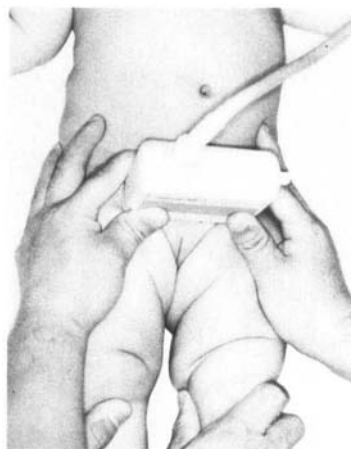


Figure 2. Ultrasonography via anterior approach with extended hips.

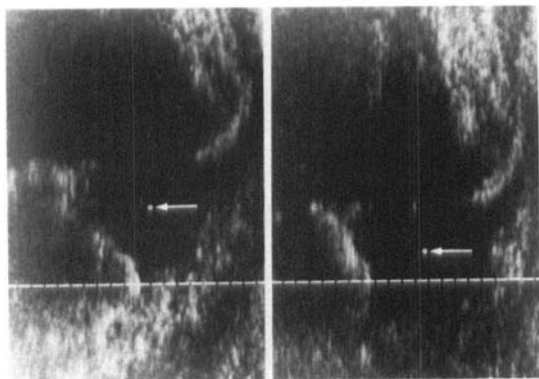


Figure 3. Ultrasonogram of the dislocated femoral head with the hip flexed. A dotted line is drawn between posterior edges of the acetabulum. Arrow indicates the center of the femoral head. The left picture was obtained when the knee was flexed and the right one when the knee was extended. When the knee is extended, the dislocated femoral head displaces more posteriorly to the acetabulum.

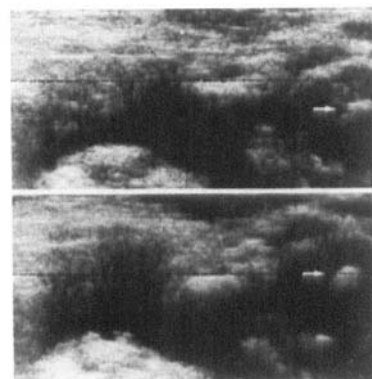


Figure 4. Ultrasonogram of the dislocated femoral head with the hip extended. A dotted line is drawn between the anterior surfaces of the pubic bones. The lower picture was obtained when the baby tried to bend its hip with the joint held in the extended position. The femoral head displaces more anteriorly.

Results

The location of the femoral head changed according to the hip position. It was posterior to the acetabulum with the hip flexed. The femoral head was displaced more posteriorly when the knee was extended, while the hip joint was held in the flexed position (Figure 3). When the hip was extended, on the other hand, the direction of the femoral head was anterior. The femoral head displaced more anteriorly when the hip was extended against resistance or when the baby tried to flex its hip while the joint was held in the extended position (Figure 4). These findings were similar in all 5 dislocated hips.

Discussion

Clinical observations showed that a fetal posture with the hip flexed and the knee extended predisposes to the development of CDH (Wilkinson 1972, Dunn 1976, Suzuki and Yamamuro 1986). Our findings indicated that tension of the hamstrings produced by knee extension pulls the femoral head posteriorly when the hip is held in flexed position. This may be the reason for the higher incidence of CDH after single breech presentation with flexed hips and extended knees.

On the other hand, it has been reported that when the hip was extended from a fetal position, dislocation could develop (Somerville 1962, Salter 1968, Ishida 1977). The mechanism of this kind of hip dislocation was studied in animal experiments, which showed that the head of the femur is pulled anteriorly by the action

of the iliopsoas when the hip is held in extension (Yamamuro et al. 1977). The results of our study confirm this possibility. The femoral head moved more anteriorly when the baby tried to flex its hip with the joint held in the extended position. This indicates that the iliopsoas pulls the femoral head anteriorly when the hip is maintained in extension. This may be the main reason why the hip wrapped in a traditional diaper in extension is likely to develop dislocation.

References

- Dunn P M. Perinatal observations on the etiology of congenital dislocation of the hip. *Clin Orthop* 1976; 119: 11-22.
- Ishida K. Prevention of the development of the typical dislocation of the hip. *Clin Orthop* 1977; 126: 167-9.
- Salter R B. Etiology, pathogenesis and possible prevention of congenital dislocation of the hip. *Can Med Assoc J* 1968; 98 (20): 933-45.
- Somerville E W. Some mechanical factors in the causation of congenital dislocation of the hip. *Develop Med Child Neurol* 1962; 4: 147-53.
- Suzuki S, Yamamuro T. Correlation of fetal posture and congenital dislocation of the hip. *Acta Orthop Scand* 1986; 57 (1): 81-4.
- Suzuki S, Kasahara Y, Futami T, Ushikubo S, Tsuchiya T. Ultrasonography in congenital dislocation of the hip. Simultaneous imaging of both hips from in front. *J Bone Joint Surg (Br)* 1991; 73 (6): 879-83.
- Wilkinson J A. A post-natal survey for congenital displacement of the hip. *J Bone Joint Surg (Br)* 1972; 54 (1): 40-9.
- Yamamuro T, Hama H, Takeda T, Shikata J, Sanada H. Biomechanical and hormonal factors in the etiology of congenital dislocation of the hip joint. *Int Orthop* 1977; 1: 231-6.