

Incidence and pattern of congenital dislocation of the hip in Aseer Region of Saudi Arabia

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Summary

Objective

The aim of this paper is to determine the incidence, pattern, predisposing risk factors, treatment modalities and outcome of congenital dislocation of the hip (CDH) in the Aseer region of Saudi Arabia.

Methods

A retrospective study of 300 cases of CDH seen during a 4-year period between 1996 to 1999 was carried out at the Aseer Central Hospital, Abha. The relevant data examined included the details on pregnancy, birth, family history, methods of diagnosis and treatment. Data on live births for the same period was also obtained from the Directorate of Health, Aseer Region, Ministry of Health, Saudi Arabia.

Results

During the period of study, 300 children were found to have CDH with an incidence rate of 3.5/1000 live births. Only 32.4% of CDH was diagnosed in first 6 months of life. Mean age at diagnosis was 14.5 ± 19.7 months while the mean age at treatment was 44.50 ± 36.41 months. Some 235 cases (78.3%) were females (M:F ratio = 1:3.6) and 292 (97.7%) were Saudi nationals. There was a positive family history in 64 cases (21.3%). Both hip joints were involved in 151 cases (50.3%), the left hip joint 82 cases (27.3%) and the right hip joint in 67 cases (22.3%). Delivery was by spontaneous vaginal delivery in 268 cases (89.3%), caesarean section in 28 cases (9.3%) and breech delivery in 29 cases (10%). Limping and waddling gait were the most common clinical presentation seen in 166 cases (55.3%). In 22 children (7.3%), the parents were blood relatives. First born children constituted 56 out of 216 (25.9%). In the present series, 46% of the children were treated surgically, 42% were treated conservatively and 12% were treated by both. Avascular necrosis (AVN) of the femoral head following the treatment was seen in 6 children (2%).

Conclusion

Incidence rate of CDH in Aseer Central hospital and by inference in Aseer region of Saudi Arabia was found to be 3.5/1000 live births. Since the neonatal screening of CDH in this region is poor, awareness programmes, routine neonatal hip joint examination at birth and up to one year of age and plain x-ray of pelvis after the age of 3 months in high-risk babies are strongly recommended.

Keywords: Congenital Dislocation of Hip, Aseer Region, Saudi Arabia.

Résumé

Objectif

L'objet de cette étude est de déterminer la fréquence des tendances nettes qui ressortent des statistiques, des prédispositions des facteurs de risques, les modalités de traitement et le résultat de la dislocation congénitale de la hanche (CDH) à la région d'Aseer au Arabie Saudi.

Correspondence

Methodologie

Une étude rétrospective de 300 cas de CDH effectuée au cours d'une période de 4 ans entre 1996 et 1999 à l'Hôpital Central d'Aseer, à Abha. Les données pertinentes étudiées sont les détails sur la grossesse, la naissance, l'histoire de la famille, les méthodes de la naissance, l'histoire de la famille, les méthodes de la diagnostique et le traitement. Les données sur les enfants nés vivant pendant la même période ont été notées auprès de la Direction de la Santé, La Région Aseer, Ministère de la Santé, Arabie Saudi.

Resultats

Pendant la période de cette étude, 300 enfants ont été découverts atteints de CDH avec le taux de l'incidence de 3,5 / 1000 enfants nés vivant. Seulement 32,4 % de CDH ont été diagnostiqués pendant le premier 6 mois de vie. L'âge moyen au moment du diagnostic était $14,5 \pm 19,7$ mois tandis que l'âge moyen au cours du traitement était $44,50 + 36,41$ mois. 235 cas soit 78,3% étaient femmes (dans la proportion de M .F = 1,3,6) et 292 soit 97,7 % étaient ressortissant du Saudi. L'histoire de la famille était positive dans 64 cas soit (21,3%) Les deux articulations de la hanche étaient impiaueées dans 151 cas soit 50,3%.

L'articulation de la hanche gauche dans 82 cas soit 27,3% et l'articulation de la hanche droite dans 67 cas soit (22,3%). Accouchement était à travers accouchement volontaire par le vaginal dans 268 cas soit 89,3%, la section césarienne dans 28 cas soit 9,3% et l'accouchement par le siège dans 29 cas soit 10%. Passer en boitant et les pas mal assurés étaient les présentations cliniques les plus fréquentes vus dans 166 cas soit 55,3%. Chez les cas de 22 enfants soit 7,3%, les parents étaient parents par le sang. Premier né enfants ont constitué 56 sur 216 soit 25,9%. Dans les séries qui nous occupent, 46 des enfants ont été traités à travers la chirurgie, 42% ont été, de façon classique, traités et 12% ont été traités à travers les deux méthodes. A la suite du traitement, on avait noté la Nécrose avasculaire (AVN) de la tête fémorale chez 6 enfants soit 2%.

Conclusion

Le taux de CDH à l'Hôpital Central d'Aseer et par déduction, à la région d'Aseer à l'Arabie Saudi était noté d'être 3,5/1000 enfants nés vivant. Etant donné que la méthode du dépistage néonatale de CDH est très mauvaise dans cette région, l'examen de routine néonatal de l'articulation de la hanche pendant la naissance, et l'examen radiographique simple du pelvis à l'âge d'un an et après l'âge de trois mois chez les bébés à haut risque, ont été fortement recommandés.

Introduction

In congerital dislocation of the hip there is an abnormal development of the hip and the femoral head does not fit normally in its socket (the acetabulum). The head can easily come out (dislocatable). It can be completely out of the socket (dislocated) or partially out (subluxated). Because hip dislocations are not truly congenital in origin, the term developmental dislocation of the hip (DDH) rather than congenital dislocation is increasingly used.¹ Typical CDH occurring in neurologically normal children is the most common form.

Early diagnosis of CDH in newborns with early initiation of treatment is important to avoid the severe disability that results

from late diagnosis. Avascular necrosis is a complication of treatment of CDH specially when started at an older age.²⁻⁴ Late sequelae of untreated CDH include late development of painful degenerative changes in the hip joint, spine deformities like hyperlordosis (which leads to back pain in adults) and scoliosis, gait disturbance and knee deformities.⁵⁻⁹

The incidence of CDH ranges from 0.1/1000 live births in Chinese children in Hong Kong,¹⁰ 0.7/1000 in Malaysia,¹¹ 1.5/1000 in Salford, England,¹² 1.7/1000 in Sweden¹³, to 75/1000 in Belgrade, Yugoslavia.¹⁴ The aim of this retrospective study of CDH was to determine the pattern, predisposing risk factors, treatment modalities and outcome in the Aseer region of Saudi Arabia.

Materials and Methods

A retrospective study was carried out at the Aseer Central Hospital, Abha, which serves as a Teaching Hospital to the College of Medicine and Medical Sciences, King Khalid University and was commissioned in 1988 to serve as a referral center for about 218 health institutions in the Aseer region in the Southwestern part of Saudi Arabia (population 1,200,000).¹⁵

All the 300 patients seen at Aseer Central Hospital with CDH over the 4-year period from 1996 to 1999 formed the basis of the study. The data retrieved from the case records included the pregnancy, birth and family history, methods of diagnosis, treatment modalities and the outcome of the treatment given, were also recorded. Data on live births for the same period was collected from the Directorate of Health, Aseer Region, Ministry of Health, Saudi Arabia, so as to calculate the incidence of CDH among live births.

Patients were seen at various stages of their development and the clinical presentation depended on the age of the patient and his/her walking status.

In order to reach a diagnosis, the clinical tests performed included: Ortolani test¹⁶⁻¹⁷, Barlow test¹², Limitation of hip abduction on the affected side (usually noted by parents when diapers are changed)¹⁸, shortening of the thigh on the affected side when child starts to walk and gait disturbance (limping on shorter side in unilateral CDH and waddling gait, like a duck in bilateral CDH).

Plain x-ray of pelvis was taken to confirm the diagnosis of CDH in children at the age of 3 months.¹⁹

Results

A total of 79,548 live births occurred during the period of 4 years (1996-1999). Out of these, 300 children had the congenital dislocation of hip giving an incidence rate of 3.77/1000 live births. The parents of 22 (7.3%) of the children were found to be blood relatives (mainly first cousins). Avascular necrosis (AVN) was observed in 6 children (2%).

Table 1 shows the distribution of 300 cases of CDH according to some characteristics. The male to female ratio was 1:3.6 (65 males : 235 females). The majority of the cases, 292 (97.7%) were Saudi and only 8 (2.3%) were non-Saudis. The birth order of children with CDH ranged between 1 to 9 with a mean of 3.4. There was a positive family history of CDH in 64 cases (21.3%). Four of the children with CDH were siblings (Fig. 1). The 4 children either had unilateral (Fig. 2) or bilateral CDH (Fig. 3). The left hip was involved in 82 children (27.3%), and the right hip in 67 children (22.3%). Bilateral CDH was diagnosed in 151 children (49.8%).

Analysis of the maternal history showed that 14 children (4.7%) has pre-term delivery, 29 children (10%) had breech presentation while 30 children (10.7%) had some form of assisted delivery such as caesarean section (28 cases) and forceps (2 cases). There was only one twin pregnancy with normal delivery in this series of cases.

Table 1 Distribution of cases of CDH in Aseer region according to some characteristics.

Characteristics	Boys (N = 64)	Girls (N = 236)	Total (N = 300)
Birth order			
1st	10 (22.2)	46 (26.9)	56 (25.9)
2nd	13 (28.9)	31 (18.1)	44 (20.4)
3rd	7 (15.6)	26 (15.2)	33 (15.3)
4th	15 (33.3)	68 (39.8)	83 (38.4)
Total	45 (100.00)	171 (100.00)	216 (100.0)
X±SD	3.38 (2.62)	3.51(±2.7)	t = .292 (P = .77)
Nationality			
Saudi	64 (100.0)	228 (97.0)	292 (97.7)
Non-Saudi		7(3.0)	7 (2.3)
Total	64 (100.0)	235 (100.0)	299 (100.0)
			X ² = 1.952 (P = .162)
Family History			
Yes	17 (26.6)	46 (19.5)	63 (21.0)
No	47 (73.4)	190 (80.5)	237 (79.0)
Total	64 (100)	236 (100.0)	300 (100.0)
			X ² = 1.517 (P = .218)
Bilaterality			
Yes	33 (51.6)	116 (49.4)	149 (49.8)
No	31 (48.4)	119 (50.6)	150 (50.2)
Total	64 (100.0)	235 (100.0)	299 (100.0)
			X ² = 0.97 (P = .755)
Gestation			
Pre-term	7 (10.9)	7 (3.0)	14 (4.7)
Full Term	57 (89.1)	229 (97.0)	286 (95.3)
Total	64 (100.0)	236 (100.0)	300 (100)
			X ² = 7.191 (P = .007)
Abnormal presentation			
Yes	10 (16.1)	19 (8.3)	29 (10.0)
No	52 (83.9)	209 (91.7)	261 (90.0)
Total	62 (100.0)	228 (100.0)	290 (100.0)
			X ² = 3.292 (P = .07)
Abnormal delivery			
Yes	7 (10.9)	23 (9.8)	30 (10.0)
No	57 (89.1)	212 (90.2)	269 (90.0)
Total	64 (100.0)	235 (100.0)	299 (100.0)
			X ² = .374 (P = .786)
Age of Diagnosis (months)			
< 6 months	24 (37.5)	72 (31.0)	96 (32.4)
6 -	11 (17.2)	32 (13.8)	43 (14.5)
12 -	25 (39.1)	105 (45.3)	130 (43.9)
36 +	4 (6.3)	23 (9.9)	27 (9.0)
Total	64 (100.0)	232 (100.0)	296 (100.0)
SD ± SD	11.33 (± 14.54)	15.35 (± 20.87)	14.48 ± 19.73
			X ² = 1.921 (P = 0.166)
Age of Treatment (months)			
6 m	-	2 (0.8)	2 (0.7)
6 -	4 (6.2)	7 (3.0)	11 (3.7)
12 -	12 (43.8)	109 (46.2)	127 (45.7)
>36	32 (50.0)	118 (50.0)	150 (50.0)
Total	64 (100.0)	236 (100.0)	300 (100)
X ± SD		44.5 ± 36.41	X ² = 0.35 (P = .851)
Type of Rx			
Conservative	33 (52.4)	91 (39.2)	124 (42.0)
Surgical	25 (39.7)	111 (47.8)	136 (46.1)
Both	5 (7.9)	30 (12.9)	35 (11.9)
Total	63 (100.0)	232 (100.0)	295 (100.0)
			X ² = 3.798 (P = .150)
X ± SD	48.47 (43.04)	43.42 (± 34.42)	t = .584 (P = .326)
Outcome			
Success	52 (81.2)	200 (84.7)	252 (84.0)
Failure	12 (18.8)	36 (15.3)	48 (16.0)
Total	64 (100)	236 (100.0)	300 (100.0)
			X ² = 1.715 (P = .616)

Table 2 Logistic regression model of outcome of intervention in CDH

Factors	β	Wald	p-value	Exp (β)
Age at diagnosis	.0237 (.008)	8.8671	.0029*	1.024
Age at treatment	-.0074 (.006)	1.5539	.2126	.9926
Sex	-.4141 (.3786)	1.963	.2741	.6609
Constant	-1.4282 (.3896)	13.4363	.0002*	

* Statistically significant
 Model $\chi^2 = 9.684$ ($p = .0214$)
 Overall fit = 84.46%

Table 3 Stepwise multiple regression of age at treatment and some independent variables.

	β	T	P
Age at diagnosis (month)	.684	5.855	.000*
Family History (positive)	10.76	2.066	.040*
Birth order	.014	.219	.827
Abnormal delivery	-.042	-.639	.524
Abnormal presentation	-.062	-.963	.336
Sex	-.078	-1.185	.238

* Statistically significant
 $F = 18.426$, $p = .000$
 $R = .391$, $R^2 = .153$, adjusted $R^2 = .145$, $SE = 31.76$

Table 4 Risk factors for delayed diagnosis +

Factor	p-value
Birth order	.196
Family History	.58
Sex	.13
Nationality	.25
Bilaterality	.18
Gestation	.90
Presentation (Cephalic)	0.03*
Type of delivery (Normal)	.002*

* Statistically significant
 + Multiple regression for the age at diagnosis was applied
 None of the previous variables was a significant predictor of delayed diagnoses ($F = .972$, $P = .459$).

About one-third of CDH cases (32.4%) were diagnosed within the first 6 months of life, 9% were diagnosed as late as after 3 years of age. The mean age of diagnosis was 14.5 ± 9.7 months. In the present series, Ortolani test was positive in 58 patients (19.3%), Barlow test in 6 (2%) and reduced hip abduction in 104 (34.7%). Shortening of the affected leg in unilateral cases occurred in 121 patients (40.3%) and limping in 166 patients (55.3%). Some of the patients had two or more positive clinical features.

With regards to the age at commencement of treatment, only 4.4% were treated within the first year of life. On the other hand, those treated after the age of 3 years constituted one-half (50%) of all cases. The mean age at commencement of treatment was 44.5 ± 36.41 months.

Treatment offered included conservative management (42%), surgical management (46%), while 12% were treated by both conservative and surgical methods. Success rate was 84%. 11.7% of cases were lost to follow-up after the diagnosis.

Table 2 shows the relationship between the age at diagnosis and the age at commencement of treatment. There was a significant relationship ($F = 31.885$, $p = 0.0002$) between the ages at diagnosis and commencement of treatment.

Table 3 shows a stepwise multiple regression of age at the commencement of treatment and other independent variables. It shows that both the age at diagnosis ($p < 0.001$) and the positive family history of CDH ($p = 0.04$) were the only significant predictors of delayed treatment.

Logistic regression of the outcome of management of CDH and some independent variables showed that the age at diagnosis was the only significant predictor of the outcome ($p = .0029$) with Model $\chi^2 = 9.684$ ($p = 0.02$). Favourable outcome was significantly associated with early diagnosis.

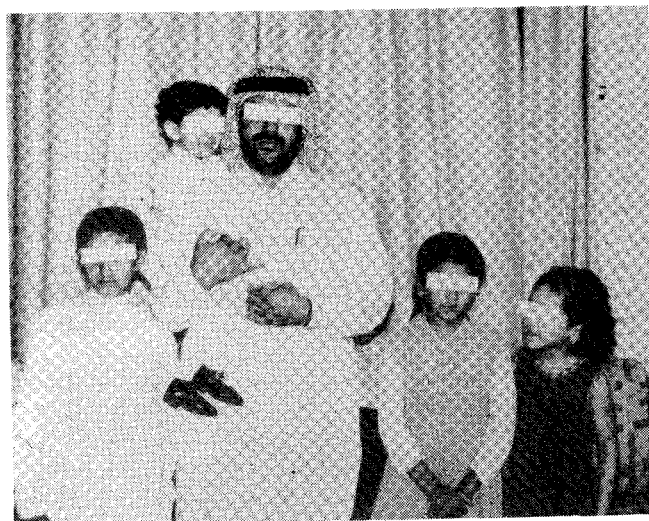


Fig. 1 A family of 4 children (a boy aged 10 years and 3 girls aged 8, 6, and 2 years respectively). All 4 children had congenital hip dislocation. The eldest and youngest children had bilateral CDH while the other 2 had unilateral CDH. The parents were close relatives.



Fig. 2 X-ray of the pelvis of the 2nd child at the age of one and a half years. She presented with limping on the right side. X-ray shows right hip dislocation.

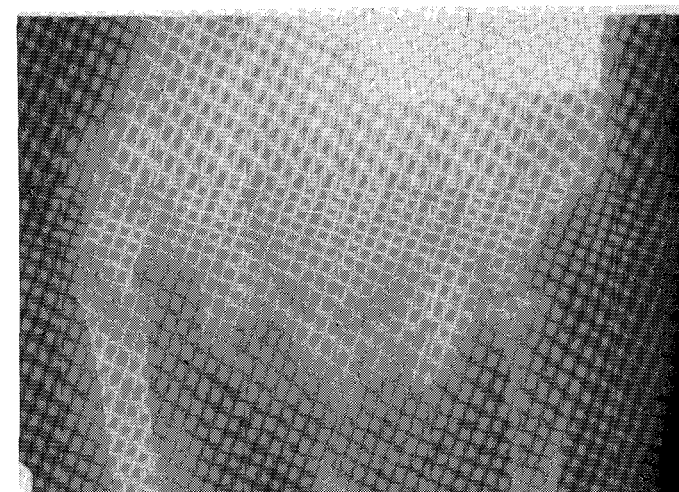


Fig. 3 X-ray of the pelvis of the eldest child at the age of 3 years when diagnosis was initially made. There is bilateral hip dislocation. He presented with waddling gait.

Table 4 shows the possible risk factors for delayed diagnosis. In bivariate analysis the only significant risk factors for delayed diagnosis were cephalic presentation ($p = 0.03$) and normal delivery ($p = 0.002$). However, when controlling for all the other factors in a multiple regression, none of the factors was a significant predictor of delayed diagnosis ($F = 0.972$, $p = 0.459$).

Discussion

The incidence of CDH varies widely from population to population.¹⁰⁻¹⁴ In this series from the Aseer region of Saudi Arabia, the incidence of CDH between 1996 and 1999 was found to be 3.5/1000 live births.

There are certain factors believed to predispose for this condition. One is what has been described as "lack of space" or "large-for-gestational-age" or "hypertrophy of a newborn".²⁰ This explains why CDH is more common in the primigravida. 50% of cases of CDH seen in Malaysia were in primigravida.¹¹ In this series, primigravidas constituted 25.9%. The unstretched abdominal muscles and the uterus of a primigravida force the left hip of the fetus against the mother's spine.²¹⁻²² The condition is more common in female babies.^{10-14,23} About three-fourth of cases in the present study were females. The condition is more common on the left sided CDH and believed to be more common when there is a family history of the disease.²⁴⁻²⁵ In our series, the left hip was affected in 27.3% of cases and 21% of patients had a positive family history. Several studies have claimed that breech presentation is also a predisposing factor.^{23,26-28} However, in the present study only 29 children (10%) had breech presentation.

Prematurity did not seem to play any major role in the pathogenesis of this condition. Only 4.7% of CDH patients had premature delivery in this series. The role of marriage between close blood relative is not clear. There were 22 children with CDH (7.3%) who had blood-related parents. Birth by caesarean section has been reported to be a predisposing factor.²⁵ In this series, 9.3% of cases had caesarean section. It has been shown that Chinese children in Hong Kong had an incidence of CDH which was at least 10 times less than what was found in Caucasians.¹⁰ This was believed to be due to "Hong Hong" position in which the children were carried on the back with the hips in a position of wide abduction. A previous study of Saudi tradition of infant wrapping with lower limbs extended and abducted (*mehad*) tends to suggest that it may predispose to hip dislocation or unfavourably affect the future progress of an unstable hip.²⁹ *Mehad* application is a very common practice in the Aseer Region of Saudi Arabia.

Awareness and early neonatal hip examinations of all babies born, especially those at risk is an important condition for the early detection of CDH.²⁴ However, late presentations still occur because missed examinations continue to be significant.³⁰⁻³¹

In the present study, a major problem of delayed diagnosis was identified as only one-third of the children (32.4%) were diagnosed within the first 6 months of life. The mean age of diagnosis was 14.5 (± 19.7) months. Bivariate analysis showed that the only significant risk factors for delayed diagnosis were normal delivery and normal cephalic presentation (Table 4). This indicates poor methods of screening the CDH in newborns in the region, especially for the normally delivered children.

Another major problem noted in this series was the delay in the initiation of treatment for the children with delayed diagnosis. The mean age at the start of the treatment was 44.50 ± 36.41 months. The only significant predictors for delayed treatment were age at diagnosis ($p < 0.000$) and a positive family history of CDH ($p = 0.04$) (Table 3). Positive family history and the difficulties experienced by the head of the family while getting an elder sibling treated for CDH, could be the important reasons for delaying the diagnosis and treatment of a younger child (Fig. 1).

The management of CDH is either conservative, surgical or both. In this series, 42% of the children were treated conservatively, 46% surgically and 12% by both conservative and surgical methods. The overall success rate of treatment was 84%. Age at diagnosis was the only significant predictor of the outcome (Table 2), while early diagnosis led to a significant success rate compared to those with late diagnosis.

Growth disturbance of the proximal femur in CDH occurs only in patients who have been treated.³² This is commonly referred to by the term avascular necrosis (AVN) or aseptic necrosis. It is considered as one of the most disastrous complications associated with treatment of CDH. The reported incidence varies from none to 73%.³³⁻³⁸ In this series, 2% of the children developed AVN. The sequelae of AVN of the proximal femur are serious and include deformity of the femoral head, shortening of the femoral neck, hip joint incongruity and osteoarthritis of the hip in later life. The incidence of AVN increases with delay in treatment. The younger patients have a lower rate of AVN.²⁻³

Conclusion

The incidence of CDH in Aseer Central Hospital and by inference, Aseer region of Saudi Arabia is 3.5 per 1000 live births. Since neonatal screening for this condition in the region is poor, awareness, routine hip examinations of newborn and regular hip joint examination up to one year of age in high risk children is recommended. Ultrasound hip examination at birth and pelvic x-ray after the age of 3 months in a high risk baby is also recommended.

Repeated examinations during the first month of life are essential to prevent missing cases of neonatal CDH. Special emphasis should be paid in case of normal delivery. Children who are delivered normally should also have routine clinical examination.

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