

# Ultrasound vs radiographs: diagnosing developmental dysplasia of the hip

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## Ultrasound vs Radiographs: Diagnosing Developmental Dysplasia of the Hip

**Introduction** The term “congenital dislocation of the hip” has been used from long ago to describe abnormal infant hips that may progress to dislocation. Currently, the preferable term is “developmental dysplasia of the hip” which implies the same range of problems but in addition, includes hips that are never documented to be dislocated but are poorly developed, as well as hips that are considered abnormal after the newborn period (French and Dietz, 1999). This abnormality may be indicated by the instability of the femoral head (ball at the top of the thigh bone) within the socket (acetabulum). The ligaments of the hip joint may also be loose and stretched (MedicineNet, 2000).

The degree of looseness or instability differs. An infant born with this problem may have the femoral head loosely in the socket, a condition termed as subluxed, or it may be completely dislocated at birth. If untreated, this condition may lead to legs having different lengths, a “duck-like” gait, pain while walking and/or early osteoarthritis (MedicineNet, 2000).

### Background

In unscreened populations, hip dislocation incidences are estimated to be 1 to 2 in every 1000 European children (Asher, 1986; Bennet, 1992). However in black Africans, this condition is rare (Aronsson et al, 1994; Skirving and Scadden, 1979). It is more prevalent in communities that practice swaddling or use cradle boards for infants (Kutlu et al, 1992; Mahan and Kasser, 2008). The greatest risk factor for hip dysplasia is present in family history. In a study carried out by British researchers, it was found that more than 20% of the children that were treated for hip dysplasia had a family history of the

disorder while 5. 5% of these children had been shown to be normal from physical examinations at birth (Marks et al, 1994). Other risk factors include first born, breech birth (accounting for 25-45% of DDH cases), intrauterine postural deformity like neonatal clubfoot or torticollis, and female sex (80% of DDH cases) (Keller and Nijs, 2009; Wheelless, 2012).

DDH occurs more frequently in the left hip (60%), 20% of the cases occur on the right hip while 20% occur bilaterally (Keller and Nijs, 2009).

According to Keller and Nijs (2009), Clinical examination screening techniques of neonatal and infant hip examination are well described and have been used for over 40 years. Clinical findings described include limited range of motion, abnormal skin creases, unequal length of limbs, palpable grinding, and in addition are the Barlow and Ortolani signs which are used only for neonates and young infants.

A small percentage (1-2%) of the neonates with abnormal clinical findings is found to have neonatal laxity which stabilizes over a few weeks without treatment. Experienced neonatal and infant hip examiners have excellent clinical results and thus have need to refer only very few cases to imaging (Keller and Nijs, 2009). It is in this light that the issue of imaging is considered. The two types of imaging being considered are sonography and radiography.

The roles of imaging are manifold; to show anatomy together with morphologic and dynamic alterations. Examinations must be “ directed to learn and to appreciate variations in immature morphology and normal ranges of laxity in order to avoid overtreatment”. Imaging also serves to confirm reductions in treatment devices (Keller and Nijs, 2009).

## Objectives

In a study carried out among Dutch practitioners, it was found that out of the 38 respondents, 81% used a combination of clinical results and imaging techniques (Heeres et al., 2011). The study further revealed that Dutch orthopedic surgeons do not agree on the diagnosis and treatment of DDH. In the early stages of life, the infant's hip is largely cartilaginous and the femoral head is unossified. This makes radiography insensitive and an unsatisfactory means of examination with high risk of exposure of the gonads to harmful rays. The images are usually exposed with the hips in the neutral and in the flexed-abducted views so that it may not capture the displaced hip joint. But after 4 to 6 months, radiography becomes useful since the femoral head ossifies at around 4 months with an average range of 2 to 8 months (Keller and Nijs, 2009). On the other hand, in a study carried out by Ramwadhoebe et al. (2010), implementation of sonography is a tedious exercise because of the cost of equipment, training of personnel and setting up of obstetric centers. Sonography also has a down side in that, since it is quite anatomically and dynamically accurate, its sensitive portrayal of results tends to result in overtreatment and higher healthcare costs (Keller and Nijs, 2009).

This paper therefore aims at finding out the collective merits of the imaging techniques and selecting the most suitable form of diagnosing DDH among infants. The two choices are sonography and radiography.

## Methodology

This study will be prioritized by simplicity and suggests an objective analysis of results and effectiveness of a particular method of diagnosis of DDH. The

suggested study population will be 36, 582 infants. This is because studies carried out by Rosendahl et al (1994) on 12, 000 infants and Holen et al (2002) on 15, 529 infants for late appearance of DDH suggest that results were not statistically significant. The sample size was calculated according to Fleiss (1981) with an alpha value of 0. 05, beta value of 0. 10 and power of 0. 90. Thus, by increasing the study group, there are better chances of obtaining significant differences in the results.

The study will be carried out in a major hospital with a high number of annual births. The duration of the study will depend on the birth rate in the particular hospital in order to reach the targeted study population.

Parents will be requested to participate in the study and those who give written consent will be included in the study. Questionnaires will be provided for all participants investigating all the known risk factors.

There would be three groups to be studied with all of them undergoing clinical observation by a senior pediatrician. These are: (i) clinically observed with those having risk factors recommended for sonography. This will be the control group. (ii) Ultrasound observed after clinical observation. (iii) Those that will be radiographically observed after clinical observation. The infants will be randomized according to birth protocol and will be given numbers for identification. Examination by ultrasound will be done on the third day after clinical examination. Registration of late-detected DDH will be done.

For all the infants, the pre-, peri- and post-natal data will be registered in a database. The tests that will be carried out for statistical analysis are the chi square test, student's t-test and the Fisher's exact test. The relative risk of detection of late HD will be calculated as the rate in each group divided by

the rate in the control group and the precision will be given at the 95% confidence level. The two figures will be compared.

With these guidelines and parameters, it is believed that once this study is carried out, the best form of imaging would be found as a result.

#### References

1. Asher MA. (1986). Screening for congenital dislocation of the hip, scoliosis, and other abnormalities affecting the musculoskeletal system. *Pediatr Clin North Am.* ; 33: 1335-53.
2. Bennet GC., (1992). Screening for congenital dislocation of the hip [Editorial]. *J Bone Joint Surg [Br].* ; 74: 643-4.
3. Definition of Dysplasia, congenital hip  
MedicineNet. com, (2000 ).  
<http://www.medterms.com/script/main/art.asp?articlekey=14426>
4. French, L. M. Dietz, F R. Screening for Developmental Dysplasia of the Hip. *American Family Physician.* 1999 Jul 1; 60(1): 177-184.
5. Heeres R., Witbreuk M, van der Sluijs J, (2011). Diagnosis and treatment of developmental dysplasia of the hip in the Netherlands: national questionnaire of paediatric orthopaedic surgeons on current practice in children less than 1 year old. *J Child Orthop* 5: 267-271 DOI 10.1007/s11832-011-0355-1
6. Holen K. J. et al, (1992). Universal or selective screening of the neonatal hip using ultrasound? A PROSPECTIVE, RANDOMISED TRIAL OF 15 529 NEWBORN INFANTS
7. Keller M. S. & Nijs E. L., (2009). The role of radiographs and US in developmental dysplasia of the hip: how good are they?

8. Kutlu A, Memik R, Mutlu M, Kutlu R, Arslan A. Congenital dislocation of the hip and its relation to swaddling used in Turkey. *J Pediatr Orthop.* 1992; 12: 598-602.
9. Mahan S, , Kasser J., (2008). Does Swaddling Influence Developmental Dysplasia of the Hip? *Pediatrics* Vol. 121 No. 1 January 1, pp. 177 -178 (doi: 10. 1542/peds. 2007-1618)
10. Ramwadhoebe S., et al, (2010) Implementation by simulation; strategies for ultrasound screening for hip dysplasia in the Netherlands. *BMC Health Services Research* 10: 75
11. Rosendahl K, Markestad T, Lie RT (1994). Ultrasound screening for developmental dysplasia of the hip in the neonate: the effect of treatment rate and prevalence of late cases. *Pediatrics* 94: 47-52
12. Wheeless, R Clifford, (2012). *Developmental Dislocation of the Hip - Wheeless Textbook of Orthopaedics.*