Original

Long-Term Study of Neonatal Examination for Congenital Dislocation of the Hip

Susumu SAITO, Yoshikatu KUROKI, Hirofumi OHGIYA,
Ryushi MARUTANI and Ken YAMANO

Abstract: In treating congenital dislocation of the hip, the importance of early screening should be emphasized. We summarized the results of orthopaedic examination for neonates who were born from Oct. 1977 to Dec. 1994. During this time 11370 babies were born in the maternity ward of Showa University Fujigaoka Hospital. A total of 8886 babies (78.2%) were examined, including 4506 male babies and 4380 female babies. Regarding the click sign, in which the instability of the hip joint can be felt by allowing the femoral head to slip in and out of the joint cavity, Ortolani's click sign was positive in 6 cases (6 joints) and Barlow's click sign was positive in 8 cases (10 joints). Of the cases tested by Barlow's click sign, 0.1% were positive. In these cases one was affected with Larsen's syndrome. Three cases that tested negative using the click sign were found to be dislocated at the follow-up time during infancy. In the click sign-positive cases, plaster cast fixation was performed in two patients, the remaining five patients were treated by a Pavlik harness and one patient was treated by abducted diaper. From follow-up examinations at an average age of 5.4 years satisfactory results were obtained in seven cases; only one case treated by plaster cast fixation showed bilateral slight aseptic necrosis of the femoral head. Although click sign-positive cases have been decreased due to primary prophylaxis from birth, the neonatal examination is essential for detecting the dislocation of the hip in early life.

Key words: neonatal examination, congenital dislocation of the hip, click sign

Introduction

Due to the prophylaxis for congenital dislocation of the hip, the occurrence of dislocations has been reportedly decreased^{1,2)}.

Here we summarize the results of the 17 years of neonatal examinations at Showa University Fujigaoka Hospital and discuss the significance of examination of hip dislocation³⁾.

Materials and Methods

We examined new born babies once a week, who were born at Showa University Fujigaoka Hospital from Oct. 1977 to Dec. 1994, within the first week after birth. At such an examination, first the posture, deformities and anomalies of neonates were observed. Secondly, the limitation of abduction of the hip and Ortolani's⁴⁾ and Barlow's click sign⁵⁾ were investigated.

Department of Orthopaedic Surgery, Showa University Fujigaoka Hospital, 1-30 Fujigaoka, Aoba-ku, Yokohama 227, Japan.

Regarding the usage of a diaper, from 1977 babies were fitted in the hip abducted position.

Results

1) Number and frequency of examination

A total of 8886 babies (4506 males and 4380 females) among 11370 births (78.2%) were examined during this period (Table 1).

Examination was carried out within a week after birth, and mostly on the third day after birth (Table 2).

Table 1. Number of births, number of examinations and frequency of examination at Showa University Fujigaoka Hospital (Oct. 1977–Dec. 1994).

Year	No. of births	No. of examinations			Frequency of examinations %
		Male	Female	Total	
1977	108	33	35	68	63.0
1978	470	212	181	393	83.6
1979	560	215	201	416	74.3
1980	684	271	258	529	77.3
1981	667	269	242	511	76.6
1982	609	193	234	527	70.1
1983	660	268	243	511	77.4
1984	637	258	236	494	77.6
1985	687	276	251	527	76.7
1986	701	281	306	587	83.7
1987	674	259	278	537	79.7
1988	592	250	243	493	83.3
1989	635	266	255	521	82.0
1990	732	303	276	579	79.0
1991	775	318	276	594	76.6
1992	758	289	306	595	78.5
1993	105	272	267	539	76.5
1994	716	273	292	565	79.0
Total	11370	4506	4380	8886	78.2

Table 2. Date of examination.

Date of exam.	No. of exam.
1st day	967
2	1588
3	1610
4	1503
5	1349
6	1216
7	380
Others	273
Total	8886

Table 3. Intra-uterine position and type of delivery.

	Numbers	%
Vertex delivery	7643	86.0
Vertex presentation, caesarian section	925	10.4
Breech delivery	158	1.8
Breech presentation, caesarian section	160	1.8
Total	8886	

Table 4. Orthopaedic disorders other than congenital dislocation of the hip.

Congenital:	Calcaneo valgus foot	37
	Varus position foot	14
	Down syndrome	6
	Poly and syndactylies	6
	Camptodactyly	5
	Bracydactylies	2
	Floating finger	2
	Spina bifida	1
	Femoral defect	1
	Knee dislocation	1
	Funnel breast	1
	Pterygium colli	1
	Major pectoralis defect	1
	Constriction band syndrome	1
	Larsen syndrome	1
Total		80
Aquired:	Clavicular fracture	10
	Birth palsy	5
	Humeral fracture	1
Total		16

2) Type of delivery

Of the deliveries, 86.0% were vertex delivery and 10.4% were vertex presentation delivered by caesarian section; 1.8% were assisted breech delivery and 1.8% were breech presentation delivered by caesarian section. The body weight at birth was from 1220 g to 4970 g, with an average birth weight of 3117.4 g (Table 3).

3) Other orthopaedic disorders

The other orthopaedic disorders that were observed were 37 valgus feet, 14 varus position feet, 6 Down's syndromes, 6 poly and syndactylies, 5 camptodactylies, 2 branchydactylies, 2 floating fingers, one spina bifida, one congenital femoral defect, one congenital knee dislocation, one funnel breast, one pterygium colli, one congenital major pectoralis defect, one constriction band syndrome and one Larsen's syndrome⁶⁾ (Table 4).

Table 5. Click-positive cases.

Sex	Birthday	Birth weight	Birth order	Intrauterine posture and type of delivery	Examination day	Click sign	
F	1979.2.25.	2790	1st	vertex	5	Ortolani	R. +
						Barlow	R. +, L. +
M	1980.8.4.	1220	1st	vertex, caesarian section	7	Ortolani	R. +
						Barlow	R. +
F	1981.1.15.	2640	2nd	vertex	7	Ortolani	—
						Barlow	L. +
F	1982.1.11.	3980	1st	vertex	6	Ortolani	L. +
						Barlow	L. +
F	1983.4.25.	3380	1st	vertex	4	Ortolani	L. +
						Barlow	L. +
F	1987.10.31.	3650	1st	vertex	5	Ortolani	L. +
						Barlow	L. +
F	1990.10.26.	3166	1st	breech, caesarian section	1	Ortolani	L. +
						Barlow	L. +
F	1992.6.19.	3580	1st	breech, caesarian section	7	Ortolani	—
						Barlow	R. +, L. +

Table 6. Comparison of click sign-positive cases from 1977 to 1994.

Examination period	No. of exam.	No. of click positive	Frequency of click pos. %
Oct. 1977~Dec. 1985	3876	5	0.13
Jan. 1986~Dec. 1994	4910	3	0.06

4) Click sign

Ortolani's click sign (the examination technique reported by Ortolani⁴⁾) was positive in 6 cases, 0.1% (6 joints) among 8886 neonates. Barlow's click sign⁵⁾ was positive in 8 cases, 0.1% (10 joints) in 8886 neonates: in one male baby and in 7 female babies. One male neonate was affected with Larsen's syndrome (Table 5). Of these 8 babies, the posture of birth was vertex position in 6 and in breech position in 2. Three of these were delivered by caesarian section: 7 were first born babies and one was a second born baby.

Three babies were born from January to March, 2 from April to June, one from July to September, and 2 from October to December. Five babies were affected in the left hip, 2 in the right hip and 2 in both hips. The click sign positivity was observed from 1979 to 1983, and in 1987, 1990 and 1992. During the first 9 years, from 1977 to 1985, 5 of 3876 babies (0.13%) tested as click sign-positive; in the second 9-year period, from 1986 to 1994, 3 of 4910 (0.06%) tested as click sign positive. Compared to the first 9 years, the number of click sign-positive cases decreased by 0.07% (Table 6).

5) Dislocations from click-negative cases

Three dislocations were recognized in the click negative cases during the follow-up period in infancy. One of these cases was found to be congenital muscular dystrophy (Table 7).

6) Treatment

Concerning click sign-positive cases, plaster cast fixation was performed in two cases. The

Table 7. Dislocations found later in click negative cases at the neonatal examination.

Sex	Birth day	Birth weight	Birth order	Intrauterine posture, type of delivery	Examination day	Dislocation diagnosed age	Treatment
F	1980.12.10.	3560	2nd	vertex	3	5M	Pavlik harness
Congenital dystrophy							
F	1981.12.2.	2940	2nd	vertex	3	2M	Pavlik harness
F	1992.12.14.	3168	3rd	vertex	2	2M	Pavlik harness →Plaster cast

Table 8. Treatment of click-positive cases.

Case	Treatment	Follow-up period	Result
1	Pavlik harness	8M	Good
2	Plaster cast	14Y 4M	Good
3	Pavlik harness	3Y 1M	Good
4	Pavlik harness	11Y 8M	Good
5	Pavlik harness	5Y 4M	Good
6	Pavlik harness	4Y 6M	Good
7	Abducted diaper	1Y 6M	Good
8	Pavlik harness → Plaster cast	2Y 6M	aseptic necrosis

other five cases were treated using a Pavlik harness and one case was treated using abducted diapers. All were satisfactory except one plaster cast fixation case which showed slight aseptic necrosis of the femoral head in both hips (follow-up period: from 8 months to 14 years and 4 months, average 5 years 5 months) (Table 8).

Discussion

1) Frequency of examination

In our hospital normal delivery babies are discharged about 6 to 7 days after birth. Thus the frequency of a once a week examination was 78.2%.

2) The click sign test as assessed by Barlow's technique

Barlow's test is more accurate to reveal an unstable dislocatable hip than Ortolani's test. It is meaningful to do long-term examinations rather than numerous examinations over a short period.

3) Frequency of occurrence of the click sign-positive cases

The frequency of click sign-positive cases tested by Barlow's click sign was 0.1% (8 cases, 10 joints). Compared with the term from Oct. 1977 to Dec. 1985 and the term Jan. 1986 to Dec. 1994, the occurrence of the click sign-positive cases in the period of the first half was 0.13% (5 positive cases of 3876 babies) and that of the second half was 0.06% (3 positive cases of 4910 babies). The frequency of click-positive cases of the later half was decreased. The following is the incidence reported from other studies: Yamamuro⁷⁾: 1.6% (115 cases of about 1200 babies), Yamada⁸⁾: 0.72% (60 cases of 8337 babies), Ishida¹⁾: 2.75% (54 of 1967) by rolled style diaper, 0.28% (9 of 3224) by hip abducted

Table 9. Reports of click sign-positive cases in neonatal examination.

Year	Author	No. of examination	No. of click sign positive	Frequency of click sign positive %
1970	Yamada	8337	60	0.72
1972	Yamamuro	7200	115	1.6
1978	Akashi	2589	4	0.15
1980	Ishida	1967	54	2.75 (rolled diaper)
		3224	9	0.28 (hip abd. diaper)
1980	Ogiwara	8554	143	1.67 (Year 1964~1975)
		2837	15	0.53 (Year 1976~1979)
1985	Iwasaki	19373	78	0.4
1995	Present study	8886	8	0.1

style diaper. Ogiwara⁹⁾: 1.67% (143 of 8554, from 1967 to 1975), 0.53% (15 of 2837, from 1962 to 1979), Iwasaki²⁾ et al.: 0.40% (78 of 19373), Akashi¹⁰⁾ et al.: 0.15% (4 of 2589, from 1971 to 1982) (Table 9). Compared to these data the present result of 0.1% seemed low. Concerning the season of frequency of the click sign-positive cases, there were three cases from January to March, two from April to June, one from July to September and two from October to December. The frequency of click sign-positive cases was related to the birth season. Namely the incidence was high among the babies born in cold seasons. According to the birth order, the first born babies were 5 cases and second born was one case. Based on this result, the first born baby is thought to have a possibility of a higher occurrence of click positivity. But this is not necessarily true, as all cases did not always include multiple birth families. Concerning about the delivery style, 6 cases were delivered in the vertex position and 2 cases in the breech position. A positive click sign was noticed more often in the left hip than in the right hip.

4) *Dislocations from click sign-negative cases*

Three dislocations were observed in infancy which were not found in the neonatal examination. One of these was recognized to be congenital muscular dystrophy in infancy. Were all these cases unrecognized in the first examination? This is possibly the case when click sign was negative in neonate and then dislocation was visible in infancy due to the increase of limitation of abduction of the hip or by the unclearness of click sign under muscular disease.

5) *The significance of the examination for congenital dislocation of the hip in neonates*

Although neonatal examination was thought to be influenced throughout Japan, this examination has not been performed in all of the hospitals in Japan. It is a very hard task to perform neonatal examination for a long time period. To do this examination for a long time is very meaningful. It is also very important for the study of the epidemiology of congenital dislocation of the hip in order to know the incidence of click sign-positive cases overall in Japan and also to acknowledge the incidence change from year to year. Although primary prophylaxis of congenital dislocation of the hip has been influential and the click sign-positive rate has decreased, the orthopaedic examination continues to be important to determine dislocatable hips. Because the prognosis of dislocations found by neonatal examination is very good, the neonatal examination is significant. Although the incidence of click sign positivity is decreasing, and the significance of the neonatal examination

is becoming weak, the chance for an orthopaedist to observe neonates is in itself very meaningful, in terms of observing possible new findings in babies.

Conclusion

1. We reported the results of orthopaedic examinations for neonates over an 18-year period and discussed the significance of this examination.
2. We performed the examination on 8886 cases of 11370 new born babies.
3. Ortolani's and Barlow's click sign test were performed. Ortolani's click sign was positive in 6 cases (6 joints), and Barlow's click sign was positive in 8 cases (10 joints). According to Barlow's click sign, the incidence of the positivity rate was 0.1%.
4. Three dislocations were found later in infancy in cases which were click negative at the neonatal examination.
5. The results of treatment by Pavlik harness were all satisfactory but one bilateral dislocated case showed slight aseptic necrosis of the femoral head.
6. Although the occurrence of click sign-positive cases has been decreasing due to primary prophylaxis, the examination of neonates is still significant.

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