RESEARCH BRIEF

Ultrasound Profile of Hips of South Indian Infants

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One thousand consecutive infants, 437 girls and 563 boys, attending their first DPT vaccination at a mean age of 48 days underwent ultrasonological screening of the hips by Graf's technique at the immunization clinic of a tertiary hospital in South India. Graf I (mature) hips were seen bilaterally in 925 children. The incidence of Graf type II hips was 74/1000 infants. The incidence of sonographically abnormal hips (II, III and IV) in this population was 7.5%. The hip dislocation rate was 1 in 1000 (0.1%).

Key words: *Developmental dysplasia of hip, Ultrasound screening.*

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Ultrasound examination of the infant hip by the static Graf technique is a safe and effective screening tool for the evaluation of Developmental Dysplasia of Hip (DDH) [1]. Universal ultrasound screening of neonatal hip is adopted in some European countries resulting in a significant decrease in late presenting DDH and surgical management [2,3]. It is ideally done at 4 to 6 weeks when hip is allowed to show its true nature, decreasing the number of false positives [3].

The incidence of DDH requiring treatment in the world literature varies from less than 1/1000 to 34/1000 [4]. There is no data available on the incidence of DDH in our country. A large proportion (90%) of late presenting DDH in our practice combined with very few referrals in early infancy have been the stimulus for this study to assess the incidence of ultrasonological abnormalities and the true hip dislocation rate in Indian children.

METHODS

This study aimed to determine the incidence of DDH and ultrasonological hip abnormality in our population. An average of the highest and the lowest incidence of DDH reported in the literature is 1.7% (<0.1% to 3.4%), while the average incidence of sonographic abnormality in infants from the studies across the world was 17.1% [2,3]. Based on this a pilot study with 1000 infants was planned. The ethical clearance from Institutional Review Board was obtained.

After informed consent, 1000 consecutive infants, presenting for their first DPT vaccination at the well baby immunization clinic of our institution were selected for screening using Graf's technique [5]. Clinical examination of the hip, other congenital abnormalities, and family history was documented.

LOGIC e ultrasound machine (General Electric Medical Systems, Chalfont St. Giles, United Kingdom) with a linear probe (8-12 MHz) was used. The training in performing and reading ultrasounds according to Graf's technique was obtained by the authors in a 3-day workshop conducted by Dr Graf and practised in the department. Children were screened in lateral position in a specialized cradle. Ultrasonologically, abnormal but centered hips were followed till they became mature. Decentered hips

WHAT THIS STUDY ADDS?

- The incidence of sonographically abnormal hips in our population is 7.5% and the hip dislocation rate is 1 in 1000.

(type D, III and IV) were given treatment.

RESULTS

One thousand infants, 563 boy and 437 girls, mean age 47.8 days (40 to 67 days) were screened and their ultrasonological distribution of the hip types according to Graf is shown in ***Table* I**. Seventy five infants showed ultrasonological abnormalities of which seventy four had dysplastic hips (7 of these were bilateral) while one infant had a dislocated hip (Graf III) and required treatment. Seventy out of the 74 infants with Graf type II hips were followed up sonographically till maturity while 4 were lost to follow up. The ultrasonological incidence of abnormal hips was 7.5% with a relative precision of 22% at 5% level and the incidence of true dislocation at examination was 1 in 1000.

Fifty one (11.67%) out of the 437 girls and 24 (4.26%) of the 563 boys were affected which was statistically significant ($P<0.01$). No infant had a family history of DDH.

A positive Ortolani test was noted in the one child with a dislocated hip after the screening. Associated foot deformities included bilateral calcaneo-valgus in two, bilateral clubfoot in one and metatarsus adductus in one infant. One of the infants with clubfoot and one with bilateral calcaneo-valgus had an immature hip (IIa) on one side.

TABLE I DISTRIBUTION OF HIP TYPE (GRAF'S) IN THE POPULATION

Hip Type	Number of hips	Number ofinfants(n=1000)	
	(n=2000)	Bilateral	Unilateral
Type I		925	67
Type Ia	0460		
Type Ib	1457		
Type II	81	7	67
Type IIa	79		
Type IIc	02		
Type III	1	0	1
Type IV	0	0	0
Not classified	1	0	1

DISCUSSION

Various screening programs using clinical examination, ultrasound screening or both methods in step had been introduced in different countries for early diagnosis of DDH [3,6,7]. In 1986 the Standing Medical Advisory Committee in UK recommended that screening should occur within 24 hours of birth, on discharge from the hospital of birth, and at 6 weeks of age [6]. Two step technique was later advocated, where all are clinically screened and only infants with positive examination or risk factors for DDH are screened ultrasonographically at birth [8,9].

In our country, the only screening is clinical and is carried out by pediatricians or obstetrician. There is no national screening protocol or national registry and no data exists on incidence of DDH estimated clinically or ultrasonologically.

The incidence of DDH requiring treatment in the world literature varies from less than 0.01% to 3.4% [4]. The ultrasonological screening abnormalities in the hip varies from 6.57% to 56.2% [2,3]. Our incidence of ultrasonological abnormalities and hip dislocations is towards the lower end of the published studies. It may reflect a truly lower incidence or it may be due to 6 weeks of age at screening when the minor hip abnormalities usually resolve [7]. The 6 week time also coincides with the infant's first DPT vaccination providing access to the child.

The ultrasound screening was chosen by us because it is the gold standard and is highly sensitive. The disadvantage is that further follow up of all abnormal hips is required. While Graf IIa and IIb only require observation many authors choose to

treat Graf IIc hips, which are severely dysplastic but not unstable [2]. In our study, we observed all abnormal hips except the one with dislocation. All type II hips returned to normal by 3 months of age. The ultrasonological follow up thus allowed us to decrease the number needed to be treated to just one in thousand.

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REFERENCES

1. Pillai A, Joseph J, McAuley A, Bramley D. Diagnostic accuracy of static graf technique of ultrasound evaluation of infant hips for developmental dysplasia. Arch Orthop Trauma Surg. 2011;13:53-8.
2. Treiber M, Toma•ic T, Tekauc-Golob A, Zolger J, Korpar B, Burja S, *et al*. Ultrasound screening for developmental dysplasia of the hip in the newborn: a population-based study in the Maribor region, 1997-2005. Wien Klin Wochenschr. 2008;120:31-6.
3. Grill F, Muller D. Results of hip ultrasonographic screening in Austria. Orthopade. 1997;26:25-32.
4. Developmental dysplasia of the Hip. *In:* Tachdjian's Pediatric Orthopaedics 4th ed. Philadelphia, PA: Saunder's Elsevier; 2008;637-770.
5. Graf R, Scott S, Lercher K. Hip Sonography: Diagnosis and Management of Infant Hip Dysplasia: 2nd edition. Berlin Heidenberg: Springer; 2006.
6. Maxwell SL, Ruiz AL, Lappin KJ, Cosgrave AP. Clinical screening for developmental dysplasia of the hip in Northern Ireland. BMJ. 2002;324:1031-3.
7. Riboni G, Bellini A, Serantoni S, Rognoni E, Bisanti L. Ultrasound screening for developmental dysplasia of the hip. Pediatr Radiol. 2003;33:475-81.
8. Jones DA, Powell N. Ultrasound and neonatal hip screening. A prospective study of 'high risk' babies. J Bone Joint Surg Br. 1990;72:457-9.
9. Clarke NM, Clegg J, Al-Chalabi AN. Ultrasound screening of hips at risk for CDH. Failure to reduce the incidence of late cases. J Bone Joint Surg Br. 1989; 71:9-12.