TREATMENT OF CONGENITAL DISLOCATION OF THE HIP, IN OSAKA, JAPAN

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In the Orthopaedic Department of Osaka City University Hospital, in the past 13 years, more than 1600 infants and children with congenital dislocation of the hip have been treated either conservatively or surgically. The number of surgically treated cases has been decreasing year by year. (Table 1.)

Most of the cases are now detected and treated at a very early stage by conservative means, usually with Pavlik band (Fig. 1) soon after birth or with Milgram's traction plaster cast (Fig. 2) from 3 months to 18 months, although we have similarly treated a few older ones.

In discussing the results of conservative treatment, the authors would like to divide them into 3 groups.

Group–A: Most of them younger than 6 months, and some seen soon after birth. (Table 2). These cases were usually treated with Pavlik band. It is still too early to discuss the end results of this group. However, a perfect anatomical cure might be expected in this group (Figs. 3a & b).

Group–B: Older than 6 months and treated with Milgram's traction plaster cast (Table 3A & B). In 29 cases (31 hips) with longer than 3 years follow-up, both clinical and roentgenographic evaluations show satisfactory results and a relatively rare incidence of avascular changes of the epiphyses. (Figs. 4a, b & c).

Group–C: Older than 1 year of age and treated by the classical method: manipulation under general anaesthesia and plaster immobilization of the Lorenz or Batchelor type. (Table 4).

Among 21 cases (31 hips) with longer than 7 years follow-up roentgenographic evaluation reveals some unsatisfactory results in 30% with rather severe avascular changes in 16%. The clinical results have so far been satisfactory. (Figs. 5a & b; Figs. 6a & b).

Even in the younger pre-ambulant group the authors feel some cases really need surgical intervention because of the evidence of an obstacle to sufficient reduction which can be visualized on the double contrast pneumoarthrogram. (Fig.7). Recently we have preferred the open reduction and Salter's innominate bone osteotomy (Figs. 8a & b) instead of prolonged, unsuccessful immobilization in a plaster cast or a brace.

Table 5 summarises the surgical treatment. Three procedures have been followed (i) central placement of femoral head by means of osteotomy, (ii) inward displacement of the weight bearing axis by sub-trochanteric osteotomy and (iii) capsular arthroplasty introduced by Colonna.

First group: Usually inter-trochanteric osteotomy is indicated for subluxation and for dysplasia. Correction of the ante-version of the neck-shaft angle are properly maintained by internal fixation and 3 weeks in a hip spica. Horizontal osteotomy of the innominate bone is also indicated for the older group. (Figs. 9a & b).

Second group: Sub-trochanteric angulation osteotomy has been used for the improvement of the limp but this group might be omitted in this paper.

Third group: Capsular arthroplasty is considered to be the most rational procedure available to-day for children beyond the age of 3 years. Since Syotaro Mizuno introduced Colonna's operation in Japan, the authors have operated on more than 200 cases, using a multi-staged method or a modification of this procedure. (Table 6).

According to the original method of Colonna, the procedure is divided into 3 stages. The first stage consists of preliminary traction to stretch the soft tissues in order to bring down the displaced femoral head. In the second stage, capsular arthroplasty is done to assure the central placement of the head in

Fig. 1. To show Pavlik band in use.

Fig. 2. Milgram's traction plaster cast.

Fig. 3a.

Fig. 3b.
Fig. 3. Before (a) and after (b) treatment using Pavlik band (in a three-month old female).

Fig. 4a.

Fig. 4b.

Fig. 4c.
Fig. 4. Before (a), during traction (b) and after (c) treatment, using Milgram's method.

Fig. 5a.

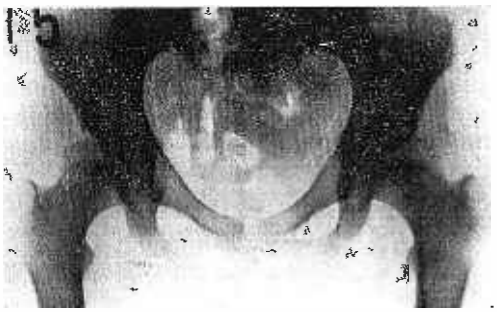

Fig. 5b.
Fig. 5. Before (a) and after (b) the classical method of treatment — a satisfactory result in a two years old female.

Fig. 6a.

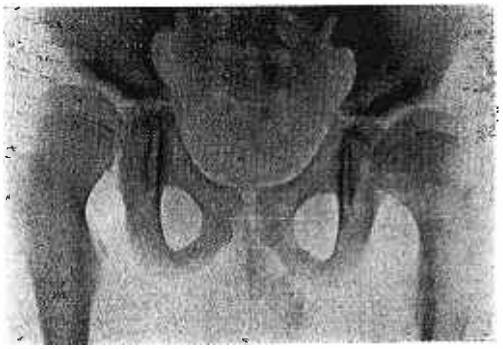

Fig. 6b.
Fig. 6. Before (a) and after (b) the classical method of treatment — not so satisfactory result in a one year and eight months old male.

Fig. 7. A double contrast pneumoarthrogram showing obstacle to sufficient reduction.

Fig. 8a.

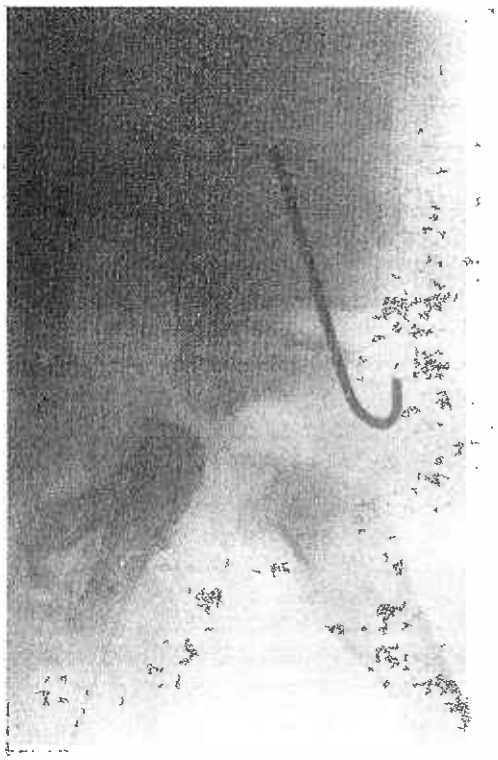

Fig. 8b.
Fig. 8. Before (a) and after (b) Salter's innominate osteotomy.

Fig. 9a.

Fig. 9b.
Fig. 9. Before (a) and five years after (b) horizontal osteotomy of the innominate bone in a twelve years and three months old female.

Fig. 10a.

Fig. 10. Before (a) and 6 years after (b) Colonna's capsular arthroplasty in a two years and two months old female (optimal age group).

Fig. 10b.

Fig. 11a.

Fig. 11. Before (a) and 8 years after (b) Colonna's capsular arthroplasty — showing a fairly good result in a six years old female.

Fig. 11b.

Fig. 12a.

Fig. 12. Before (a) and 6 years after (b) Colonna's capsular arthroplasty — not so satisfactory result in a eleven years old female.

Fig. 12b.

TABLE 1

NUMBER OF C.D.H. TREATED FOR THE PAST 13 YEARS IN OUR DEPARTMENT

Years	Conservative Treatment	Capsular Arthroplasty 0 – 3ys.	3 – 6ys.	6 – 12ys.	12 – 18ys.	18ys. –	Total
1951	48	2	–	–	–	–	2
1952	78	5	2	4	2	–	13
1953	105	5	3	11	2	2	23
1954	94	8	3	9	1	3	24
1955	135	6	5	5	4	2	22
1956	170	7	5	19	6	2	39
1957	156	1	3	5	3	5	17
1958	129	5	8	4	1	2	20
1959	141	–	5	5	5	1	16
1960	123	2	4	5	–	1	12
1961	120	1	1	5	–	1	8
1962	106	–	3	4	2	1	10
1963	57	–	1	1	2	–	4
Total	1460	42	43	77	28	20	210

TABLE 2

NUMBER OF C.D.H. TREATED BY PAVLIK BAND

Age	C.D.H.	Dysplasia
Younger than 3 months	17	16
3 – 6 months	39	32
6 – 12 months	13	6
Older than 1 year	2	1
Total	72	55

TABLE 3A

NUMBER OF C.D.H. TREATED BY MILGRAM'S TRACTION PLASTER CAST.

Age in months or year	Reduced without manipulation	Reduced with gentle manipulation
6 months	3	–
7 „	1	2
8 „	–	1
9 „	5	–
10 „	2	2
11 „	1	1
1 year	20	26
1 year 6 months	14	25
2 years	3	5
2 years 6 months	1	2
3 „ 6 „	—	1
4 „	—	1
Total	50	66

TABLE 3B

FOLLOW-UP STUDIES OF MILGRAM'S TRACTION PLASTER CAST: 29 CASES, 31 HIPS.

3 years of age	15 cases
4 „	13 „
5 „	1 case

Age at initial treatment

younger than 1 year	2 cases
1 – 2 years	25 „
2 – 3 „	2 „

Results (Severin's table)

Ia	Ib	IIa	IIb	III	IVa	IVb	V	VI	Total
8	4	5	12	1	1	0	0	0	31 hips

Avascular changes on femoral epiphsis

none	18 hips
trace	7 „
slight	5 „
moderate	1 „
severe	0 „

TABLE 4

FOLLOW-UP STUDIES OF CLASSIC METHOD 21 cases, 31 hips. (MANIPULATION—IMMOBILIZATION from LORENZ to BATCHELOR CAST)

7 years of age	5 cases
8 „	11 „
9 „	4 „
10 „	1 case

Age of initial treatment

younger than 1 year	1 case
1 year – 2 years	10 cases
2 years – 3 years	7 „
3 years – 4 years	2 „
older than 4 years	1 case

Results (Severin's table)

Ia	Ib	IIa	IIb	III	IVa	IVb	V	VI	Total
5	1	13	2	5	3	2	0	0	31 hips

Avascular changes on femoral epiphysis

none	10 hips
trace	9 „
slight	7 „
moderate	3 „
severe	2 „

TABLE 5

PROCEDURES OF SURGICAL TREATMENT Procedures	case	hip	AGE AT THE TREATMENT 0–3ys.	3–6ys.	6–12ys.	12–18ys.	18ys.–	Total
Valgus, detorsion osteotomy	6	8	1	3	2	0	2	8
Varus, detorsion osteotomy	23	28	2	14	10	1	1	28
Detorsion osteotomy	6	6	0	4	2	0	0	6
Shelf operation & osteotomy	6	7	1	3	3	0	0	7
Horizintal osteotomy of pelvis	22	24	1	3	9	2	10	25
Fusion	1	1	–	–	–	1	0	1
Resection angulation osteotomy	6	7	–	–	–	2	5	7
Shantz osteotomy	11	12	–	–	–	2	10	12
Bifurcation	3	4	–	–	–	0	4	4
Displacement	5	6	–	–	–	2	4	6
Capsular arthroplasty	199	247	56	55	86	34	16	247
Additional * shortening esteotomy	15	20	0	1	7	5	7	20
Additional * –valgus	3	3	0	0	3	0	0	3
–varus	3	3	1	0	2	0	0	3
–detorsion osteotomy	12	14	1	5	3	3	2	14

* These cases are included in "Capsular arthroplasty"

TABLE 6

NUMBER OF CASES OPERATED ON WITH COLONNA'S PROCEDURE OR ITS MODIFICATIONS.

Year of surgery	younger than 3ys.	3–6ys.	6–12ys.	12–18ys.	Older than 18ys.	Total cases	(hips)
1951	2	–	–	–	–	2	(3)
1952	5	2	4	2	–	13	(14)
1953	5	3	11	2	2	23	(27)
1954	8	3	9	1	3	24	(28)
1955	6	5	5	4	2	22	(33)
1956	7	5	19	6	2	39	(49)
1957	1	3	4	3	5	16	(23)
1958	5	7	4	1	2	19	(21)
1959	1	4	5	5	1	16	(18)
1960	1	4	5	–	1	11	(16)
1961	1	2	3	–	1	7	(8)
1962	–	3	6	2	1	12	(13)
1963	2	2	4	3	–	11	(12)
Total	44	43	79	29	20	215	(266)

TABLE 7

FOLLOW-UP STUDIES OF 117 CASES OPERATED ON COLONNA'S METHOD OR ITS MODIFICATIONS.

Age in year	Results Excellent	Good	Fair	Poor	Total
younger than 3	6	2	2	1	11
3	8	6	4	1	19
4	5	4	3	–	12
5	2	7	1	1	11
6	2	2	1	3	8
7	–	–	–	1	1
8	2	–	–	3	5
9	–	4	–	–	4
10	1	1	–	2	4
11	1	2	–	1	4
12	–	2	1	1	4
older than 12	2	8	7	17	34
Total	29	38	19	31	117

TABLE 8

EIGHT CASES OPERATED ON BY ONE-STAGE PROCEDURE CAPSULAR ARTHROPLASTY.

Cases	Age	Side	Sex	Date of Op.	Shortening	Derotation	Varus
1. Y.Y	13	l.	f.	Aug. 22, '62	3.0 cm.	30°	–
2. M.N.	6	l.	f.	Oct. 17, '62	0.8 cm.	15°	–
3. M.T.	17	r.	f.	Nov. 14, '62	2.0 cm.	30°	10°
4. K.E.	11	l.	f.	Nov. 28, '62	1.0 cm.	15°	–
5. Y.K.	6	r.	f.	Dec. 12, '62	0.7 cm.	40°	30°
	7	l.	–	Mar. 13, '63	1.0 cm.	50°	20°
6. S.H.	10	l.	f.	Dec. 19, '62	2.0 cm.	–	–
7. N.H.	12	l.	m	June 5, '63	2.5 cm.	15°	–
8. S.M.	14	r.	f.	July 3, '63	1.3 cm.	20°	10°

TABLE 9

FOLLOW UP OF ONE-STAGE PROCEDURE DR. DEGA'S RESULTS

Age in years	Results Excellent	Good	Fair	Poor	Total
3	18	16	5	–	39
4	20	15	5	2	42
5	11	14	2	3	30
6	10	10	8	3	31
7	4	2	3	5	14
8	1	–	7	3	11
9	–	–	3	1	4
12	–	–	–	1	1
Total	64	57	33	18	172

the new socket precisely in its anatomic position. The third stage is a derotation osteotomy, performed a few weeks after the arthroplasty, to correct the ante-version or ante-torsion that is often present. It is felt that technically it is always difficult to reconstruct a perfect relationship between the head and the socket, to have adequate capsular material available for interposition and to create a smooth joint motion without excessive muscular tension.

In the age group beyond the optimal one of 3 to 6 years, or in the severely dislocated group, the above mentioned technical difficulties are particularly hard to overcome satisfactorily at the time of arthroplasty.

Unfortunately such neglected cases are seen in our Clinic, although their number is decreasing. Table 7 shows 117 cases operated on by Colonna's technique or with some personal modifications. The end results for the optimal age group of 3 to 6 years are usually satisfactory. However, the results for older children or in the severely dislocated cases are more or less discouraging. (Table 7). A few representative cases are illustrated on Figs. 10a & b; 11a & b; and 12a & b.

The problem is how to deal with the difficult cases beyond the optimal age or with severe dislocation. The authors have treated a small group of 8 older cases by a one-stage operation introduced by Dega of Poland (Table 8). He chose to operate on the group age 3 to 6 years (Table 9). The end results of the authors' 8 cases cannot be evaluated at present and a later report will be made. The appearance of avascular changes cannot be avoided even with the prolonged prohibition of weight bearing of more than 6 months duration.

DISCUSSION

Perfect anatomical cure can be expected only for the very early cases seen soon after birth. Every congenital hip has to be properly treated for several days after birth. In the meantime, however, open reduction for the particular case of the young infant seen before walking is considered to be necessary.

As for the surgical treatment, there are many factors which may influence the results of capsular arthroplasty. Among them, the following two appear to be particularly important.

1. Pressure upon the reduced femoral head caused by the contraction of muscles between pelvis and femur.
2. Future remodelling of the deformed femoral head into a good congruity within the new socket during the subsequent growth of the patient.

The first problem may be partially avoided by improved operative technique, postoperative traction or delayed weight bearing, but fundamentally the problem in some cases may be difficult to solve or totally insolvable because of the absolutely short, under-developed muscles.

The second problem is closely related to the vascularity of the femoral head and neck. Therefore, excellent results cannot be expected in the older age group even if these changes might be only a temporary sign on roentgenogram.