Congenital dislocation of hip in children: a review of patients treated in the Institute of Orthopaedics and Traumatology, General Hospital, Kuala Lumpur, 1975—1988

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Summary

A retrospective review of patients with congenital dislocation of the hip (CDH) seen in the Institute of Orthopaedics, Kuala Lumpur General Hospital from 1975 to 1988 is presented. There was a female predominance of 17 to five. The average follow-up was 43 months and the average age at final assessment was 63 months. The results were assessed clinically and radiographically using Severin criteria. Eighty eight percent of the hips had excellent or good clinical results at final review compared with 40% of the hips which had excellent or good radiological grading (Severin I and II). Initial acetabular angle before treatment and types of treatment appeared to have a correlation with the final result. The incidence of avascular necrosis was 16%.

Key words: CDH, Severin classification, acetabular angle, avascular necrosis.

Introduction

Congenital dislocation of the hip is one of the commonest congenital hip disorders in Paediatric Orthopaedics. Possible aetiological factors include extended breech position,[1] temporary laxity of the hip at the time of childbirth[2] and neuromuscular mechanism.[3] The importance of neonatal screening is well established. The prevention of late presentation continues to be the aim of effective neonatal screening programme, despite the fact that over half of the hips that were considered to be unstable at birth become clinically normal in the first few weeks of life.[4] This paper reviews the cases treated in the Institute of Orthopaedics, Kuala Lumpur General Hospital and discusses the various aspects of the condition in relation to the local experience.

Patients and Methods

Patients: Records of patients with the diagnosis of CDH seen at the Institute of Orthopaedics, Kuala Lumpur General Hospital from 1975–1988 form the basis of this report. Patients with

dislocation of the hip secondary to neuromuscular and other disorders were excluded. There were 22 records available for complete review; 17 girls and five boys. Four other records; two girls and two boys were discarded because patients defaulted follow-up in the early stage. The left hip was involved in eight patients and right hip in 11 patients. Three patients had bilateral dislocation. The average follow-up was 43 months with a range of six months to 13 years 10 months. The age at final assessment ranged from 28 months to 15 years 4 months with an average of 63 months.

Clinical assessment: Clinical assessment was carried out according to three aspects: Pain, limp and range of movement and classified into excellent, good, fair and poor (Table 1). Any patient with a specific symptom was placed in the lowest appropriate group. Thus a patient with severe limp was considered in the poor rating even if he had no pain or no restriction of movement.

Table 1
Clinical Assessment and Rating

Clinical Assessment	Rating
No pain, no limp, no restriction of movement	Excellent
No pain, slight limp, slight restriction of movement	Good
Occasional pain, moderate limp, moderate restriction of movement	Fair
Regular pain, marked limp, severe restriction of movement	Poor

Radiological assessment: The radiological assessment was based on Severin's classification.[5] Patients aged less than six years old at final review were assessed under the same group as 6–14 year olds.

Methods of review: Clinical assessment was retrieved from the last date of follow up in the medical records while radiological assessment was done based on the last radiographs on the same date of follow up.

Results

Place of birth: Out of 22 patients, 12 (54%) records did not state the place where the delivery was conducted. Among the other ten records, seven (32%) babies were born in the general hospitals, one (4%) in a private clinic and two (9%) were delivered at home by a midwife.

Clinical grading: Clinical results were a great deal better than the radiological results. Six hips (24%) were clinically excellent. Sixteen hips (64%) were classified as good. No hip fell into the group with fair result and one hip (4%) had poor result with marked restriction of movement while two hips (8%) could not be assessed accurately because of some other congenital deformities in the knees and feet. (Table II).

Radiological grading: In view of the higher tendency for a subluxed hip to develop osteoarthritis earlier in life, Severin group IV was considered to be a poor result whereas group I was considered

Table II
Clinical and radiological grading

Severin Grade	Clinical Grade					Total
	Excellent	Good	Fair *	Poor	Unclassified	
I	3	3				6 (24%)
II	1	3				4 (18%)
III	1	3			1*	5 (20%)
IV	1	5		1	1+	8 (32%)
V		1				1 (4%)
VI		1				1 (4%)
TOTAL	6 (24%)	16 (64%)		1 (4%)	2 (8%)	25 (100%)

* Bilateral congenital talipes equinovarus
\+ Bilateral congenital talipes equinovarus and genu recurvatum.

excellent, group II good and group III fair. Six hips (24%) fell into Severin grade I. Four hips (16%) were radiologically grade II. Five hips (20%) were classified as grade III. Eight hips (32%) were in grade IV and one hip (4%) each was graded as grade V and VI. (Table II). It should be stressed that the age at final review ranged from 28 months to 15 years 4 months and it is likely that the clinical and radiological results will deteriorate with age. Incidentally, the average period of follow-up for those groups which were classified as good and excellent was also 43 months.

Prognosis

While accepting the fact that this series may be too small for a statistical conclusion, we have analysed those factors which may have affected the prognosis in this series of our patients and compared that with other well known series.

Age at diagnosis: In most series reported, the younger the age at diagnosis, the better the eventual outcome. This could not be established in the series. Most of the patients (14 hips – 56%) presented to us were in the age group of between one to two years old when they started to walk. The two hips presented at aged three to 12 months had a Severin grade III result. Five out of the 14 hips presented at age of between 13 to 24 months had Severin grade I, two had grade III and seven had grade IV to VI. Among the four hips presented at age of between 25 to 48 months, one each had grade I and II, two were in grade IV to VI. Out of the three hips presented at age 49 to 72 months, one each had grade II, III and IV to VI. The two hips presented at age of above 72 months had grade II results. (Table III)

Acetabular angle: The acetabular angle was the angle subtended by the slope of the acetabular bony roof and Hilgenreiner's line (the horizontal line between the triradiate cartilage). Out of the six hips with initial acetabular angle of less than 30 degrees, two had grade I, one had grade II,

Table III
Age at treatment and radiological grading.

Age at treatment (months)	Severin Radiological Grade				Total
	I	II	III	IV–VI	
3 – 12			2		2
13 – 24	5		2	7	14
25 – 48	1	1		2	4
49 – 72		1	1	1	3
More than 72		2			2
Total	6	4	5	10	25

two had grade III and one had grade IV to VI. Among the 12 hips with acetabular angle of between 31 degrees to 40 degrees, three each had grade I, II, III and IV to VI respectively. Of the five hips with initial acetabular angle of between 41 degrees to 50 degrees, one had grade I and four had grade IV to VI. The two hips with acetabular angle of more than 50 degrees ended up with Severin grade IV to VI result. (Table IV) It does appear in this series that acetabular angle had a prognostic significance in the final outcome. Four out of five hips (80%) with an initial acetabular angle of between 41 and 50 degrees ended up with a poor radiological result and both the hips (100%) with an initial angle of more than 50 degrees had a poor result.

Table IV
Initial acetabular angle and final radiological grading

Initial Acetabular angle (degree)	Radiological grading (Severin)				Total
	I	II	III	IV–VI	
30 or less	2	1	2	1	6
31 – 40	3	3	3	3	12
41 – 50	1			4	5
More than 50				2	2
Total	6	4	5	10	25

Types of treatment: The treatment programme was not uniform. For most of the children aged less than six years old, preliminary skin traction for a period varying from one to eight weeks was carried out before any surgical procedure. Eighteen hips subsequently underwent closed manipulation and subcutaneous adductor tenotomy under general anaesthesia. They were all

put in hip spica in 90° of hip abduction and 90° flexion after the reduction. In this group of 18 hips, eight had single attempt at closed manipulation and adductor tenotomy as the only treatment; resulting in a grade I hip in three patients, a grade III hip in one, three grade IV hips and one grade V hip at final assessment. Six of the 18 hips were later subjected to open reduction as the only subsequent surgical procedure (open reduction group). Three of them had three attempts at closed manipulation under general anaesthesia before open reduction; one finally had a grade I result and two a grade IV result. The two grade IV results occurred in a child with bilateral dislocation in which open reduction was done through the Ludloff approach[7] (Figures 1a & b). The rest of the open reduction in this series was performed using the Somervelle approach.[8] Two hips had repeated open reduction for recurrent dislocation, one had a grade I and the other, a grade III result. The last hip in this open reduction group had a grade IV result. In the remaining four hips where closed manipulation and adductor tenotomy failed, open reduction was performed on two of them followed later by a femoral derotation osteotomy to correct excessive femoral anteversion. Both of them had a grade III result. One hip had an open reduction and Salter osteotomy done in a single stage. It redislocated and ended up with a grade VI result. The last hip had open reduction followed later by two femoral derotation osteotomy and one Salter osteotomy. It had a grade IV result.

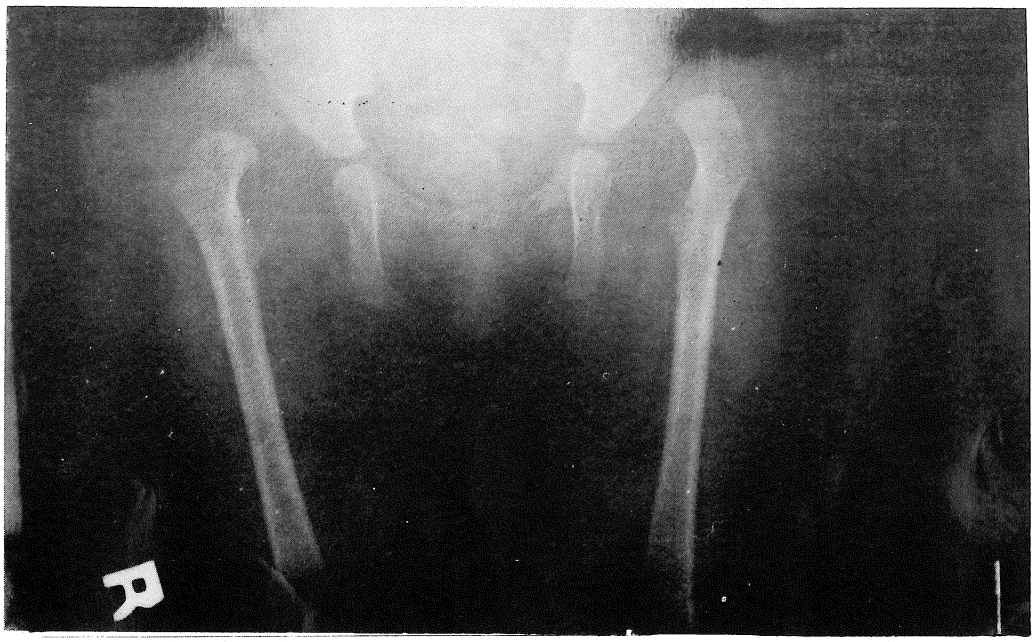

Fig. 1a: Radiograph of one year old boy with bilateral CDH.

In the second group of seven hips, no attempt at closed reduction was done. Four of them had open reduction as the only surgical treatment, resulting in one Severin grade I, two grade II and one grade III at final assessment. The hip of a child aged seven years old was subjected to open reduction and femoral varus osteotomy with femoral shortening in a single stage. It had a grade II result. Open reduction followed later by a femoral derotation osteotomy was performed on one hip resulting in a Severin grade IV. The last hip of a child aged seven years old had an open reduction and femoral varus derotation osteotomy with femoral shortening performed in the first stage. This was followed three months later by a Salter osteotomy. It had a grade II result at final assessment (Figures 2a & b)

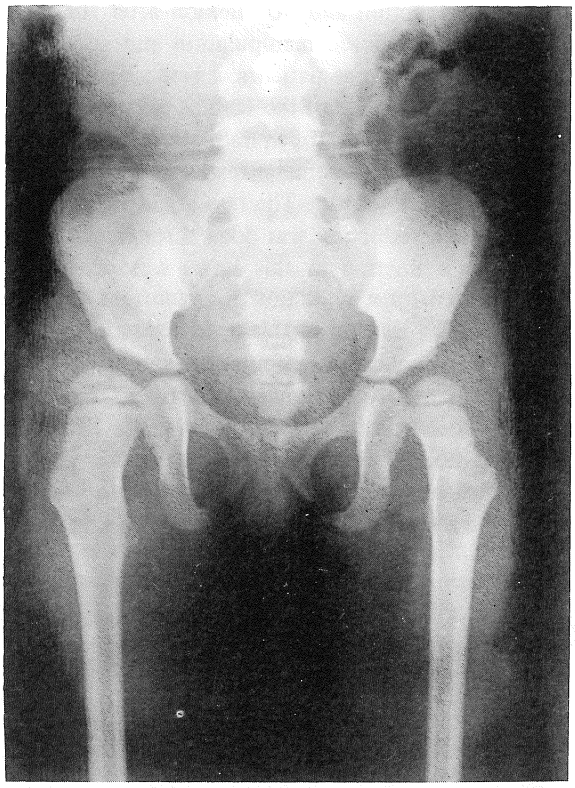

Fig. 1b: Radiograph two years after bilateral open reduction through the Ludloff approach, both hips are subluxed resulting in Severin grade IV hips.

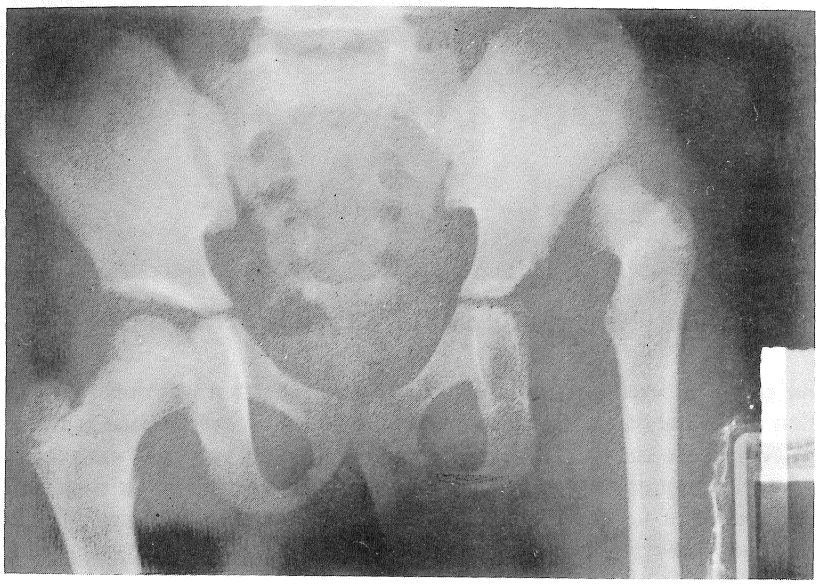

Fig. 2a: Pre-operative radiograph of a seven year old girl with left CDH.

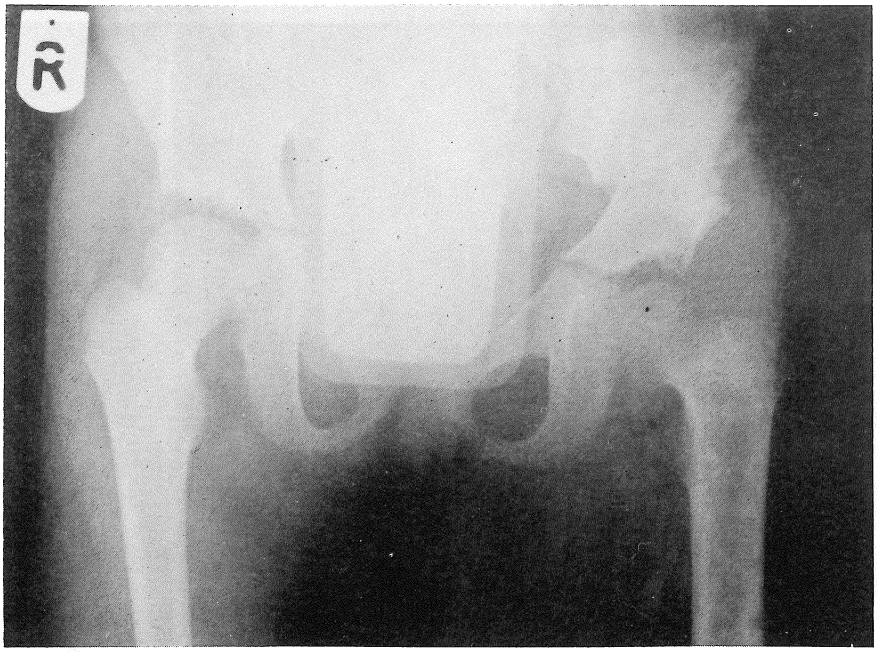

Fig. 2b: Post-operative radiograph six month after open reduction and varus derotation osteotomy with femoral shortening followed by a Salter osteotomy resulting in a Severin grade II hip.

Thus out of the seven hips where no closed reduction was attempted, five (72%) had excellent or good result (grade I and II), one (14%) had a fair result (grade III) and one (14%) had a poor result (grade IV). Whereas in the group of 18 hips where patients were put on hip spica after closed reduction and adductor tenotomy, five hips (28%) were rated good or excellent (grade I and II), four (22%) were fair (grade III) and nine (50%) were poor (grade IV to VI).

Complication

Avascular necrosis: Using the criteria established by Kalamchi and MacEwen,[9] each hip was assessed for signs of avascular necrosis. This occurred in four hips (16%). Three of which involved the ossific nucleus (Figures 3a & b) and one involved the ossific nucleus and epiphyseal plate. Three of them occurred in the group treated by open reduction after failed manipulation and one of them occurred after closed manipulation and abductor tenotomy alone.

Discussion

The incidence of Congenital Dislocation of Hips surveyed in a prospective study in this region was reported to be 0.7 in 1000 live births.[10] The total number of babies born in the Maternity Unit, Kuala Lumpur General Hospital in 1987 and 1988 were 26,569 and 27,451 respectively.[11] Using these statistics available, the number of expected babies born with CDH in Kuala Lumpur General Hospital should be 18 and 19 in 1987 and 1988 respectively. This number of patients were not noted in this series as only four patients were seen in 1987 and one in 1988. Most of them were referred from other hospitals and all of them were above one year old.

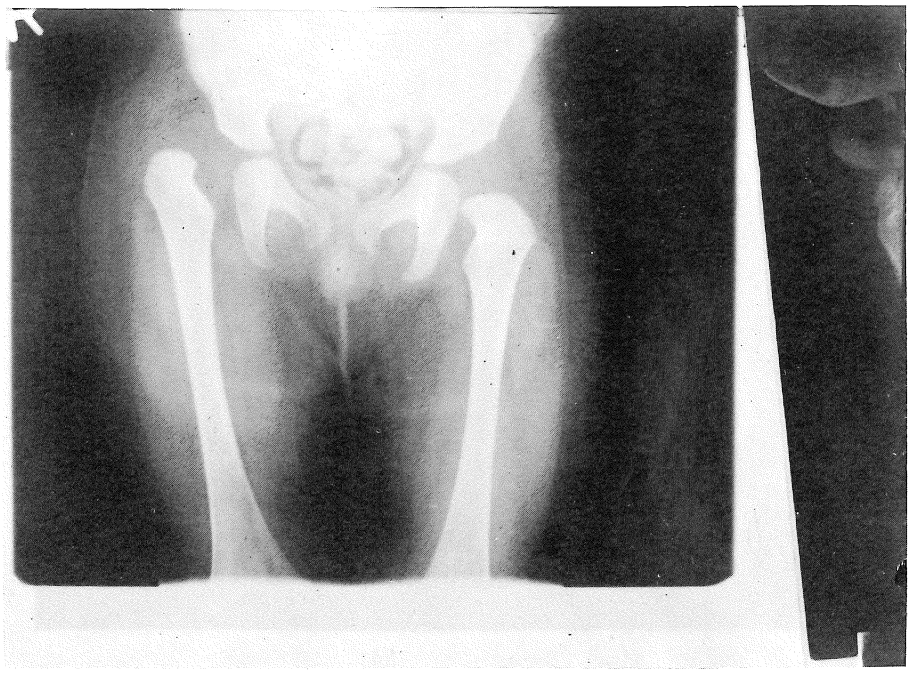

Fig. 3a: Preoperative radiograph of a one year old girl with right CDH.

Fig. 3b: Avascular necrosis of the ossific nucleus after failed closed reduction followed by open reduction and derotation osteotomy.

Majority of the patients were detected when they started to walk. This means that we will continue to expect late presentation, either in the government or private hospitals. Among the ten records where the place of delivery was known, eight (80%) were attended by a doctor and only two were home delivered by midwives. These statistics clearly reflect the lack of proper screening programme in this country. Clinical diagnosis at birth can be difficult, even in experienced hands.[12] Without the availability of facilities like ultrasound which have been shown to be sensitive and accurate,[13] clinical screening plays an important role, as the treatment in CDH is most effective in the neonate.

As in most other reported series, the clinical results are always better than the radiological grades.[6] In this context, it must be remembered that the clinical results will deteriorate with age, especially if the follow-up is short. The radiological grade is a better yardstick to measure the success of the treatment, although the measuring of the centre-edge angle in the younger children can be difficult.

It is surprising to note that age does not seem to influence the result of the treatment in this series. The two children aged more than six years old had good radiological grade whereas those under two years old had mixed results. Types of treatment and surgeon's experience probably accounted for this negative correlation as compared to other large series.

The acetabular angle appears to be the most significant prognostic factor in this series. While accepting that the bony configuration of the acetabulum and the apparent acetabular angle are not reflections of the true cartilaginous state of the acetabulum, those patients with acetabular angle of more than 40 degrees are most likely to end up with poor results. This may be explained by the observation that the acetabular angle is related to the growth potential of the acetabulum, with smaller angle showing larger growth potential.[14]

The final result is also influenced by the types of treatment. A successful closed reduction and adductor tenotomy can produce excellent results. In contrast, immobilisation of an unreduced hip in a spica for some period followed later by open reduction is likely to end up with poor results as compared to immediate open reduction under the same anaesthesia after a failed closed reduction. This is not surprising as immobilisation in the unreduced position subjects the head to undue pressure from the acetabular edge and abnormal muscle force.

Ten hips in this series were immobilised in the spica in a supposedly 'reduced position' which was later found to subluxed or dislocated requiring open reduction. Although late subluxation can occur after an initial successful reduction which remains unstable, the difficulty in judging a successful radiological reduction of a mainly cartilaginous head and acetabulum is well known. This is often made worse in the presence of a hip spica. Since arthrogram is done scarcely in this series, it is advised that concentric reduction in every closed manipulation should be confirmed by an arthrogram before a hip spica is applied.[15] If concentric reduction cannot be achieved or is doubtful as revealed by the arthrogram, an immediate open reduction should be done under the same anaesthesia. The Ludloff approach should be used for children aged less than one year old.[16] The hips done on a child aged 1½ years old through the Ludloff approach had a poor radiological grade. Once the child starts to walk, the dislocated head stretches the superior capsule to form a pouch outside the acetabulum. Since this redundant pouch is not accessible in the medial approach, it encourages redislocation.

The incidence of avascular necrosis is high in this series. Preliminary traction has been shown to protect against avascular necrosis.[17] While almost all the patients in this series have had skin

traction applied for a period of several weeks, it had not been effective in bringing down the head to the level of acetabulum, as revealed from the serial radiographs. Traction reduces the incidence of avascular necrosis only if it is effective in bringing down the head. This probably explains the fact that despite traction, the incidence of avascular necrosis is still high in this series. Other factors such as repeated attempts at closed reduction, immobilisation in the unreduced position in hip spica and the extreme frog position may play a part in the development of avascular necrosis.[18] While the long term prognosis of avascular necrosis involving the ossific nucleus is better than involvement of the epiphyseal plate, the overall outlook is poor.[9,19] Every effort should be made to prevent the development of avascular necrosis by eliminating the possible risk factors.

In conclusion, the management of CDH requires experience and operating skills which are difficult to achieve if the clinical problems are not faced regularly. There is clearly a case for a regional centre of referral and training where proper management can be instituted.

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