CONGENITAL DYSPLASIA OF THE HIP

With Special Reference to Congenital Subluxation or "Pre-luxation"

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About twenty years ago a baby was brought to our clinic because congenital dislocation of the hips was suspected. There was severe limitation of abduction on both sides, but the radiographs failed to reveal the expected signs of dislocation. No appreciable upward and sideways shift of the femora was visible; the ossific centres for the femoral heads were still absent. Since it was during the heat of the Mediterranean summer the application of a plaster case (in those days still our standard treatment) was delayed and the child was merely kept under regular supervision. The range of movement at the hips improved spontaneously, and in a matter of some weeks it became apparent that no treatment was required. Further radiographs showed normal development.

Although this case seemed rather remarkable it was rated as a rare exception. Our attention was again drawn to this subject when in 1943 a paper was read by Lenk and Nassau before the annual convention of paediatricians in Tel Aviv. The authors claimed to have singled out a new clinical entity for which they proposed the name "pseudoluxatio coxae congenita," which mimicked to a variable extent and in various combinations the "classical" signs of true congenital dislocation, but ended by spontaneous recovery in a matter of months:

TABLE I
CLINICAL COURSE IN EIGHTY PATIENTS

Age at first examination		Interval before clinical and radiological recovery reported	
Age	Number of cases	Interval	Number of cases
1-3 months	11	3-5 months	17
4-6 months	64	6-8 months	44
7-12 months	5	9-12 months	12
		more than 1 year	7

the hips were always normal before the end of the second year of life. A note of caution was sounded to abstain from unnecessary treatment with possible damage to the tender structures by prolonged, let alone forced, abduction. Although only seventeen cases were reported, the authors suggested that the condition might be fairly frequent. This seemed to us to be doubtful. We started scrutinising our cases with some reluctance but with steadily growing interest.

CLINICAL FEATURES

I wish to report eighty patients (twenty-eight boys and fifty-two girls) treated during the last five years (Table I). This is only a fraction of the patients who have come under our care, but the earlier cases are inadequately recorded. In about a third of the cases both hips were affected.

Early diagnosis—Many years ago we reached the conclusion that the “classical” signs of congenital dislocation of the hip before the age of weight bearing were of doubtful value, though they should continue to be regarded as suggestive and warranting an orthopaedic consultation when found by general practitioners and midwives. With increasing experience we came to attach less and less importance to asymmetry of the body contour, obliquity of the vulva, spontaneous outward rotation of the legs, and especially unequal skin folds of the thighs. Measurable shortening of a leg in the earliest cases is seldom found, and in bilateral cases usually undetectable.

We came to rely instead on two physical signs: 1) the actual jumping of the femoral heads into and out of the sockets when the hips are brought into the “frog position”; and 2) obvious limitation of abduction, especially if one-sided.

FIG. 1

Case 1—Boy aged five months. Severe limitation of abduction of the right hip. No eccentricity. Acetabular roof slanting.

Since in early life a fully developed dislocation is the exception the “jumping phenomenon” must needs be rare. On the other hand we thought that limited abduction was a constant and therefore reliable feature of the early stages of dislocation. During the first examination it sometimes seemed uncertain whether we were dealing with a unilateral or bilateral case: if the limitation of abduction is marked on one side, slight limitation on the other may be overlooked.

We tried to grade the limitation of abduction by measuring the angle between the fully abducted femora and the mid-line of the trunk with the patient supine, but it became evident that the limitation of abduction did not correspond to the radiographic appearance. In some cases of marked limitation we found nearly normal radiographs, and *vice versa*. Quantitative measurements of the range of abduction were therefore abandoned.

Granted that it is a frequent sign—more frequent than all the other “classical” signs taken together—limited abduction by itself became more and more of a problem: so much so that we wondered whether the search for reliable clinical signs was not a waste of time,

FIG. 2

Case 1—At seven months there was no ossification centre on the right side. Acetabular roof still slanting.

FIG. 3

Case 1—Condition shown at five years. No treatment had been given.

FIG. 4

Case 2—Girl aged three months. Severe limitation of abduction at both hips. Only the left ossification centre is visible. No eccentricity.

especially since radiography seemed to offer an easy solution. As will be shown, however, radiographic studies themselves were sometimes equivocal.

RADIOGRAPHIC APPEARANCES

The radiographic examination of the hips in cases of limited abduction may show: 1) normal bone shadows; 2) a slanting or defective acetabular roof; 3) absence or unequal size of the ossification centres of the femoral heads (the one on the affected side always being the smaller); 4) a combination of 2 and 3; 5) irregularly shaped ossification centres.

Some radiologists and surgeons rely on geometric lines drawn upon the radiographs in order to establish an early diagnosis, especially before the nucleus of the femoral head has appeared. We distrust such devices because we have found that there is a wide variety of acetabular angles and broken Shenton's lines that do not necessarily indicate that the hip will dislocate.* In this we agree with Ponseti (1944) (Figs. 11 to 14).

Very careful study of the radiographs is required before a femoral head is described as "eccentric." Figure 7 is a tracing of the pelvis of a baby with severe limitation of abduction of the left hip. Figure 8 represents the mirror image of the normal femur drawn upon the apparently eccentric one of the other side. It seems that the bony nucleus is somewhat displaced but inside an otherwise normally shaped cartilaginous head. The further development of the hip in this case was normal.

The obvious inference is that "eccentricity" may be spurious. It was recently stressed by Caffey, Ames, Silverman, Ryder and Hough (1956) and by Schwartzmann (1955) that the radiographs give only incomplete information about the cartilaginous structures. This is a plain truth, but it is difficult not to imagine a pea rattling in a box if one looks at a "small" femoral head in a "wide" acetabulum. So the surgeon should not hesitate to rely upon his trained sense of feel in making a provisional decision.

FURTHER DEVELOPMENT

The clinical progress is fairly uniform in that the limitation of abduction subsides spontaneously in six to eight months. In the meantime standing and walking are begun without

* Only recently I came across an article by Sir Harry Platt (1958) in which he stated explicitly that a broken Shenton's line may correct itself spontaneously in the course of growth.

FIG. 5

Case 2—At four months the right ossification centre is considerably smaller than the left. Acetabular roof slanting.

FIG. 6

Case 2—At twenty-one months the femoral heads are well developed and the acetabula are of normal shape.

undue delay. It must be repeated that the degree of limitation of abduction is of no prognostic significance: severely contracted hips may become freely mobile after three weeks despite radiographic evidence of impaired development of the femoral heads; whereas in other cases over a year may elapse before the spread knees can be brought on to the bed.

FIG. 7

FIG. 8

Tracings of the hips of a five-months-old girl (see text).

The course of events as shown radiographically is far more varied. In brief, the ossification centres of the femoral heads may show: 1) delayed appearance; 2) asymmetrical growth; 3) irregular outlines; 4) heterogeneous appearance of the inner structure—"granular," "crumbled," "cloudy" and "translucent." The acetabulum may show: 1) bony apposition on the acetabular roof; or 2) deepening and rounding of a large and shallow socket. Usually at the age of one to one and a half years, but sometimes later still, the radiographs become normal (Figs. 1 to 6 and 9 to 17). The small ossification centre "catches up" with the larger one; the structural irregularities disappear gradually and the acetabulum comes to "embrace" its head. The distorted outline of the ossification centre appears frequently as a half moon with its convexity towards the femoral neck.

TREATMENT

We have to stress that it could be demonstrated beyond any reasonable doubt that in certain cases with developmental anomalies of the hip region spontaneous recovery occurs. This tendency is not to be detected by one single radiograph but only by repeated examinations and careful comparison of the films.

At a conference of orthopaedic surgeons in Tel Aviv three years ago grave doubts were felt lest the best time for treatment might be missed: most were for treatment "at sight."

Our counter-argument was based on two contentions. 1) The patient is not simply left to his fate but is checked regularly, at first with radiographs taken at monthly or two-monthly intervals. There is not one patient in our records in whom a dislocation was "missed" and had to be reduced by manipulation later. Only five children (not in this series) were put in Denis Browne splints after several weeks' observation "for security reasons" because their hips did not show satisfactory anatomical improvement before reaching the deadline. Our deadline is set arbitrarily at eight months, the start of weight bearing. 2) Since all our patients are young (Table I) we have ample time to determine the course of events before any danger is incurred.

Reviewing our treated cases of congenital dislocation at their annual follow-up examinations, we became occasionally critical of the strictness of our earlier indications. We now believe that quite a number of babies could have been spared the disturbance of prolonged treatment if we had had the patience and experience that we have now.

The numerous anatomical researches published in the last decade leave small doubt that the twisting of the capsule in the "frog position" involves some danger to the blood supply

FIG. 9

Case 3—Boy aged six months. Severe limitation of abduction of the left hip. Irregularly shaped ossification centres on both sides.

FIG. 10

Case 3—At the age of three years the hip joints are well developed.

FIG. 11

Case 4—Girl aged five months. Severe limitation of abduction on the right side; moderate limitation on the left. Shenton's line interrupted on the right side.

FIG. 12

Case 4—At six months there is marked bony apposition at the right acetabular roof. Shenton's line still broken but unchanged.

FIG. 13

Case 4—At one year nine months the right femoral head is still smaller than the left but well rounded. The acetabula are normally shaped. Shenton's line is now unbroken.

FIG. 14

Case 4—At four years three months the femoral heads and acetabula are of equal size.

FIG. 15

Case 5—Boy aged five months with moderate limitation of abduction at the right hip. No ossification centre visible on the right side.

FIG. 16

Case 5—At the age of eleven years both hips are normally shaped. When the boy was three years old a slight right-sided hemiparesis became apparent.

of the femoral heads by obstruction of the nutrient vessels. This is true even when force is not used, abduction being secured by gradual means.

ETIOLOGY

This topic has been discussed extensively by several authors, among them Lenk and Nassau (1944) and Badgley (1949). No clear solution of the problem has been found, but several possibilities have been raised. After a study of our findings we have to admit that the incidence of each factor is too small to give any clue of statistical value.

Hereditary factors—In one case a brother had club feet. In nine cases children of the same family had dislocated hips; two of them were heterozygous twins.

Other malformations—One patient had multiple naevi. One had hemivertebrae with congenital scoliosis, and one had hemivertebrae with shortening of the leg on the side of the limited abduction; another child had a misshapen big toe. There was one case of severe pigeon breast, and one of asymmetry of the skull. (To this group would belong the case of Lenk and Nassau with supernumerary epiphyses of the metatarsal bones.)

Neurological conditions—One patient had slight hemiparesis on the same side. One patient had the benign form of amyotonia congenita (Turner 1949, Walton 1957).

Although conclusions cannot be drawn from this sparse material particular attention is drawn to the nine cases of dislocated hips in siblings—more than 10 per cent of the cases presented.

Because of the “spasticity” of the adductor muscles we looked for other signs of some spastic condition. We found only one case of a slight but unmistakable hemiparesis which later on cleared up and left the child with an insignificant pes cavus.

COMMENT

There exists a deviation in the development of the hip joint of the human infant which includes various clinical and radiological features as outlined above. The final outcome may follow two lines: 1) return to normality; or 2) deterioration to full dislocation.

In 1906 it was boldly stated by Gourdon that subluxation of a hip may remain unchanged during the whole lifetime without ever leading to dislocation. In 1938 Marx declared with the same boldness and without statistical proof by mass investigation that “spontaneous reduction” occurs in a large percentage in early life. Those articles in fact indicated the need for further investigation, but failed to elicit attention. Most orthopaedic surgeons believed that every “prelaxation” led inevitably to dislocation. Only recently has this belief been questioned. Many who see their patients only after walking has started must remain ignorant of the self-limiting dysplastic condition.

The underlying causes of the anomaly are entirely unknown or at least unproved. At present we believe congenital dislocation to be a genuine malformation. The “dysplasia” may represent either a bland or abortive form of the real dislocation, or a persistent embryonic form after birth which, reaching a certain “critical” point, is apt to “miscarry.”

As to the first possibility, it must be stressed that among eighty cases sixteen bore some definite relationship to various other anomalies—namely to full dislocation (nine), or to other malformations (seven). This represents 20 per cent and is unlikely to be due to chance.

Nevertheless the possibility that we have to deal with a persistent embryonic form may equally be correct. It is conceivable that two different underlying conditions lead to the same

result—spontaneous recovery. If this were so it would shed a somewhat dubious light on the excellent results of early treatment embarked upon uncritically, and our former statistics might well lose part of their value.

That is not to say that we should put the clock back and revert to late treatment, but merely that we should establish more stringent indications. The tremendous advantages of early diagnosis and treatment need no further discussion.

There remains finally the question how common "dysplasia" of the hips actually is. It seems to be much commoner than we have assumed hitherto, but judgment must be postponed until mass investigations on whole populations become available.

In the absence of established facts we make two propositions. 1) In order to reach an early diagnosis one should not rely on the static condition shown by one radiograph (except when the diagnosis is obvious): several pictures taken at regular intervals will show a trend of development, which is more reliable (a "starting curve" rather than a "starting point").

FIG. 17

Case 6—This girl was treated fourteen years ago because of "left-sided dislocation" on the evidence of this radiograph, although there was no eccentricity of the femur and there was a marked bony spur at the acetabular roof. Such a hip would now be left alone.

2) As soon as a tendency to deterioration becomes obvious, the eccentricity of the femur increasing and the acetabular roof failing to grow out, treatment along atraumatic lines should be instituted before the age of weight bearing. Treatment without sufficient indication is not warranted.

SUMMARY

1. Eighty infants with congenital dysplasia of the hip, diagnosed before walking began, are reviewed.
2. The clinical and radiographic features of congenital dysplasia are described.
3. A dysplastic hip may either become normal spontaneously, or it may deteriorate to the state of true dislocation.
4. Treatment is discussed.

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