FROM MARTINA HANSEN'S HOSPITAL, NORWAY
(HEAD: JOHN K. HALD, M.D.)

THE TREATMENT OF COXA PLANA

A follow-up examination

By

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INTRODUCTION

The treatment of coxa plana has been the subject of great discussion during several years. In the Scandinavian countries opinion on the whole has been that no treatment could alter the definite shape of the femoral head. The majority of doctors therefore allow children with coxa plana to run about as they please. Individual doctors warn against exertion (violent play, sports and so on) and keep the patients under the control of the out-patient department. Only a very few hospitals do not permit the affected hip to bear weight for any length of time (bed rest, crutches). It is only when pain or contracture is present in the hip that all agree on the treatment: the patient must be put to bed, and skin traction (adhesive plaster or zinc-paste traction) must be applied until the pain or contracture has disappeared.

One of the reasons of this negative attitude towards therapy is to be found in the publication of the results of the first follow-up examinations of a major number of patients, also from Scandinavia (*Sundt*). This attitude is also partly due to the theory previously held of the development of the disease, based on X-ray pictures of the caput femoris. Both points of view have changed to some extent: more recent pathological-anatomic studies have altered our outlook on the pathogenesis of coxa plana (*Jonsäter*). Moreover, in recent years large series have been published which indicate the good effect of non-weight-bearing (*Sjövall, Helbo*).

As early as 20 years ago the first information arrived of good results obtained in this disease from prolonged bed-rest, from America. *Dan-*

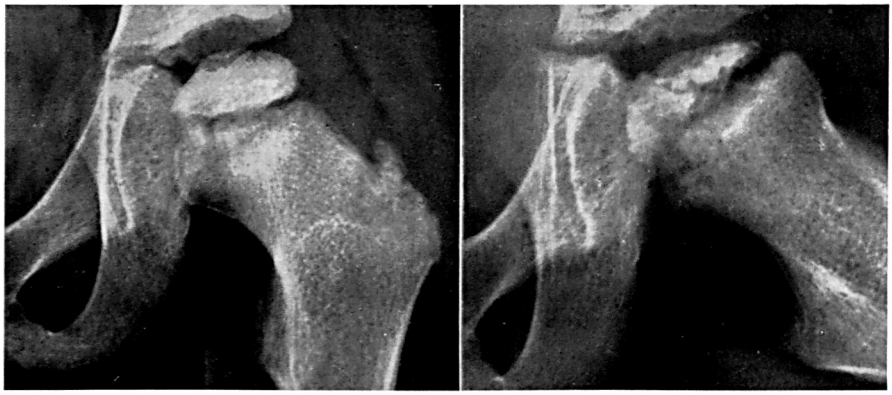

Fig. 1 a and b.
a. Boy, aged 5. X-rayed on admission, 31/10/50. Left-sided coxa plana.—*b.* Same as Fig. 1 a. X-rayed 31/10/50 in Lauenstein's position.

Fig. 1 c.
Same patient as Fig. 1 a. Picture after 4 months bed rest. Further fragmentation (Lauenstein's position).

forth began it, then came others and afterwards many authors enthusiastically recommended bed rest as the best treatment for 1 and 2 years, up to 4 years (*Eyre-Brook, Petersen & McCarrol, Mindell & Shermann, Pike, Herndon & Heyman*). Most of the British-American investigations, however, are characterised by relatively small series. Moreover, the results are difficult to evaluate. Some are based exclusively on roentgenological changes, others, in addition, also measure the caput index, while others also take the clinical findings and sym-

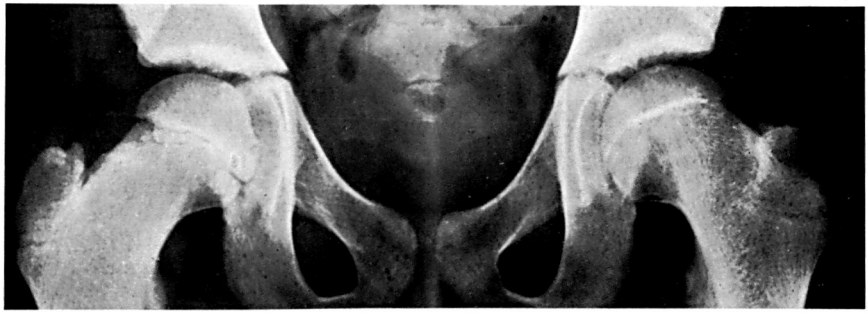

Fig. 1 d.
Same patient as Fig. 1 a. Picture 28/9/55, about 4 years after treatment was concluded; rather low, but a ballshaped and evenly rounded joint head.

Fig. 1 e.
Same as Fig. 1 d. Picture 28/9/55 in Lauenstein's position.

ptoms into consideration. Finally there are few who have consistently adopted the same treatment. The majority have reduced weightbearing *both* by bed rest and crutches, and the period of non-weightbearing varies greatly.

In Martina Hansen's Hospital coxa plana patients have been treated for many years with bed rest. On discharge and later outpatient control we gained the impression that our results were not on the same level as those published in other quarters. The purpose of the present investigation is to either prove, or disprove this impression, and thus obtain a basis for our future attitude towards this form of treatment.

Fig. 2 a.
Girl aged 8. Picture 19/10/55, 4 years after conclusion of treatment: a broad, flattened, but evenly rounded joint head.

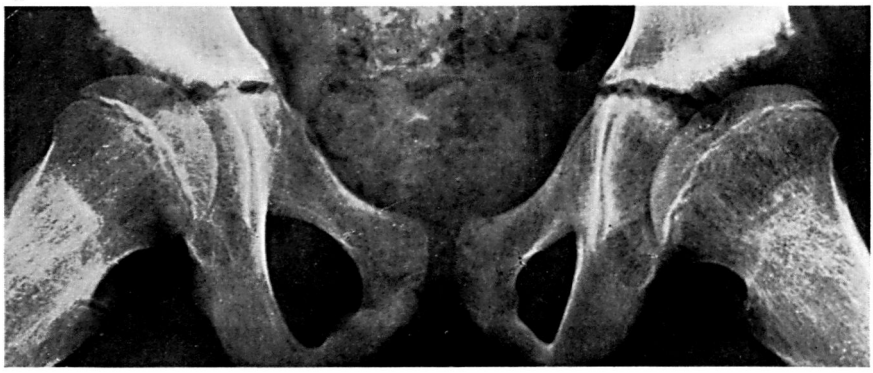

Fig. 2 b.
Same as Fig. 2 a. Picture 19/10/55 in Lauenstein's position.

THE TREATMENT USED

From 1936 nearly all patients with coxa plana were treated with bed rest for exactly 1 year. The limit of 1 year was due to the former Sick Relief Fund arrangements which did not make payments for a hospitalisation period of more than 1 year (from 1/10–53 the payment has been made for an unlimited period). Some patients indeed were discharged earlier. These cases arrived for treatment so late that it was thought that lengthy bed rest would have no effect. None of them were included in this series.

The patients are permitted to sit up at all meals and also to a varying degree during the day in connection with reading, games, different types of handicraft etc. Thus there has been no consistent *recumbent* position. If patients were more restless than usual or wanted to kneel

Fig. 3 a.
Boy aged 13. Picture 17/6/54, 5 years after conclusion of treatment: a flattened and angular joint head.

Fig. 3 b.
Same as Fig. 3 a. Picture 17/6/54 in Lauenstein's position.

often in bed, plaster belts or canvas belts were applied to them over a longer or shorter period and fastened to the bed. On the whole the expression "bed rest" must be accepted with the reservation that in many cases it is not possible to prevent weightbearing precisely as one wishes. Most authors employ the phrase "bed rest" without discussing the many practical difficulties involved.

If the patients have pain in the affected hip on arrival and/or contracture, zinc-paste traction is applied in all cases until the pain or contracture has disappeared. In a number of cases the traction is retained longer than necessary in order that the patient may be kept as quiet as possible in bed.

During bed rest systematic physiotherapy is pursued throughout, under the guidance of physiotherapists. In this way it is intended to keep the joint function and the muscular apparatus as intact as possible. For 2 or 3 weeks before discharge the patients are permitted to get up and walk. During this period and the period immediately following discharge we only use a method of reducing weightbearing (crutches, sling or similar aids) in exceptional cases.

THE SERIES

The number of patients and hips which were treated with bed rest for 1 year appears in Table 1. The great increase in numbers of recent

Fig. 4 a.
Girl aged 5. Picture on admission 14/8/51: bilateral coxa plana. Note: no objective or subjective symptoms on the right side.

Fig. 4 b.
Same as Fig. 4 a. Picture 14/8/51 in Lauenstein's position.

years results from the fact that from 1949–1950 bed spaces which were originally destined for other uses (bone and joint tuberculosis) were released to an increasing degree.

TABLE I

Number of patients—hips—treated with 1 year's bed rest.

Period	Boys	Girls	Total number	
			patients	hips
1936 — 1945	14	5	19	24
1945 — 1950	13	3	16	20
1950 — 1951	14	2	16	21
1951 — 1952	18	5	23	32
1952 — 1953	20	6	26	35
1936 — 1953	79	21	100	132

Fig. 5 a.
Same patient as in Fig. 4. Picture 24/11/55, about 3 years after conclusion of treatment: ball-shaped joint head on the right side, flattened on the left side.

Fig. 5 b.
Same as Fig. 5 a. Picture 24/11/55 in Lauenstein's position.

The series shows that 32 out of 100—32 %—had bilateral coxa plana. The number is strikingly high, considerably more than as reported elsewhere in the literature: 10–15 %. It should be noted that *abortive* forms of coxa plana are not included in this series although one might be tempted to believe this from the figures stated. In each case a fairly pronounced fragmentation of the joint head was required during the developmental stage of the disease.

The series is divided into age groups and into groups referring to the stage of disease at which the treatment began. Both divisions are only of interest with reference to the treatment results and therefore will be discussed later.

The subjective symptoms and the clinical findings on admission correspond to the conditions recognised in earlier publications and thus are not reported.

THE FOLLOW-UP

After discharge from the hospital all the patients were followed-up as out-patients (clinical examination and X-rays) at intervals of 3 to 4 months. Later the intervals became longer, up to 1 year. In this way the patients were followed-up for about 3–4 years. In most cases the last X-ray checks showed a caput femoris which had attained its previous form with a homogeneous bone structure. In 16 cases there was doubt whether the patient had reached the final stage at the last out-patient follow-up. They were therefore recalled again for the purposes of this article.

A long period of observation with a follow-up of the later results and the secondary arthrosis was not our intention and lies outside the scope of the present article.

The X-ray examination was the same each year: a frontal picture of the pelvis with both hips (N.B.: on the same picture!) and a picture of the hips with Lauenstein's projection. In the clinical follow-up special importance was attached to possible limping, and to whether Trendelenburg's sign was present or not, and to exact comparison of the mobility results for both hips (N.B.: the patients lie prone and the knees are flexed 90 degrees when examining outward and inward rotation!).

THE RESULTS

It must be emphasised that *the results demonstrated in this series are based exclusively on the shape of the caput femoris judged from the X-ray picture.* This is thought to be justified by the following conditions, previously pointed out by other authors (*Sundt, Helbo*):

1) A ball- or almost ball-shaped epiphysis (caput femoris) during childhood shows none, or extremely insignificant arthrosis later.

2) A flattened, but evenly rounded epiphysis results in a moderately pronounced arthrosis.

3) An angular epiphysis results in a pronounced arthrosis.

Correspondingly we have recorded *a final result with a ball-shaped joint head as good, a flattened, but evenly rounded caput as fair, an angular caput as poor.* (See Table II). In order to illustrate in detail how we judged a case according to the X-ray findings, we demonstrate 3 typical examples. Fig. 1, Fig. 2 and Fig. 3 are X-ray pictures which show a good result (even if the joint head is lower than on the other side) a fairly good and a poor result.

TABLE II

Result of the treatment, judged from the X-rays.

Treatment was commenced	Good	Fair	Poor	Total no. of hips
In the initial stage	25 (62,5 %)	10 (25 %)	5 (12,5 %)	40
In the fragmentation stage	18 (19,6 %)	43 (46,7 %)	31 (33,7 %)	92
Total	43 (32,6 %)	53 (40 %)	36 (27,4 %)	132

TABLE III

The Results of treatment (lengthy bed rest) in different series.

Authors (year)	Number patients (hips)		Good results No.	%	Duration of bed rest.
Danforth (1934)	5	(5)	5	100	3 — 4 years
Sjövall (1942)	12	(12)	12 ?		$1^1/_2$ — $2_1/_2$ „
Petersen & McCarrol (1951)	10	(10)	10	100	$1^1/_2$ — 2 „
Herndon & Heyman (1952)	37	(41)	37 ?		$1^1/_2$ „
Helbo (1953)	66	(?)	49	74	$1^1/_2$ — 2 „
Ma. Ha. Ho. (1955)	100	(132)	43	33	1 „

Table 2 reveals that 32.6 % of our patients finish the disease with a ball-shaped caput femoris after 1 year's bed rest. This is not particularly encouraging when it is known that about 25 % obtain the same result without treatment (*Sundt*). Nor is it especially encouraging if a comparison is made with the results others have achieved after a long period of non-weightbearing. Table III shows the results from some American investigations and from the largest series in Scandinavia. As stated in the introduction, however, there are so many conditions which have a part to play that no direct comparison can be made of the figures. On the whole most authors have prolonged non-weightbearing to a greater extent than we have done. Apart from some few articles (*Eyre-Brook, Helbo*) information is not given at which stage of the disease the treatment commenced. Our series is burdened to a considerable degree with patients who came late for treatment. This is seen very plainly in Table II which shows the great difference

in the results if the patients have non-weightbearing treatment late or early in the disease. Of those who were treated *early, 62.5 % achieved a ball-shaped joint head,* that is, considerably more than when no treatment was given at all.

This series includes a special condition which must be described in more detail. Shortly after admission to hospital a completely new coxa plana was discovered in 5 patients in the "healthy" hip. Thus both hips were given bed rest for 1 year and so all the conditions (age, weight, hormonal conditions, possible disposition) should be alike. Every one of the 5 hips which were rested early, healed very well, but the results of the side (hip) that received belated treatment, were: 3 fair and 2 poor. Fig. 4 shows the X-ray picture taken on the arrival of one of these patients, and Fig. 5 shows the last picture after bed rest for 1 year. The right hip is very good, while on the left side there is a flattened joint head. The 5 cases illustrate the importance of early rest, for the great difference in the results can hardly be explained as pure chance.

The findings: the difference in the results if treatment is commenced early or late in the disease may well agree theoretically with the pathological-anatomical investigations of *Jonsäter.* These show that the epiphysis is softest in the developmental stage, not in the fragmentation stage as was earlier believed.

If the individual reports and respective X-rays in this series are studied, it will be seen that we have certainly discharged a number of patients too early. On discharge the patients were in the middle of the fragmentation stage and even if the epiphysis was somewhat harder in this stage than in the previous one (see *Jonsäter*) it seems as if the renewed weightbearing made the condition worse: the capitular epiphysis became flatter and the symptoms progressed. The above-mentioned limit set by the Sick Relief Fund prevented us, however, from maintaining bed rest as long as would have been desirable from a medical standpoint.

The results of the treatment in the various age groups are evident from Table IV. The figures are small for the individual groups and are not statistically valid but decisively indicate a better prognosis for the younger ages if treatment is commenced early in the disease (Table IV a). When the treatment is started late, the difference is not noticeable (Table IV b). Similar observations have been made by *Folke Ståhl* and *Sundt,* but others declare that the prognosis is best in the older age groups.

TABLE IV (a and b)
Results of the treatment in the different age groups.
Treatment commenced:

Age	a) in the initial stage			b) in the fragmentation stage		
	Good	Fair	Poor	Good	Fair	Poor
Under 4 years.....	1					
4—5 years...	2	1			1	3
5—6 » ...	6		1	2	7	6
6—7 » ...	10	3		3	9	11
7—8 » ...	2	1	1	8	10	3
8—9 » ...	3	3	2	4	12	3
9—10 » ...	1	2			4	5
Above 10 years			1	1		
Total.....	25	10	5	18	43	31

Another point which is advanced by *Helbo* amongst others, is confirmed by our series: bed rest *shortens* the course of the disease. With our patients it takes on an average 1¼ years from the time that the first subjective symptoms are recorded until the disease passes into a stage of *roentgenological* repair. In untreated series it takes a little over 2 years.

In other respects our series may illustrate a number of interesting problems concerning X-ray pictures of the various stages and the relationship between the acetabulum and caput femoris. These will not be discussed more fully in this connection. It will only be stated that if cysts are found in the collum directly under epiphysis line (the cervical form of coxa plana), it is a poor sign for the prognosis (*Mindell & Shermann, Gall & Bennett*).

An important question which must also be taken into consideration, relates to the patients' physical and mental development: how much hardship does a boy or girl have to suffer when forced to stay in bed for 1 year or more and be separated from home and friends? In an earlier article (*Foss Hauge*) we have given a detailed account of our attitude towards this problem.

CONCLUSION

The results which are achieved with bed rest for 1 year when patients have coxa plana, are considerably better than the results from non-

treated series, but they are not so good as those reported from other quarters which have employed prolonged bed rest. It is *possible* that the results would be improved by resting the patients for a longer period, e.g. on average 1½ years, provided that the duration of bed rest is adapted to individual needs. On the other hand there seems to be no doubt that the results are best when patients are received for treatment early in the development of the disease. This may well agree with recent histological studies which show that the caput femoris is softest in the first stage of the disease.

The younger the patient the better the prognosis for coxa plana after lengthy bed rest.

SUMMARY

In Martina Hansens' Hospital coxa plana patients have been consistently treated with 1 year's bed rest. This series comprising 100 patients and 132 hips was investigated when the disease was primarily concluded. The results (evaluated from X-ray pictures of the caput femoris) are better than those of non-treated patients, if weightbearing ceases early in the disease—about 60 % against 25 %—but they are not as good as those published in other quarters (Britain-America, Denmark).

It is presumed that the duration of the bed rest should be prolonged to 1½ years on an average, but must be adapted to the needs of the individual patient.

The younger the patient the better the prognosis of the disease seems to be.

RESUME

A l'hôpital Martina Hansen, les malades atteints de coxa plana ont été traités d'une manière conséquente par un alitement d'une année. Le matériel d'observation porte sur 132 hanches chez 100 malades qui ont été examinés à la fin de la phase primaire de la maladie. Les résultats (établis sur la base des radiographies de la tête fémorale) sont meilleurs que dans les cas qui n'ont pas été soignés, lorsque les malades sont mis en traitement à un stade précoce de la maladie – environ 60 % contre environ 25 % – mais ils ne sont pas aussi bons que ceux publiés ailleurs (Angleterre, Amérique, Danemark).

On suppose qu'il convient de prolonger la durée de l'alitement en le

portant en moyenne à un an et demi, mais en procédant individuellement dans chaque cas particulier.

Le pronostic semble être d'autant plus favorable que le malade est plus jeune.

ZUSAMMENFASSUNG

Am Martina Hansen Krankenhause wurden coxa plana Patienten konsequent mit Bettlägerigkeit für ein Jahr behandelt. Das Krankengut, bestehend aus 100 patienten mit 132 erkrankten Hüften, wurde anlässlich des primären Abschlusses der Erkrankung nachuntersucht. Die Ergebnisse (nach den Röntgenbildern des caput femoris beurteilt) sind besser als bei unbehandelten Fällen, vorausgesetzt dass die Patienten frühzeitig im Krankheitsverlaufe entlastet wurden-ungefähr 60 % gegenüber 25 % – sind jedoch nicht so gut als die von anderer Seite veröffentlichten. (England, Amerika, Dänemark).

Die Zeit der Bettlägerigkeit sollte wahrscheinlich auf durchschnittlich 1½ Jahre verlängert werden, muss aber doch in jedem einzelnen Falle individualisiert werden.

Das Leiden scheint eine umso bessere Prognose zu haben je jünger der Patient ist.

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