

Incidence of Congenital Hip Dislocation in Children with Idiopathic Congenital Talipes Equino Varus

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Purpose: Congenital dislocation of hip has long been considered as an association with foot deformity. In the past there has been publications suggesting that the association is with calcaneo-valgus and metatarsus adductus deformity rather than talipes equino varus ; while others suggested that there is an association between clubfoot deformity and hip dysplasia. The association is specifically relevant in the context of high risk screening as to decide whether idiopathic clubfoot deformity warrants routine screening. We investigated the association of clubfoot and hip dislocation in this study.

Study design: All children attending our plaster clinics for clubfoot deformities from January 2006 to January 2012 and clubfoot clinic from February 2012 (from the time separate clubfoot clinic was established in our hospital) to October 2014 had their records reviewed (total 9 year). A total of 1240 children were identified with clubfoot deformity. Children with arthrogryposis and neuromuscular disorders with foot deformity (Total 43 patients) were excluded. Remaining 1197 children with idiopathic clubfoot were included in the study. In the children with dislocated hip clinical, radiological and ultrasound results (corresponding to Graf type D, III or IV) were considered.

Results: Out of 1197 children with clubfoot included in the study 8 had hip dislocation which could be diagnosed clinically. So, the incidence of congenital dislocation of hip was 6.7 per thousand in children with idiopathic clubfoot (95 % confidence interval: 2.9 to 13.2). This is higher than the incidence of congenital dislocation of hip in normal children (Approximately 1 per thousand). This suggests that children with clubfoot has higher incidence of congenital hip dislocation compared to normal population.

Conclusion: Results of this study are in favour of association between idiopathic clubfoot and congenital dislocation hip.

Clinical relevance: This suggests that children with idiopathic clubfoot should be included in the screening for hip dysplasia in a setting of high risk screening.

Introduction

Congenital dislocation of hip (CDH) is one of the most common congenital malformation of

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musculoskeletal system. The incidence of dislocation or subluxation of hip is quoted differently in various studies, but approximately one in thousand newborns has congenital hip dislocation and 10 in 1000 newborns have hip dysplasia (Developmental Dysplasia of Hip : DDH)⁶⁾. It is widely accepted that early detection and treatment of this condition gives better results. Hence, screening strategies have been adopted which vary at different regions and institutions. Clinical screening based on Barlow test, Ortolani test, asymmetrical thigh folds and restriction of hip abduction does not involve any extra cost but has poor sensitivity. Hip ultrasound scanning is more reliable method used in screening programs around the world. In some countries the healthcare system follows a universal screening; means they subject all the new born babies to hip ultrasound screening. In many other regions they perform high risk or selective ultrasound hip screening which is restricted to newborns having some risk factors associated with them, like breech delivery, family history of hip dysplasia, torticollis, congenital foot deformities etc.. Common foot deformities associated with congenital hip dislocation are so called “packaging defects” like congenital calcaneovalgus and metatarsus adductus. Intrauterine crowding, which is the etiological factor for these foot deformities has causal role in congenital hip dislocation also.

In the past there has been publications suggesting association of congenital hip dislocation with other foot deformities like calcaneovalgus²⁾ and metatarsus adductus⁷⁾. The co-existence of hip dislocation and neurogenic and syndromic clubfoot is also well described. But, its association with idiopathic clubfoot (Congenital Talipes Equinovarus : CTEV) is controversial, with many studies³⁾¹¹⁾¹⁴⁾ published in favor of and

many others^{8)~10)12)} against this association. The association is specifically relevant in the context of high risk screening as to decide whether idiopathic clubfoot deformity warrants routine screening. We investigated the association of clubfoot and hip dislocation in this study.

Clubfoot treatment moving to specialised clinics and started early. It is possible to select this group for advanced screening techniques such as high risk screening so that not only the true dislocations are picked up which may be found on clinical examination but also minor forms of dysplasias which may become symptomatic in later childhood. As the association between the two is subject of controversy and debate we have looked at the incidence of those diagnosed to have dislocations in a clubfoot clinic setting and compared this with the known incidence of hip dislocation identified by clinical means in our country and those found dislocated or decentered on ultrasound screening in our universal hip screening program.

Methods

Institutional Review Board approval had been obtained prior to the study. This is an observational study spanning 9 years from January 2006 to October 2014. All children attending our plaster clinics for clubfoot deformities from January 2006 to January 2012 and clubfoot clinic from February 2012 to October 2014 had their records reviewed (from February 2012 a separate clubfoot clinic was established in our hospital). Hospital outpatient records and radiographs were analysed. Children with arthrogryposis and neuromuscular disorders with foot deformity were excluded.

The diagnosis of clubfoot was based on the typical appearance of the foot in forefoot adduction, hindfoot varus, equinus and cavus often

with medial and posterior skin creases and calf muscle atrophy.

In the children with dislocated hip clinical, radiological and ultrasound results (corresponding to Graf type D, III or IV¹³⁾) were considered. All children were clinically evaluated for hip instability (Barlow, Ortolani tests in neonates and restricted hip abduction, Galeazzi sign in older children). Those children with clinically unstable hips were subjected to hip ultrasound examination (in children younger than 6 months) or radiographs (children older than 6 months) for confirmation.

The results were subjected to statistical analysis. Rate of hip dislocation in idiopathic clubfoot and its 95% confidence interval calculated using exact binomial distribution (Stata software).

Results

A total of 1240 children with clubfoot deformity who had undergone treatment at our institution with adequate records were identified. Among these, 43 patients having syndromic or neurogenic clubfoot were excluded. Remaining 1197 children with idiopathic clubfoot were included in the study.

There were 870 boys and 327 girls; there ratio

Table 1. Sex distribution among children with clubfoot

Sex	Number of children	Ratio
Male	870	2.7:1
Female	327	

Table 2. Side of involvement among children with clubfoot

Side of involvement	Number of children	Percentage of total
Bilateral	658	55%
Right	335	28%
Left	204	17%

being 2.7: 1 (Table 1).

There were 658 (55%) children with bilateral involvement, 335 (28%) had only right foot involved and 204 (17%) had only their left foot affected (Table 2).

Out of 1197 children with clubfoot, 8 children had hip dislocation which could be diagnosed clinically. So, the incidence of congenital dislocation of hip was 6.7 per thousand in children with idiopathic clubfoot (95% confidence interval: 2.9 to 13.2). The details of these eight children with congenital hip dislocation co-existing with idiopathic clubfoot are given in Table 3 (Fig. 1-3). These eight children were followed up for an average duration of 30.1 (range: 3 to 65) months. During the follow up period they did not manifest any features suggestive of syndromic or neurological association.

Discussion

Both clubfoot and developmental dysplasia of hip are two common congenital paediatric orthopaedic conditions. But, whether there is an association between them is a controversial topic. There are many studies published supporting and opposing this association.

Perry et al¹¹⁾ did an observational cohort study spanning 6.5 years involving routine ultrasound screening of the hips of 119 neonates with CTEV. There were seven cases of DDH requiring treatment (Graf types IIB, III, and IV). Thus the frequency of DDH in babies with CTEV is 5.9%, which is higher than the incidence in normal population. So, the study concludes that patients with CTEV have an increased risk of DDH.

Canavese and colleagues³⁾ studied 26 babies with idiopathic clubfoot among 15 785 newborns born in University of Geneva Hospitals, Geneva, Switzerland in 4 years. Among these, two (2/26

Table 3. Details of eight children who had both clubfoot and congenital dislocation hip in this series.

Patient	Age* / sex	Foot	Hip	Diagnosis of CDH	Treatment summary	
					CTEV	DDH
1	2 years/ Male	Right CTEV	Right CDH	Clinical, Radiological	PMSTR	Lost To Follow-Up
2	2 months/ Male	Left CTEV	Left CDH	Clinical, Radiological	Casting	AT + OR
3	3 Months / Male	Right CTEV	Left CDH	Clinical, Radiological	Casting+ TA tenotomy	AT + CR
4	<1 Month /Female	Left CTEV	Bilateral CDH	Clinical, Radiological	Casting	AT + CR
5	2 Months / Female	Bilateral CTEV	Left CDH	Clinical, Radiological	Casting	Pavlik Harness
6	<1 Month / Female	Bilateral CTEV	Left CDH	Clinical, USG (Gr.III), Radiological	Bilateral PMSTR	AT + CR, Later OR
7	<1 Month / Male	Bilateral CTEV	Righ CDH	Clinical, USG (Gr.IV), Radiological	Bilateral TA tenotomy	AT + CR
8	<1 Month / Male	Right CTEV	Right CDH	Clinical, USG (Gr.III), Radiological	Casting	Pavlik harness

* Age at first consultaion at our institution

CTEV : Congenital Talipes Equinovarus, CDH: Congenital Dislocation Hip, USG: Ultrasonogram

PMSTR: Posteromedial Soft Tissue Release, AT : Hip Adductor Tenotomy, OR : Open Reduction, CR : Closed Reduction, TA Tenotomy: Tendo Achilles tenotomy

= 7.7%) developed hip dysplasia and required Pavlik harness treatment. The authors recommend hip ultrasound screening in patients with idiopathic clubfoot.

Zhao et al¹⁴⁾ did a study of 184 babies with CTEV using hip sonography and found that 5 patients (2.7%) had DDH (Graf type IIa(-) or worse). This is a higher incidence of DDH compared to the general population of the same race. Thus, the study supports an association between the CTEV and DDH.

At the same time, there are some studies published against co-existence of DDH and Idiopathic clubfoot:

Westberry and colleagues¹²⁾ performed a retrospective study to find the rate of DDH in 349 patients with idiopathic clubfoot. Out of these 127 had a screening hip radiograph and remain-

ing 222 patients were assessed for clinical signs/symptoms of hip pathology. In the group with hip screening radiographs, only one patient (0.8%) was found to have evidence of DDH. In the group without hip screening radiographs, none developed any clinical signs or symptoms of hip pathology during the follow-up period (Average of 9.6 years). The overall rate of hip dysplasia in the idiopathic clubfoot population in this series was less than 1.0%.

Paton and Choudry⁹⁾ published a study on 614 of infants referred over a period of 11 years as part of ultrasound screening programme for DDH. There were 60 cases of fixed congenital talipes equinovarus, 436 postural talipes equinovarus, 93 congenital talipes calcaneovalgus and 25 cases of metatarsus adductus. The rate of significant hip abnormality (Type III or IV dys-

plasia) was 0% in congenital talipes equinovarus, 0.45% in postural talipes equinovarus, 6.5% in congenital talipes calcaneovalgus and 4 % among metatarsus adductus. They concluded that congenital talipes calcaneovalgus and metatarsus adductus have statistically significant higher risk of hip dysplasia and there is no strong relationship to postural or fixed CTEV deformities in DDH.

Mahan et al⁸⁾. conducted a study among 677 children who were reported to the birth defects registry as having a clubfoot in three states of the United States of America. Data regarding presence of hip dysplasia, its treatment and presence of clubfoot were obtained through a telephone interview. In addition, 2037 infants without a foot malformation were also included in the study as controls. Treatment for hip dysplasia was reported by only 5 mothers of patients with clubfoot (0.74%) and 5 mothers of control subjects (0.25%). Although the proportion of treated hip dysplasia was 3 times higher among cases, the difference was not statistically significant. It is a retrospective study with data collected by telephone interviews which are obviously inferior compared to those obtained by clinical examination and imaging.

There are other recent studies published in this topic like Chou and Ramachandran⁴⁾ and Paton et al¹⁰⁾.

In general, all these studies, whether they support or oppose the association, have inadequate sample size to prove or disprove the association between these two congenital conditions.

In the present study, when 1197 children with idiopathic clubfoot were evaluated for presence of hip dysplasia the rate of hip dislocation was 6.7 per thousand. This is higher than the rate of congenital dislocation of hip in otherwise normal children in the same population (1.0 per

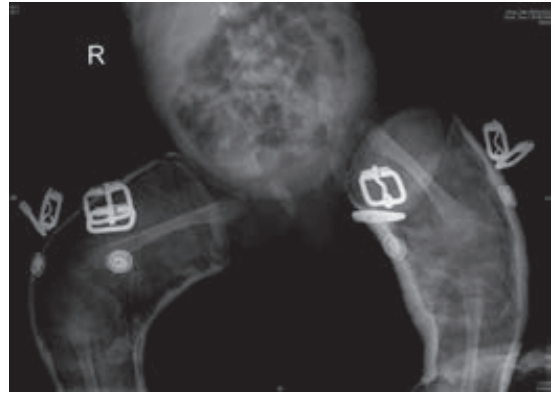


Fig. 1. Left hip dislocation being treated with Pavlik harness. Parts of bilateral plaster casts for clubfeet can also be seen in the figure (Patient 5).

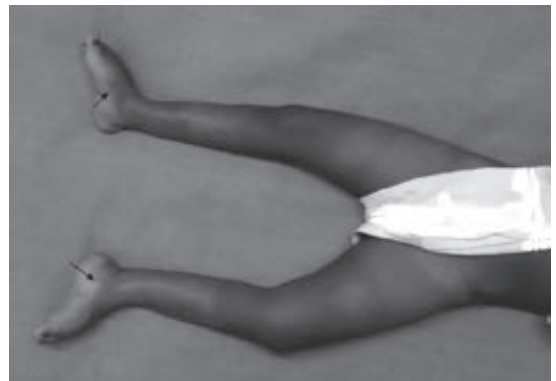


Fig. 2. Clinical photograph of a child with clubfoot co-existing with congenital dislocation hip. Bilateral clubfeet soft tissue release and left hip dislocation open reduction have been done. Surgical scars are marked with arrows (Patient 6).

thousand)¹⁷⁾.

It is known that DDH diagnosed early in infancy requires less complex treatment than when presenting later. But early diagnosis of DDH is difficult based on clinical tests alone. Hence selective ultrasound scanning of hips which are at risk for DDH becomes important. Since clubfoot is a condition which is easily diagnosed clinically, it can be considered as an indication for selective screening for hip dysplasia. The association of clubfoot and DDH becomes important in this context. Hence we recommend that babies with clubfoot be included in the high



Fig. 3. Same patient as in picture 2; left hip open reduction surgical scar is marked with arrows.

risk screening for detection of hip dysplasia.

Conclusion

Results of this study are in favor of association between idiopathic clubfoot and congenital dislocation hip. This suggests that children with idiopathic clubfoot should be included in the screening for hip dysplasia in a setting of high risk screening.

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