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EXAMINATIONS OF HIPS IN NEWBORN BABIES AND RESULTS*

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In the last three years the author examined personally 4300 newborn babies between the second and sixth day of age. From this group 2920 were females and 1380 males. Of the females 2514 were white and 406 were colored and of the males 1195 were white and 185 colored. The newborn was examined in the nursery and the follow-up done in the Pediatric and Orthopedic Clinics.

METHOD OF EXAMINATION

The newborn was not examined on the day of birth, in order to avoid additional stress to the baby.

The examination consisted of:

a) Observation of the lower part of the body and lower limbs.

b) Manual examination of the hips.

c) Radiographic examination.

A) Observation of the lower part of body and lower limbs.

It was noted that the newborn baby while supine and without diaper kept the lower extremities in the various positions. (Figure 1). Only the breech born baby held the thighs in abduction of 70-85°, and flexed at 95-100°. The knees were flexed at 90-100°. The skin of the lower part of both the gluteal and perineal regions were cyanotic color. (Figure 2). The breech born baby held the lower limbs in this position for 5-10 days and the color of the skin persisted for the same time.

The symmetry of the skin folds of the gluteal, perineal and thigh regions were observed. In our series we detected asymmetry of the skin folds of the gluteal region in 12 babies (8 females and 4 males); in the perineal region in 11 babies (9 females and 2 males); on the medial and posterior aspect of the thigh in 37 (29 females and 8 males). In 7 babies (6 females and 1 male) the skin folds were asymmetrical in all three regions. The manual and radiographic examinations of the hips in these newborn babies were negative. The babies were followed for a period of 3-14 months and in no case developed congenital hip dislocation (C.H.D.). Usually the asymmetry of the skin folds disappeared after 2-3 months, except in 4 cases of the last group in which the asymmetry of the skin folds persisted for 12-14 months, without any sign of C.H.D. (Figures 3, 4, 5, 6, 7).

B) Manual examination of the hips.

To examine properly the hips of the newborn the diaper should be removed and the baby laid on a firm examining table with enough space for manipulation of both hips.

*This work is a part of the paper awarded the First Prize by the Detroit Academy of Orthopedic Surgery in 1960.

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Figure 1
One of the most common spontaneous positions of the lower extremities in the newborn baby while supine.

Figure 2
Characteristic spontaneous position of the lower extremities in the newborn baby delivered in breech position. Note the dark color of the lower gluteal and perineal regions.
Baby girl who had at birth asymmetrical skin folds in the perineal, gluteal regions and on the medial aspect of the thighs. Photo taken at 10 months of age. At 14 months the asymmetry of the skin folds disappeared spontaneously. Manual and radiological examinations of the hips were negative since birth.

The same patient with asymmetrical folds on the gluteal region and on the thighs.

The same patient with full range of the abduction of the thighs.

Radiographies of the pelvis of the same patient. Anterio-posterior and frog-leg views disclosed normal hips.
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Ortolani’s or the sign of “click” can be produced in the newborn baby with congenital hip predislocation (C.H.P.) only if the exact technique of examination is applied (Figure 8).

Figure 8
Four phases of the hip examination in the newborn baby searching for Ortolani’s sign.

While the child is supine both hands of the examiner hold the baby’s lower extremities around the knees. The thumbs are placed on the medial side and the other fingers on the lateral side. The index finger is placed along the femur shaft with the tip on the region of the great trocanter. The right hand of the examiner is on the left knee and vice versa. The thighs are flexed at 90° in neutral rotation and the knees are flexed at 90°-100°. To examine the left hip, the examiner holds the right hip firmly against the examining table in the above manner. The examiner exerts moderate pressure on the left knee downward to transmit pressure to the femur and hip.

In the case of C.H.P. on the left side, the examiner should feel a very slight “click” produced by the passing of the head of the femur over the ridge of the acetabulum posteriorly. Keeping the same amount of pressure the examiner begins to abduct the left hip and at approximately 45-50° of abduction a certain resistance should be felt, but this is not a true limitation of abduction. At that moment pressure of the tip of the index finger is exerted upon the region of the left great trocanter and the hip is reduced. At that moment another sensation of the “click” should be felt, and there is no further feeling of resistance to the abduction which was present prior to the hip reduction. The right hip is examined in the same manner. The newborn babies were examined also to establish the reverse hip-knee-hip triad which has been described by the author.

C) Radiographic examination was performed for every newborn baby with positive Ortolani’s sign and in an additional 350 newborn babies whose hips were completely normal clinically.

DISCUSSION

A) Every textbook of fundamental orthopedics describes asymmetry of the
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gluteal, perineal or thigh skin folds as one of the signs which should make us suspect C.H.D. in children.

We limited our study to newborn babies only, and our experience shows that asymmetry of the skin folds was not reliable in the diagnosis of C.H.D. or C.H.P. We found asymmetry of the skin folds in the newborn baby who had much subcutaneous fat. This asymmetry disappeared after a few months except in four cases and may be due to the formation of small subcutaneous fibrous bands which persisted for longer period. These four babies had an unusual amount of subcutaneous fat on the lower part of the body and the lower extremities from birth until 12-14 months of age when they began to walk. At this time we made the final clinical and radiographical examination which established the finding of normal hips.

Special attention was paid to those newborn babies who delivered in the breech position, a controversial cause of C.H.D. and C.H.P. In our series there were 215 breech born babies, and in only one a positive Ortolani's sign was detected.

B) The exact technique must be applied in the examination of the hips in the newborn babies in whom we are looking for the positive Ortolani's sign. If the positive Ortolani's sign is present, the "click" should be felt with the hands more than heard. The first "click" is simultaneous with a feeling of the femoral head passing over the ridge of the acetabulum and a feeling of reduction with the second "click". We are convinced that the "click" could be very easily misinterpreted if all details of the examination are not known. The audible "click" which does not represent a positive Ortolani's sign in the newborn babies can be produced by the following anatomical structures.

1) The interposition of the ligamentum teres between the head of the femur and acetabulum in the supero-posterior part of the acetabulum.

2) The "click" in the knee during the examination of the hips could be interpreted as the "click" of the hip.

3) Gliding of the tendon of the ileopsoas could give the "click" during the examination of the normal hips in a case of an unusually large ilio-pectineal burso.

4) Gliding of the tendon of gluteus maximus and tensor fascia lata over the great trocanter can produce the "click" in the examination of the hips in the newborn babies.

These observations are the result of clinical examinations and anatomo-pathological dissections of 115 still born babies.

In our series we detected the positive Ortolani's sign in 22 newborn white babies. Of these 9 had bilateral and 13 unilateral positive Ortolani's sign; 10 on the left and 3 on the right. Among them 19 were females and 3 males. There was no sign of C.H.P. in the newborn colored babies.

Ortolani's sign showed interesting changes with the growth of the four baby girls in whom it was detected at birth on the left hip and for whom treatment was started two months after birth. In those babies the "click" of Ortolani's sign was
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more audible at three weeks of age than immediately after birth. The feeling of resistance prior to reduction, which in the newborn is vague, is more developed in the three week old baby. Those babies at two months of age and still untreated showed the first "click" still audible, but the second was not easily produced because of limitation of abduction which started to develop.

The author would like to emphasize that in the newborn babies with the positive Ortolani's sign limitation of abduction of the hips does not exist. The examiner looking only for limitation of abduction of the hips with no thought of Ortolani's sign will completely miss the hips in the phase of predislocation.

The positive Ortolani's sign found at birth disclosed that the hips of the newborn were in the phase of predislocation at birth. It is impossible to predict whether this condition will evolve into C.H.D. or C.H. subluxation. Spontaneous healing of hip dislocation has been widely discussed. In our series we did not find spontaneous healing of C.H.P.

C) Radiography of the hips of the newborn babies with positive Ortolani's sign revealed the acetabular angle greater than 28°. We established this value as the upper limit on the basis of the radiographies of 350 newborn babies with clinically normal hips, who were followed for 12 months without any sign of C.H.D. or C.H.P. The same value was established as the upper normal limit in the radiographies of the hips of 55 still born babies in whom the dissection revealed normal hips.

TREATMENT

All newborn babies with a positive Ortolani's sign were treated. The treatment of 18 babies was initiated between the third and sixth day after birth. The treatment of four babies in whom we detected a positive Ortolani's sign at birth, was started at 2 months of age (Figures 9, 10, 11, 12, 13, 14, 15, 16).

Figure 9 and 10
The radiography of the hips in antero-posterior and frog-leg view of newborn baby girl three days old shows acetabular angle over 28°. There was positive Ortolani's sign bilaterally. The treatment with Frejka pillow started at 2 months of age.
Figure 11 and 12
Radiographs of the hips of the same patient at 3 months of age. Clinically negative. Continued treatment with Frejka pillow.

Figure 13
Radiography of the hips of the same patient at 5 months of age. Clinically negative. No appearance of the nucleus of ossification of the proximal femoral epiphysis. Treatment with Frejka pillow continued.

Figure 14
Radiography of the hips of the same patient at 11 months of age shows difference in size of the nucleus of ossification. Treatment discontinued. Discouraged the parents to allow the baby to stand or walk.

Figure 15 and 16
Radiographies of the hips of the same patient at 13 months of age. There is still very small difference in the size of nucleus of ossification, and the higher position of the left proximal epiphysis. The patient started to walk.
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The treatment consisted of the application of the Frejka pillow (Figure 17). It is very important that the pillow is properly applied. The instructions given to the mother should be clear and followed by the demonstration of the Frejka pillow application.

![Figure 17](image)

Frejka pillow properly applied on the newborn baby.

The thighs have to be abducted for 60-70° when the pillow is applied. The pillow should be applied over the diaper, and reapplied with the changing of diaper. In the beginning of the treatment the child has to be seen after two weeks for the control of the correct application of the Frejka pillow. After this examination the child is checked clinically and radiologically every 2½ to 3 months until the well developed acetabulum and well centered proximal femoral epiphysis radiographically and stable hip clinically are obtained.

In the 18 babies in whom the treatment started within a few days after birth, the hips were negative within 4-6 months.

Four cases in whom treatment started at two months of age had negative hips within 7-11 months.

The result of all treated children is excellent at the present time; however, many of them are still under periodic clinical control.

The changes in the Ortolani’s sign in the newborn treated with the Frejka pillow were interesting. Two weeks after the beginning of treatment Ortolani’s sign was still positive, but within 1-3 months disappeared completely.

It is important to emphasize that we had complete and excellent cooperation of the mothers in the cases whom we treated or in those whom we followed in the clinic for various above mentioned reasons. After the explanation of our work
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on the hip problems and earliest diagnosis and treatment of the hip, we had both parents on our side.

CONCLUSIONS

1) From our three years experience we believe that the examination of the hips of the newborn babies by the Doctor who is acquainted with the exact technique, is of paramount importance in the diagnosis and earliest treatment of C.H.P. and C.H.D.

2) Since we started with the systematic examinations of the hips of all newborn babies in Henry Ford Hospital, we have not had a case of C.H.D. seen in our Orthopedic Clinic who was not diagnosed within a few days after birth.

3) Ortolani’s sign is a reliable sign in the diagnosis of the C.H.P. in newborn babies.

4) All newborn babies with the positive Ortolani’s sign had radiography with increased acetabular angle over 28°.

5) The treatment with Frejka pillow in the newborn with positive Ortolani’s sign should be started within a few days after birth.

6) The hip examinations of the newborn babies, the clinical follow-up, the control of the position of the baby’s hips while radiographies were taken, and the dissection of hips of the stillborn babies were all done personally by the author. In this manner all phases of the investigation were controlled by one person resulting in consistent findings.

SUMMARY

The Author examined personally 4300 newborn babies among whom 22 had a positive Ortolani’s sign. The Author describes the technique of the examination of the hips, treatment and results.

Our investigations and examinations were possible only with the close and friendly help and cooperation of the Pediatric, Obstetric, and Radiology Departments.

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