STRUCTURAL CHANGES IN CONGENITAL
HIP DISLOCATION *

WALLACE BLANCHARD, M.D.

Assistant Clinical Professor in Surgery (Orthopedic), Rush Medical
College; Orthopedic Surgeon, Home for Destitute Crippled
Children and University Hospital

CHICAGO

A diversity of forms of dismantlement and reconstruction are always shown in the roentgenographic presentation of a number of congenital hip dislocations taken before and several years after reduction. In every case the roentgenogram offers a suggestion as to the best position in which to place and hold the leg in the plaster-of-Paris spica in order to secure stability of the head of the femur and ultimately a good functioning joint.

In congenital hip dislocation, the obliteration of the acetabulum, the flattening of the head of the femur and the changing shape and direction of the neck are always shown in varying forms. When the mush-

or of other injury are largely decreased when the head is reduced over the more shallow lower rim. A reduction should not be accepted as satisfactory unless the head of the femur can be felt in the groin.

After the reduction, it is the position of the limb in the plaster-of-Paris spica that gives it stability or lets it go out. The roentgenogram usually gives a good indication of the position in which the leg should be held to secure stability.

If a small portion of the roof of the acetabulum is left so that it is shown in the roentgenogram even as large as a pea, a posterior dislocation may be reduced with a reasonable certainty that it will remain secure if the hip is firmly held in the Lorenz position of 90 degrees both in flexion and abduction.

The short unilateral plaster-of-Paris spica secures sufficient fixation for practical purposes of stability. The following case is presented to cover several points, including the opposing views of many European surgeons who agree with Bankart¹ that "a unilateral plaster is unsatisfactory as it does not fix the hip properly."

Fig. 1.—A (at left), B. J. (Case 1) in plaster-of-Paris spica after reduction of congenital hip dislocation. B (in center), R. G. (Case 2) in plaster soon after reduction. C (at right), H. F. (Case 3) in plaster soon after reduction.

roomed or cone-shaped head of the femur is placed and held approximately where the acetabulum once existed, the head usually again develops and cartilage grows up around it and deepens till, by a rebuilding process, a more or less functionally perfect joint is formed. The technic of bloodless reduction has steadily improved since the first visit of Professor Lorenz to this country in 1902. The forceful stretching method then employed, which frequently resulted in fracture of the femur without replacement, was superseded in 1904 by Prof. Albert Hoffa's milder manipulative reduction.

Some operators stretch every possible set of muscles and reduce over the superior or posterior rim of the acetabulum. Other operators, without preliminary muscle stretching, flex the hip and press strongly and continuously down on the knee till the head is pushed below the acetabulum, and then lift the head over the lower rim into position. The dangers of fracture

CASE 1.—B. J., girl, aged 6 years, with a congenital dislocation backward of the right hip, and the leg 3.5 cm. short. The roentgenogram showed the acetabulum obliterated except for a small flat button that was left of the roof. The head was atrophied and mushroomed to half its normal size and thickness. The neck was shortened and elevated. The dislocation was reduced and the hip was placed in the position of 90 degrees flexion and abduction and put in the short unilateral spica, as shown in Figure 1 A. One month later the patient contracted diphtheria and, following the use of antitoxin, developed a dermatitis under the plaster spica necessitating its removal. Pneumonia followed the diphtheria, and after eight weeks without the plaster I found the head of the femur still in place. The rebuilding of the articulation had gone on without interruption. The plaster spica was renewed, and eight months after the reduction it was discontinued and the patient left to her own devices.

A roentgenogram (Fig. 2) taken soon after the removal of the spica showed a tilted pelvis of abduction with the head in place. A light strip between the head of the femur and the acetabulum indicates the space that is filled by the

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1. Bankart, A. S. B.: Treatment of Congenital Dislocation of the Hip, *Brit. Med. Jour.*, 1913, i, 1044.

new acetabulum that is not yet sufficiently advanced in calcification to show in the picture, but is serving well for retention.

Walking for several months after the plaster spica has been removed with the leg in abduction has a double advantage of deepening the acetabulum and of keeping the head more securely in place.

A roentgenogram (Fig. 3) taken three years after reduction shows a new femoral head built up over the atrophied and

Fig. 2 (Case 1).—Roentgenogram taken soon after the removal of the plaster spica.

mushroomed head to the full size of the normal head, and above that a new acetabular roof shows dark and strong, and the hip is functionally good.

CASE 2.—R. G., girl, aged 3½ years, with double congenital hip dislocation. A roentgenogram (Fig. 4) showed a double congenital hip dislocation with small buttons as the only remnants of the overhanging roofs. Reduction was made over the lower rim, and the hips put in plaster in the right angle flexion and abduction position.

A photograph (Fig. 1 B) was taken soon after the reduction. One month after the reduction the patient was reported dangerously ill with diphtheria, and following antitoxin a dermatitis developed under the plaster, which was removed. After four weeks without the plaster spica a roentgenogram

Fig. 3 (Case 1).—Three years after reduction.

was taken that showed both femoral heads to be in place. The legs remained in the "frog position," and a new plaster spica was applied.

The roentgenogram of this case showed small round buttons of bones as all that remained of the roofs. The visible remnants of the roofs were, of course, supported by considerable decalcified bone, and these formed buttresses against redislocations.

CASE 3.—H. F., girl, aged 6 years, with left hip dislocated posteriorly and leg 3.5 cm. short. The reduction was too easy and no security was imparted to the head with the leg either in the primary position of Lorenz, or in the Lange position; but elevating the hip to 30 degrees above the Lorenz position toward Werndorff's axillary position imparted stability. A plaster spica was applied with the hip in this exaggerated position and left for eight months in the belief that the objections to so doing had not been sustained. The normal leg was included in the plaster as a counter lever to secure fixation, as shown in Figure 1 C. The plaster spica was removed after eight months and the patient left to her own devices. The leg was over a year coming down from abduction to normal position.

The roentgenogram (Fig. 5) taken soon after the removal of the plaster shows a tilted pelvis, decalcification of the upper end of the femur and the adjoining pelvic bone as well as a roughened outline at the original seat of the acetabulum. An irregular cavity marks the original site of the acetabular roof, which explains why the leg had to be elevated toward the axillary position to secure stability.

The second roentgenogram (Fig. 6), taken two years later, shows a recalcification of the lightened bones. Also a new roof shows the dark shadow of strength, and the head of the femur is in place. Even after three years there remained a slight suggestion of abduction, though the leg was functionally perfect.

Fig. 4 (Case 2).—Double congenital hip dislocation with small buttons as the only remnants of the roofs.

From three to five years may be taken as the age for reduction to get the best ultimate results. The increasing dismantlement of the unreduced hip joint as the child grows older and the insufficient ossification in younger children that allows soft bone to give way during and after reduction must be considered. The following case presents the two sides of the question:

CASE 4.—M. H., girl, aged 2 years and 3 months, with congenital dislocation backward of the right hip, and the leg 3.3 cm. short. A roentgenogram (Fig. 7) taken before reduction showed that the right upper femoral shaft and neck had about one half the diameter of the left. The head of the femur had almost disappeared, and the overhanging shelf was nearly obliterated. A roentgenogram (Fig. 8), taken two and one-half years after reduction, showed a redevelopment of the upper femoral shaft, neck and head. Also the roof had reappeared dark and strong. But note the wide strip of light between the head of the femur and the nearest bone of the pelvis that indicates the situation of the soft reforming acetabulum and femoral head. Experience shows that weight bearing will cause this pliable acetabulum and head to give somewhat so as to produce some shortening before recalcification and ossification are sufficiently advanced

to afford a stable joint. The ultimate result is likely to show that the reduction was made too early, though at present the legs are the same length and function is perfect.

Changing the position of the leg after two and a half months in plaster, as is advised by Calot and others, interrupts the rebuilding of the articulation which is necessary to secure a stable joint.

The prognosis may be said to be favorable in posterior dislocation, unfavorable in forward dislocation and unfavorable in upward dislocation, if on rotation of the leg the head can be felt both anteriorly and posteriorly.

Bankart's¹ conclusion that "no operative method reaches the excellent results obtained by manipulative reduction" has been quite generally accepted. The elimination of unnecessary violence has marked every step forward in the reduction of congenital hip dislocation.

CONCLUSIONS

Experience seems to warrant the following conclusions:

A shortened or twisted neck in a coxa valga position may look unpromising in the roentgenogram, and yet

Fig. 5 (Case 3).—Soon after removal of the plaster.

present no bar to a good reduction and ultimately to a good functioning joint.

Eight months is the shortest time in which a dependable acetabulum reforms, and any radical change in the position of the leg interrupts the rebuilding process. The unchanging pressure of the femoral head accelerates the absorption of the extraneous structures that obstruct the acetabulum. After the plaster spica has been removed, the child should be left to its own devices, and the longer the abduction remains, the more stable the joint will become.

The best functional result may be obtained in children from 3 to 5 years of age and with from 2.5 to 4 cm. of shortening. There is no age limit, upward. The older the child and the greater the shortening, the more secure the replacement, if it can be made. The difficulty of reduction increases with the shortening after 4 cm. have been passed. A reduction by steps can be gained in older children with 5 cm. or more of shortening by following the practice of the Vienna school. The head should be brought as near as possible to the acetabulum and put into a plaster

spica just the same as if reduced, and a second attempt, made three weeks later, may result in a satisfactory replacement.

Reduction should be delayed in all cases of 3 years or younger and that show 2 cm. or less of shortening.

Fig. 6 (Case 3).—Two years after removal of the plaster.

The child needs all the freedom that can be safely accorded, and a great majority of unilateral cases will do best in unilateral plaster spica.

The reduction must be made at an age of susceptibility to diphtheria and other children's diseases, and the two cases here given show that if the plaster spica has been on a month or more and the roentgenogram reveals even a small remnant of the roof, the plaster may be left off one to two months with the patient on the bed without much danger of a redislocation.

If the roentgenogram shows delayed ossification from rickets or other causes, the reduction must be postponed. Roentgenographic observations of the

Fig. 7 (Case 4).—Before reduction.

hips should be taken before and after reduction and at frequent intervals so that a careful watch may be kept of the bone regeneration that produces a good joint.

Perfect or satisfactory function may be obtained in a large majority of the unilateral and a fair proportion of the bilateral cases.

The case that looks the best may turn out the worst, and the reduced hip that feels the most stable may be the first to go out; but a careful roentgenographic study of each case will go far toward placing the reduction of congenital hip dislocation on a more assured basis.

15 East Washington Street.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. HIBBS, WATKINS AND BLANCHARD

DR. JOHN RIDLON, Chicago: I believe that Dr. Hibbs' operation is wholly unnecessary. He was good enough to let me replace one hip after he had turned the thigh bone, as he showed you today. I was very anxious over the case and found it very difficult because things did not feel natural. I believe that the operation recommended by Dr. Watkins and done by Dr. Sherman yesterday is wholly unnecessary. I believe that there is a great deal less deformity about the head and neck of the femur than we have been accustomed to believe. Some hips are dislocated backward and upward, some are dislocated forward and upward, and some are dislocated directly upwards. We have talked about the twisting of the neck for years and years, and believed that existed. I do not know whether it does or not. Now we are told that it is not there, that it is in the shaft, but I do not know whether the shaft is twisted or not. We have believed that all these dislocated hips had "hour-glass" contraction, so that the head could not be tucked back through the narrow passage. I do not think they all have it; some of them may, and very likely some of them do have it. We have been taught that the sockets were all malformed and filled with fat, fibrous tissue, and the cotyloid ring had so narrowed that the head could only go to the opening of the socket and not into the socket. Now I am sure that is not so in some cases. I am sure that the main fault in most of these congenital hips is because of a defective and a shallow socket, and here is my evidence, in two pictures that I will pass: first, of a man, 52 years old, a policeman, 6 feet 4 inches tall, and tremendously broad and heavy, and he had never had a particle of trouble with his hips in his life. These pictures show that in one hip only two-thirds of the head is included in the socket, and in the other hip one-half of the head is included in the socket. Here is another picture with a socket no deeper than the palm of my hand. I replaced this hip several years before Lorenz came here. When the plaster was taken off, the hip appeared to be normally in place. I did not see the child again until several years afterward when the existing condition was found. She walked with scarcely a perceptible limp. I believe no man, whether he manipulates by my method or Lorenz' method or Davis' method or any other method, or cuts down on it by Hibbs' method or Sherman's method, will get a better socket than Hoffa used to get, and many of his slipped out.

However you operate, whatever your methods are, you will get, according to your skill, a certain percentage of good cases, and you will have a certain percentage of cases in which the hip slips out.

DR. LEONARD W. ELY, San Francisco: During the reading of these papers a thought has occurred to me which I think would be well to mention. In visiting one of the hospitals in the city here a few days ago I saw a patient

who was to be operated on for congenital dislocation of the hip. The roentgenogram showed the dislocation. There was no wound on the leg, no history of any disturbance at all. The mother had simply brought the child in and left it on account of its failure to walk. I recognized the child as a patient I had treated several months before for arthritis. I had withdrawn a syringe full of pus from the hip. The arthritis slowly subsided without further treatment, leaving behind a typical dislocation of the hip, with no sign whatever of any operation, and I wondered how many of these cases that come to us in this walk of life are of the same kind.

DR. RUSSELL A. HIBBS, New York: There is one other point which I did not make in my paper. There must be some relation existing between the direction of the head and neck of the femur and the direction of the center of the acetabulum. It is quite possible in some cases that the amount of anteversion in normal femurs and in normal heads varies, and to meet that condition there must be a variation in the direction of the center of the acetabulum. It is obviously very difficult to determine that question.

DR. JAMES T. WATKINS, San Francisco: Among the procedures which we of the Children's Hospital staff have been employing of late years in the treatment of our congenital hip dislocations has been the subtrochanteric osteotomy which was first advocated by the late Professor Schede of Bonn as a means of correcting the forward twist of the upper end of the femur on the shaft. We differ from Dr. Hibbs in that we make the correction after reduction instead of before it, and attack the upper instead of the lower end of the shaft. Regarding the results of arthrotomy followed by osteotomy, our most careful estimate has given rather better than 70 per cent. of cures, which were both anatomically and functionally complete. Dr. Ridlon has lifted a great weight from my mind. If I understood him aright, one may reduce a congenital dislocation of the hip, and if God so wills it will stay reduced; otherwise it will not.

Often in the still watches of the night I have worried lest imperfect results in my cases of congenital dislocation might be due to my own defects, and, humbly confessing my sins before God, I have sought diligently wherein I might do better. But now since I learn that not I but God did it, I feel better and shall sleep better.

DR. WALLACE BLANCHARD, Chicago: Wolf's law governs in dislocation of the hip and in the replacement of the head of the femur, the same as it governs and controls the breaking down and reconstruction of other parts of the body. The acetabulum distorts and flares out and the direction of the head and neck changes during the whole period of dislocation, but after replacement, the head builds up in the direction where the stress of weight bearing occurs and the overhanging shelf builds up where the stress of weight bearing must fall, and so Wolf's law governs and helps to replace the hip joint and make it something toward the normal.

Top Notchers and Thoroughness.—The third class are the top men, men who are careful, thorough and conscientious in their every relation to their patients and to their profession. There are more of them in Tennessee this year than there were last year, and there will be more next year than this. Their example is telling, and they all belong to their county medical societies. Had you noticed that?—Editorial, *Jour. Tennessee State Med. Assn.*, August, 1915.

Fig. 8 (Case 4).—Two and a half years after reduction.