

# Treatment of congenital dislocation of the hip after neonatal diagnosis

During 1966-1975, 920 infants with a congenital dislocation of the hip diagnosed neonatally were born in Uusimaa county in southern Finland. The first examination of the hips was made by a pediatrician, but the diagnosis was generally confirmed by a pediatric surgeon before treatment was started. The mean age of beginning treatment was 7 days. An abduction pillow was the only treatment in 852 cases, six of whom later developed complications, notably two with avascular necrosis. The duration of the pillow treatment shortened noticeably during the time under review but this caused no increase in the number of failures. In 64 cases the routine pillow treatment could not be carried through, mostly because the hip dislocated on the pillow. The most apparent reason for this was inappropriate control of the pillow by the parents. In this group bilateral dislocations and associated calcaneovalgus feet were found more often than in the rest of the neonatal group. Non-operative treatment was successful in 96 per cent of the 920 cases.

*Key words:* congenital dislocation of the hip; failures; neonatal; non-operative treatment; results.

**Esko Heikkilä &  
Soini Ryöppy**

University Children's Hospital, Department of Surgery, Helsinki, Finland

Congenital dislocation of the hip (CDH) is the commonest orthopedic disorder which needs treatment immediately after birth. The most optimistic authors are of the opinion that all dislocations can be diagnosed at birth and that the hips will always be normal after adequate treatment. Other studies have shown that there are failures even after apparently correct therapy. The treatment should be started so early that there are not yet any secondary changes, but children ought not to be put in a splint unnecessarily, as it is not certain that all the splints in use are harmless to hips. The treatment should last long enough to prevent failures. On the other hand, a long period of splinting causes stress to the whole family.

Several authors have used the term "early", referring to diagnosis and treatment. This can be confusing, since "early" in this connection has as many meanings as there are authors. Before the adoption of the current methods of treatment soon after birth, "early" meant before walking age. Nowadays, it may mean, for

instance, 2 weeks (James & Sevastikoglou 1970), 3 weeks (Mendes & Roffman 1980), 4 weeks (Bjerkreim 1974, Cyvin 1977a), 6 weeks (Galasko et al. 1980), 3 months (Place et al. 1978) or 6 months (Basch et al. 1980).

The practice of using the abduction splint is different in different centres. Von Rosen (1970) emphasized that at the beginning of the treatment the splint ought to be removed only on the check-up visit to the hospital. Other centres have been more liberal as regards this practice.

The purpose of our survey was to investigate the following topics: 1. The institution and the qualifications of the doctors responsible for the diagnosis and initiation of treatment. 2. The age of the patients at the beginning of treatment. 3. The mode of treatment. 4. The complications and results.

## Patients and methods

During the 10-year period, 1966-1975, the incidence of CDH was examined in Uusimaa county in southern

Finland. During the time of the investigation 1035 babies with CDH were born (Heikkilä 1984). The material consisted of 920 patients who were diagnosed and began treatment during the first month of life. Practically every newborn was examined by a qualified pediatrician and all affected children were sent to one of two hospitals. The patients were routinely followed up until walking age and thereafter until the radiographic picture was normal.

The abduction pillow which was mostly used in the present series is made of plastic foam and has a gap at both ends. It is placed over the clothes and the parents are allowed to take it off when bathing the baby and changing the napkins.

## Results

The institution where the treatment was started and the qualifications of the doctors responsible for the initial diagnosis are presented in Table 1.

The age at the start of the treatment dimin-

Table 1. Institution and qualification of the doctor responsible for the diagnosis and initiation of the treatment of CDH

	No.	%
Maternity hospital, pediatrician	207	22.5
University or municipal hospital, pediatric surgeon	679	73.8
Smaller hospital, pediatrician and general surgeon	33	3.6
Private pediatrician	1	0.1
Total	920	100

Table 2. Changes in the length of treatment with an abduction device

Weeks year	-8	9-11 per cent	12-19	20-
1966	3	8	30	59
1967	2	4	31	63
1968	7	3	34	56
1969	1	4	37	58
1970	1	2	45	52
1971	1	14	40	44
1972	3	14	38	44
1973	5	27	53	15
1974	37	34	20	9
1975	38	40	17	5
Total	9	14	35	44

ished during the years of the investigation from 8.5 days to 5.2 days, averaging 6.8 days. In 852 babies out of the total of 920 the abduction pillow was used. Table 2 shows the changes in the duration of the pillow treatment in patients for whom no other type of treatment was necessary. Two children were primarily treated with the von Rosen splint and two with the abduction plate. In all these cases the result was considered good when the treatment was completed. In six patients (0.7 per cent) some complications appeared later.

In nine patients abduction was already so limited at birth that it was impossible to set the abduction pillow. These patients were admitted to hospital. One of them was immobilised in a plaster cast after manipulation in anesthesia. The others were treated in traction before cast immobilisation. The traction was of the overhead type with a slowly increasing abduction.

In 55 babies, the initial pillow treatment failed and had to be changed to another type (Table 3). In four cases the change was necessary because the parents complained that the baby could not be kept on the pillow. In two of these cases the pillow was replaced by the von Rosen splint and in two cases by the abduction plate. After the change, treatment went on normally with a good final result. In the case of 51 infants the hip dislocated while the baby was on the pillow. In this group eight parents complained of difficulties in keeping the baby on the pillow.

Consequently, there were 64 children (7.0 per cent) for whom the routine pillow treatment

Table 3. The annual number of failures in pillow treatment

Year	Patients no.	Failures no.	%
1966	125	6	4.8
1967	114	3	2.6
1968	73	5	6.8
1969	80	6	7.5
1970	91	4	4.4
1971	104	7	6.7
1972	104	7	6.7
1973	67	7	10.4
1974	93	8	8.6
1975	69	11	15.9
Total	920	55	mean 6.0

Table 4. Characteristics of the group where routine treatment could not be carried through compared with the rest of the neonatal group

	Additional treatment needed		Routinely treated	
	No.	%	No.	%
Boys	14	22	183	21
Girls	50	78	673	79
Side right	15	23	164	19
left	14	22	394	46
bilateral	35	55	298	35
First-borns	47	73	538	63
Breech-borns	18	28	160	19
Positive family history	6	9	46	5
Associated calcaneo-valgus feet	14	22	47	6

Table 5. Duration of the pillow treatment in weeks before changing the type of treatment

Weeks	No.
1	1
2	4
3	3
4	11
5	8
6	3
7	2
8	6
9	2
10	2
12	1
14	8
16	1
20	2
24	1
Total	55

was not possible. To find out whether this group differed in some way from the rest of the neonatal material, some special features were registered to allow comparison with the data analyzed previously (Heikkilä 1984). The mean birth weight of boys was 3622 g and that of girls 3408 g. The other features are to be seen in Table 4.

Of the 51 infants whose hips dislocated while on the pillow, two were immediately put in an abduction plaster, the rest being treated with traction before casting. Table 5 shows the length of the splinting period before the treatment was changed. The failure was usually noticed at a control examination at the age of 4,

8 or 14 weeks. The length of the traction ranged from 2 to 24 days, averaging 8 days. After traction, two of the children were treated with an abduction plate. Two patients were treated by adductor tenotomy and then with the pillow again. The other 45 were examined in anaesthesia and immobilised in a plaster cast. The period of casting was from 2 to 8 months (mean 6 months). After this, a Denis Browne splint was still used in 37 patients for an average of 4 months.

### Late complications

In one boy and five girls the routine pillow treatment was carried out normally and the result was considered good, but their further development was not favourable. After pillow treatment for 3 and 4 months one boy and one girl developed a redislocation at the age of 12 and 10 months, respectively. In two girls a valgus deformity and subluxation were noticed at 7 and 9 years' age, respectively. In two girls an avascular necrosis of the femoral head appeared at 2 and 6 years' age, respectively. In addition to this, 12 patients among the 64 infants to whom pillow treatment could not be applied developed avascular necrosis. The total number of patients with avascular necrosis was 14 (1.5 per cent) in the whole neonatal group.

### Results of the treatment

Of those patients receiving only the pillow treatment, the final result was good in 846 (99 per cent) and unsatisfactory in six cases, as mentioned above. The two patients treated with the von Rosen splint and the two treated with the abduction plate were also cured without complications. Of the 64 children in whom the routine pillow treatment could not be carried through, the final result after non-operative treatment was good in 36 patients (56 per cent). Twelve patients (19 per cent) were treated operatively. An avascular necrosis developed in 12 patients (19 per cent) and four (6 per cent) had minor complaints. Out of the total of 920 neonatal patients non-operative treatment was successful in 886 cases (96 per cent).

## Discussion

Because of the great variation in the meaning of the word "early", it is not possible to compare the numbers and percentages in this series with those of most other investigations. The most comparable studies are those carried out in other Scandinavian countries.

Opinion generally favours starting treatment as early as possible. The annual mean age at the beginning of the treatment in this study shows a decreasing tendency. The same is seen in Cyvin's (1977a) material, but the overall mean in his study, 5 days, is much lower than in the present investigation. The treatment of a small proportion of the children was started in the maternity hospital by a pediatrician, but in the majority of the patients the treatment was not started until the diagnosis was confirmed by a pediatric surgeon. This caused a delay of some days in the initiation of the treatment.

Since some babies born with a laxity of the hip heal even without treatment, there have been attempts to postpone splinting (Palmén 1970, Fredensborg & Nilsson 1976, Paterson 1976, Galasko et al. 1980, MacKenzie & Wilson 1981). However, as it is not possible to predict which patients will recover by themselves, most centres consistently splint all patients. One recommendation is to continue the treatment until the ossification centre of the femoral head can be seen (Parkkulainen & Solonen 1959). In most Scandinavian studies the recommendation is 3–4 months (Bjerkreim 1974, von Rosen 1970). A period as short as 6 weeks has also been proposed (Emnéus 1966). In the present study the duration of the treatment was gradually decreased until 1972, when there was a rapid shift to a shorter time of splinting. In spite of the significant shortening of the immobilisation period, no complications or adverse effect could be seen. The increase in the number of failures of patients receiving pillow treatment in 1973–1975 was not due to the shortened time of splinting. No reason for this increase could be found.

Additional treatment was needed in 64 of the 920 patients. This figure is low compared with many others, e.g. 16 per cent (Parvinen 1972), 8 per cent (Cyvin 1977b) and 28 per cent (Bjerkreim 1974). However, since in 55 cases the

failure seemed to be due to inappropriate control of the pillow by the parents, resulting in a redislocation, the type of pillow used in this study has been discarded at the University Children's Hospital.

Bjerkreim (1974) and Cyvin (1977a), treating CDH patients with a Frejka pillow, and Fredensborg & Nilsson (1976), using the von Rosen splint, were of the opinion that splinting was not harmful to hips. Palmén (1961), however, reported two cases of femoral head fragmentation after splinting. Ilfeld & Makin (1977) described damage to the capital femoral epiphysis in seven patients whose only treatment was the Frejka pillow. The present study does not support the opinion that pillow treatment is quite harmless to hips, although complications were rare (two cases of avascular necrosis out of 856 patients in this material).

The group in which the routine pillow treatment was not successful differed from the rest of the neonatal group in having associated calcaneovalgus feet more often and being initially more often bilateral. There was no significant difference as to birth weight, sex, order of birth, breech deliveries or family history. The reason for this difference is somewhat obscure. It is probable, however, that the most serious cases were bilateral at the beginning and more often associated with calcaneovalgus feet. The less severely affected side often improves during the initial treatment, since later problems were encountered only six times on both sides. Genetic factors may be the cause of a more severe affection.

This group was complicated by as many as 12 cases of avascular necrosis (19 per cent). One reason for this is the obviously too short pre-manipulation traction, compared to 3–4 weeks which was the routine later. During the first years of the period under review, the practice in the hospitals participating in the treatment was not well established in this respect.

## Conclusions

- Treatment just as an extra precaution is not acceptable, since not even the pillow treatment is quite harmless.
- An eye must be kept on patients who are

bilaterally affected or have associated calcaneovalgus feet.

– If the parents complain about difficulties in keeping the baby on the splint, it may mean that the hip is dislocated on the pillow.

– An abduction device which the parents are allowed to take off is not to be recommended, since the parents are not always able to reset it correctly.

## References

- Basch, M., Bialik, V. & Fishman, J. (1980) Early diagnosis at the CDH clinic. *Isr. J. Med. Sci.* **16**, 250–252.
- Bjerkreim, I. (1974) Congenital dislocation of the hip joint in Norway. *Acta Orthop. Scand.* Suppl. 157.
- Cyvin, K. B. (1977a) Congenital dislocation of the hip joint. *Acta Paediatr. Scand.* Suppl. 263.
- Cyvin, K. B. (1977b) Unsatisfactory results of early treatment of infants with unstable hips at birth. *Acta Orthop. Scand.* **48**, 665–672.
- Emnéus, H. (1966) Some new aspects of the treatment of congenital dislocation of the hip according to Palmén-von Rosen. *Acta Orthop. Scand.* **37**, 311–316.
- Fredensborg, N. & Nilsson, B. E. (1976) Overdiagnosis of congenital dislocation of the hip. *Clin. Orthop.* **119**, 89–92.
- Galasko, C. S. B., Galley, S. & Menon, T. J. (1980) Detection of congenital dislocation of the hip by early screening program, with particular reference to false negatives. *Isr. J. Med. Sci.* **16**, 257–259.
- Heikkilä, E. (1984) Congenital dislocation of the hip in Finland. An epidemiologic analysis of 1035 cases. *Acta Orthop. Scand.* **55**, 000–000.
- Ilfeld, F. W. & Makin, M. (1977) Damage to the capital femoral epiphysis due to Frejka pillow treatment. *J. Bone Joint Surg.* **59-A**, 654–658.
- James, A. & Sevastikoglou, J. A. (1970) Analysis of a material of congenital dislocation of the hip. *Acta Orthop. Scand.* Suppl. 130, 30–35.
- MacKenzie, I. G. & Wilson, J. G. (1981) Problems encountered in the early diagnosis and management of congenital dislocation of the hip. *J. Bone Joint Surg.* **63-B**, 38–42.
- Mendes, D. G. & Roffman, M. (1980) Early detection and treatment of congenital dislocation of the hip in newborn. *Isr. J. Med. Sci.* **16**, 247–249.
- Palmen, K. (1961) Preluxation of the hip joint. *Acta Paediatr. Scand.* Suppl. 129.
- Palmén, K. (1970) Preluxation of the hip in the newborn. *Acta Orthop. Scand.* Suppl. 130, 8–12.
- Parkkulainen, K. V. & Solonen, K. A. (1959) The influence of early treatment on the prognosis of congenital dislocation of the hip joint. *Ann. Paediatr. Fenn.* **5**, 290–303.
- Parvinen, T. (1972) *Praeluxatio coxae congenita*. Thesis. Turku.
- Paterson, D. C. (1976) The early diagnosis and treatment of congenital dislocation of the hip. *Clin. Orthop.* **119**, 28–38.
- Place, M. J., Parkin, D. M. & Fitton, J. M. (1978) Effectiveness of neonatal screening for congenital dislocation of the hip. *Lancet* **ii**, 249–250.
- von Rosen, S. (1970) Instability of the hip in the newborn. *Acta Orthop. Scand.* Suppl. 130, 13–24.