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# CONGENITAL DISLOCATION OF THE HIP

## *Results of Early Treatment*

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Closed reduction of simple congenital dislocation of the hip (c.d.h.) with retention in a "frog position" (flexion, abduction, and external rotation in the hip joints) was introduced by *Lorenz* in 1895. This treatment was usually carried out at the age of 2–3 years, frequently it was traumatizing to the hip joints, it required anaesthesia, and it was prolonged. In 1936 *Ortolani* described the reduction phenomenon which is recognized as a sure sign of c.d.h. in newborns. Thereafter, it was possible to treat these patients at a far earlier age than previously. Nevertheless, there was disagreement as to when and how to treat patients with c.d.h. for several years after *Ortolani's* observation. After the great efforts to receive these patients for treatment as early as possible made by *von Rosen* and others, it has been accepted that early treatment by closed reduction is the treatment of choice (*von Rosen* 1957, 1962, 1965, *Ponseti* 1961, *Barlow* 1962, *Borghlin* 1962, *Vulpius* 1964, *Schwartz* 1965).

## METHODS

From May 1, 1958 to December 31, 1966 a total of 59 patients in whom the diagnosis of c.d.h. was made within the first 10 days of life were treated in the Orthopaedic Hospital, Aarhus. In all cases the diagnosis was based upon the presence of Ortolani's phenomenon and/or instability in the hip joints. The first 5 patients were examined by arthrography, confirming the diagnosis. A few patients had other X-rays examinations, but without diagnostic significance.

In all cases the treatment was started a short time, *i.e.* a maximum of 9 days, after the diagnosis was made. All the patients were treated in a felt-padded hip plaster cast with the lower limbs in the "frog position", *viz.* Lorenz position I (Figure 1). The plaster was changed at 2–3-week intervals. The period of plaster

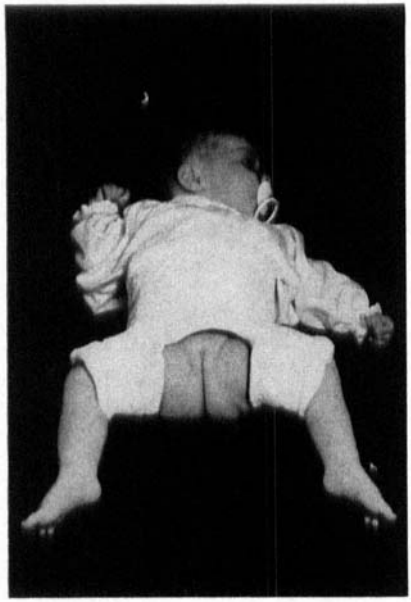

*Figure 1. The plaster cast in a 6-week-old girl.*

treatment was in practically all cases around 13 weeks. Thereafter, the first 7 patients were kept in a position of abduction for 7–37 weeks. Two of these patients were kept in plaster in the Lorenz I position for 25 and 22 weeks respectively, one because of a questionable subluxation and the other one because of subluxation after the first treatment period. The remaining 52 patients were not treated by a period of abduction, their lower limbs being left free after removal of the hip cast. In 3 of these patients further treatment was required. Their histories will be reported in brief outline:

1 B. 126542. After treatment in a hip cast for 13 weeks the hips were clinically and radiologically normal. About 4 months later the head of the right femur was found to be dislocated, so that after closed reduction the baby was kept in plaster in the Lorenz I position for another 10 weeks. Thereafter abduction bed for 16 months. At follow-up at the age of 4 years both hips were found to be normal, clinically as well as radiologically.

2 B 132565. After treatment in a hip cast for 13 weeks the left hip was found to be dislocated and there was severe dysplasia of the acetabulum. The baby was kept in plaster in the Lorenz I position for another 13 weeks, followed by a plaster cast keeping the hips in abduction and internal rotation—the Lorenz II position—for 12 weeks, and thereafter in an abduction bed for 5 months. Even then, the left hip remained dislocated and the acetabulum dysplastic. At the age of 18 months, operative reduction was done by a Lance acetabuloplasty and derotation osteotomy on the upper end of the femur.

3 B 133210. After treatment in a hip cast for 13 weeks the hips were normal, clinically as well as radiologically. Four months later the right hip was found to be dislocated, so that the baby was kept in an abduction bed for 9 months. At follow-up at the age of 2 years the hips were normal.

The follow-up was performed in the Departmeent, and comprised a clinical as well as an X-ray examination. In the clinical examination special emphasis was laid on: complaints, gait mobility in the hip joints, and shortening of the legs. In the X-rays: Situation, size, and bony structure of the femoral head, appearance of the acetabulum, and orientation of the upper end of the femur in relation to the femoral diaphysis.

## RESULTS

In all the cases the diagnosis had been made within the first 10 days of life—average 2nd day of life. At the institution of treatment the age averaged 6 days.

Tables 1 and 2 list the distribution of the dislocations by sex and side affected.

*Table 1. Sex ratio.*

| | Number of patients | Ratio |
|---|---|---|
| Females | 50 | 5.5 |
| Males | 9 | 1 |

*Table 2. Distribution of dislocations by side affected.*

| | Left | Right | Bilateral | Total |
|---|---|---|---|---|
| Number of dislocations | 27 | 10 | 22 | 81 |

41 patients with 54 dislocations were included in the follow-up. The remaining 18 patients had not started walking at the time of the follow-up and were, therefore, left out.

At follow-up the age ranged from 1 year 7 months to 8 years 8 months, average 4 years 8 months.

*Complaints:* No patient had any complaints from the hips.

*Gait:* Normal in 40 patients. One patient could not walk at follow-up because of re-dislocation in the hip joint. Thus, 97.5 per cent of the patients had a normal gait.

*Shortening:* Three patients with unilateral dislocation showed shortening of the homolateral leg as compared with the unaffected one. In two patients the shortening was 1½ and ½ cm and caused by varus position in the hip, of 90° and 100° respectively. In the third case the shortening was caused by re-dislocation in the hip joint; the extent of the shortening was not measured in this patient. In the 13 patients

with primarily bilateral dislocations there was no difference in leg length.

*Mobility:* Two patients had restricted mobility in the relevant hip joint. In one the restriction amounted to a slight reduction in all movements and a 15° flexion contracture. In the other patient the restriction consisted in reduced abduction. Thus, 96 per cent of the treated hip joints showed normal mobility.

Situation of femoral head: One patient showed re-dislocation of the hip joint, while in all the others the femoral head was *in situ* in the acetabulum. In other words, 98 per cent of the treated hips showed successful reduction of the dislocation.

Size of femoral head: In 2 cases the femoral head in the treated hip was smaller than that in the unaffected hip. In all the others the femoral heads were of equal size in both hips. In the 13 patients with bilateral dislocations, the size of the femoral head in the right and left hip was assessed in relation to each other, in relation to the size of the acetabulum, and in relation to the size of femoral heads in normal hips of children of the same age. In all 13 patients the size of the femoral head was found to be normal.

Structure of the femoral head: In 2 cases the bony structure of the femoral head was irregular, and in 1 case it could not be assessed because of a greatly reduced size of the head. In the 13 patients with bilateral dislocations the bony structure was compared with that in normal hips of children of the same age. A normal bony structure was found in 94.5 per cent of the treated hips.

Appearance of acetabulum: In 1 patient the roof of the acetabulum on the treated side was abnormally steep and dysplastic. In all the others the acetabulum was normal. Thus, 98 per cent of the treated hips showed normal acetabula.

Orientation of the upper end of the femur: Varus deformity was found in 2 hips, corresponding to 4 per cent of the dislocations. In these 2 hips the angle between the shaft and neck of the femur was 100° and 90°, measured on the anteroposterior views of the hip joints in a position of neutral rotation. The possible presence of valgus deformity and anteversion of the upper end of the femur was assessed by means of 2 anteroposterior views, one with the hips in a position of neutral rotation, the other with abducted, internally rotated hips. If the head-neck angle exceeded 145°, the appearance was taken to represent valgus deformity. The degree of anteversion was estimated on the basis of the two projections. Valgus deformity was found in 7 hips of 4 patients.

Four of these hips had been treated for dislocation, while 3 had not been dislocated. Thus, 8 per cent of the treated dislocations showed valgus deformity. Increased anteversion of the upper end of the femur was found in 2 patients with unilateral dislocations. These 2 patients also had increased anteversion of the non-dislocated hip. In one of these patients the anteversion was of the same extent in both hips. In the other patient the anteversion was more marked on the side treated for dislocation. In 4 per cent of the treated dislocations there was increased anteversion of the upper end of the femur. The anteversion was not, however, in any case of a degree which indicated derotation osteotomy.

Summing up, the treatment had given functionally good results in 40 out of 41 patients = 97.5 per cent and in 53 out of 54 dislocations = 98 per cent. A radiologically normal result was found in 45 out of 54 treated dislocations. In 9 cases there was deformity of the hip skeleton. In 3 of these cases the deformity was considerable (2 coxa vara, 1 acetabular dysplasia with redislocation), while 6 cases, all in patients treated for unilateral dislocations, showed mild deformity (coxa valga and anteversion). If the 45 normal hips + the 6 hips showing mild changes of the upper femoral end are considered good, there were good radiological results in 51 of the 54 treated hips = 94.5 per cent.

## COMPLICATIONS

One patient showed, when the plaster cast was removed at the end of 13 weeks, a slight pressure wound in the left groin. The patient had to be admitted for 12 days for treatment of the wound which thereafter healed. There were no other therapeutic complications.

## DISCUSSION

Congenital dislocation of the hip is the most common congenital skeletal malformation in man (*Exner* 1954, *Penners* 1955, *Schlegel* 1961). Its incidence varies geographically and racially (*Shands* 1957, *Schlegel* 1961). In Scandinavia it is 2–3 in 1000 newborns (*von Rosen* 1962, *Vulpius* 1964). The disease is about 6 times more common in girls than in boys (*Hilgenreiner* 1935), and it is more often unilateral than bilateral (*Muller et al.* 1953). All newborn infants should be examined for c.d.h. (*Peltesohn* 1920, *Hilgenreiner* 1935, *Penners* 1955, *Borghlin* 1962, *von Rosen* 1962), and clinical examination is most important. In

the presence of Ortolani's phenomenon treatment is indicated. As a rule, primary X-ray examination is unnecessary (*Peltesohn* 1920, *Ortolani* 1951, *Penners* 1955), but in case of clinical doubt special X-ray examinations, *e.g.* arthrography, may be considered.

Most authors agree that spontaneous healing of c.d.h. does occur (*Putti* 1929, *Hass* 1951, *Chiari* 1952, *Barlow* 1962, *Vulpius* 1964), but how often is not definitely known. As a non-reduced dislocation will cause great disability in later life, all dislocations should be treated (*von Rosen* 1962), although it is known that some become spontaneously reduced. In newborns the dislocation is rarely fully developed (*Exner* 1954). In most cases there is a question of a state of subluxation or pre-dislocation which may later develop into true dislocation. The previous view that subluxation and dislocation of the hip are two different diseases (*Leveuf* 1947) is no longer accepted (*Ortolani* 1951, *Sommerville* 1953, *Weitnauer* 1955).

The therapeutic results reported in the present paper are on a level with the best ones obtained by others by *early* closed reduction (*Putti* 1933, *Hilgenreiner* 1935, *Bost et al.* 1948, *von Rosen* 1962, *Medbö* 1965). They are better than those obtained by treatment of patients aged 2–3 years (*Bost et al.* 1948, *Schwartz* 1965), which has given good results in a maximum of 65 per cent (*Scott* 1953).

The principle of closed treatment is to fix the reduced dislocation in order thereby to procure the best possibility of a normal development of the hip skeleton (*von Rosen* 1962, 1965). The plaster cast mentioned in the present paper is well-suited for the early treatment of c.d.h., as it gives favourable results, the treatment does not traumatize the hip joints, it can be carried out on an out-patient basis, it does not cause the patients discomfort, and the patients are easy to mind. Other forms of early, closed treatment, in principle the same as the present one, have given similar, good results, and the therapeutic results are comparable, the follow-up period being the same as in the present series (*Putti* 1933, *Bost et al.* 1948, *von Rosen* 1962, *Medbö* 1965).

## SUMMARY

The results of early, closed treatment of simple, congenital dislocation of the hip are submitted. During a period of 8½ years 59 patients with 81 dislocations have been treated in the Orthopaedic Hospital, Aarhus, Denmark. 41 patients, with 54 dislocations, were re-examined after an average follow-up period of 4 years 8 months. The results were assessed

clinically and radiologically. Functionally good results were found in 97.5 per cent of the followed patients and in 98 per cent of the followed dislocations. The radiological results were good in 94.5 per cent of the followed dislocations. In one patient the result was poor, clinically as well as radiogically. It is pointed out that early diagnosis and treatment are of decisive prognostic importance and that all newborn infants should be examined for congenital dislocation of the hip. For treatment, the author recommends a hip plaster cast fixing both hip joints in the Lorenz I position. In the great majority of cases a treatment period of 3 months is sufficient.

## RESUME

Les résultats du traitement fermé précoce de la luxation congénitale simple de la hanche sont exposés. A l'Hôpital Orthopédique d'Aarhus, il a été mis en traitement, dans l'espace de 8 ans et demi, 59 malades avec 81 luxations. 41 malades avec 54 luxations ont été réexaminés au bout d'une période moyenne d'observation de 4 ans 8/12. Les résultats sont appréciés en partant d'un point de vue clinique et radiologique. On a trouvé de bons résultats fonctionnels chez 97,5 pour cent des malades et dans 98 pour cent des luxations réexaminées. Les résultats radiologiques étaient bons dans 94,5 pour cent des luxations réexaminées. Chez un malade, le résultat était mauvais aussi bien d'un point de vue clinique que radiologique. Il est souligné qu'un diagnostic et un traitement précoces sont d'une importance décisive pour le pronostic de la maladie et qu'il convient d'examiner tous les nouveau-nés pour constater une luxation congénitale éventuelle. Comme traitement, il est recommandé un bandage de plâtre qui fixe les deux articulations de la hanche dans la position Lorenz-I. Le port du bandage pendant trois mois suffira dans la plupart des cas.

## ZUSAMMENFASSUNG

Die Ergebnisse einer frühzeitigen, geschlossenen Behandlung der einfachen angeborenen Hüftverrenkung werden vorgelegt. Am Orthopädischen Krankenhaus in Aarhus wurden im Verlaufe von 8½ Jahren 59 Patienten mit 81 Luxationen behandelt. 41 Patienten mit 54 Luxationen wurden mit einer durchschnittlichen Beobachtungszeit von 4 8/12 Jahren nachuntersucht. Die Ergebnisse wurden klinisch und röntgenologisch beurteilt. Funktionell gute Ergebnisse wurden bei 97,5 Pro-

zent der nachuntersuchten Patienten und in 98 Prozent der nachuntersuchten Luxationen gefunden. Die röntgenologischen Ergebnisse waren gut bei 94,5 Prozent der nachuntersuchten Luxationen. Bei einem Patiente war das Ergebnis sowohl klinisch als auch röntgenologisch schlecht. Man hebt hervor, dass früzeitige Diagnose und Behandlung von ausschlaggebender Bedeutung für die Prognose des Leidens ist, und dass alle Neugeborenen auf angeborene Hüftverrenkung untersucht werden sollten. Als Behandlung empfiehlt man eine Hüftgipsbandag, die beide Hüften in Lorenz-I Stellung fixiert. Bandagierung für 3 Monate wird in weitaus den meisten Fällen zureichend sein.

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