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## TRAUMATIC SEPARATION OF THE UPPER FEMORAL EPIPHYSIS AS AN OBSTETRICAL LESION

*By*

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Two case histories of traumatic separation of the upper femoral epiphysis during delivery will primarily be presented including radiograms up to four years after birth. Problems of diagnosis and treatment and the incidence of this lesion, infrequently mentioned in the literature, will secondarily be discussed.

### CASE HISTORY

1: 12.6.1958 a full-term baby boy was delivered at a clinic during rather dramatic circumstances. Twice the mother had had a still born child. The umbilical chord was incarcerated between the head and the pelvis and the obstetrician had to perform in bed podalic version and forceful extraction on the left leg. Three days later the boy was sent to department III of the orthopaedic hospital on the diagnosis of fracture of the left femur.

On admission the entire left femur was swollen with firmness at the upper end, bruises around the left ankle and foot. No active movements of the left hip joint, but on passive movements strepitus or crepitus in a haematoma could be felt. The X-rays--Fig. 1--showed a displacement of the shaft of the femur laterally and upwards, most marked in the Lauenstein projection, and swelling of the soft tissue around the upper end of the femur. The picture could be mistaken for a congenital dislocation of the hip. But considering the signs of a traumatic lesion we felt it was a case either of a separation of the upper femoral epiphysis or a traumatic hip dislocation. The boy was for 6 weeks put on a Jones' splint with longitudinal traction in abduction, slight inward rotation and with cross traction medially. It was felt that in case a separation of the upper epiphysis had taken place, callus or calcification in the haematoma early would be demonstrable. The X-ray 7 days later--Fig. 2--shows, however, only some improvement in the position of the shaft of the femur. No callus or periosteal separation along the shaft can yet be seen. The cross traction medially was increased. Calcification in the haematoma or callus, and periosteal separation along the femoral shaft can be seen on the next X-ray--Fig. 3 taken 20 days after birth.

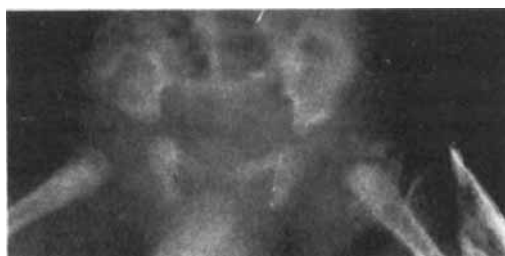
At the time the boy was taken out of the frame and traction discontinued the

*Fig. 1.**3 days after birth.*

Case 1: X-rays show a displacement of the shaft of the femur laterally and upwards, a picture similar to a dislocated hip.

*Fig. 2.**10 days after birth.*

Case 1: X-ray shows only some improvement in the position of the shaft of the femur. No callus or periosteal separation along the shaft can yet be seen.

*Fig. 3.**20 days after birth.*

Case 1: X-ray shows callus and periosteal separation along the femoral shaft.

**X-rays—Fig. 4—**show that remodelling processes have started. The position of the femur in relation to the acetabulum seems not to be very satisfactory, but on clinical examination there was no deformity and full active movements were all-ready restored.

Although we felt a traumatic dislocation of the hip joint had not taken place and the separation of the epiphysis had healed up with some angulation we tried



*Fig. 4.*

*6 weeks after birth.*

Case I: X-rays taken after traction was discontinued, full active movements restored and no clinical deformity was evident. Remodelling processes have started.



*Fig. 5.*

*4 months after birth.*

Case I: X-rays show advanced remodelling of the periosteal new bone and disappearance of the callus.



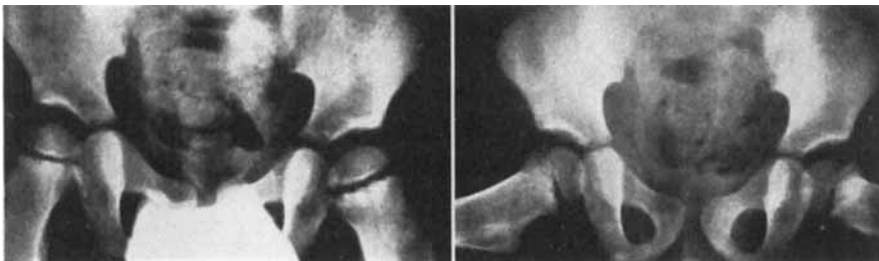
*Fig. 6.*

*7 months after birth.*

Case I: X-rays show a varus deformity and a backwards-open angulation of the grown neck of the femur. The ossification centres of the heads are now also visible.

to do an arthrogram, but failed. An arthrographia was later not attempted due to a throat infection.

Two months after birth the boy was sent home without any kind of bandaging. Two months later X-rays—Fig. 5—show advanced remodelling of the periosteal new bone and disappearance of the callus. The neck has grown in length with some varus

*Fig. 7.**4 years after birth.*

Case I: X-rays show some hypertrophy of the head, neck and shaft of the femur. The varus deformity of the neck has disappeared, only a somewhat reduced anteversion is present.

deformity, and a backwards-open angulation as seen in the Lauenstein projection. This deformity is even better shown on the next X-rays—Fig. 6—taken 7 months after birth. The ossification centres of the heads are now also visible.

The boy was last seen four years old. There is no limitation of hip movements, no limp. Leg lengths are equal—also on X-ray measurements. The last X-rays are shown on Fig. 7. A moderate broadening of the neck and a reduced anteversion are the only sequels after the primary angulation due to the epiphyseal separation.

At Allmänna Sjukhuset, Malmö, a very similar case has been seen<sup>1</sup>.

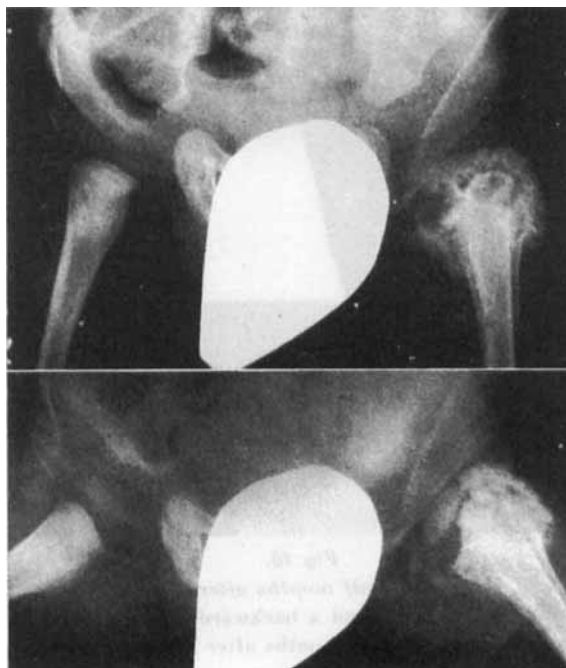
II: 1.12.1958 a full term baby girl was delivered at the obstetrical department by forceful extraction on the foot which together with the umbilical cord was present in the vulva. There was very feeble pulsation to be felt in the cord and quick delivery

*Fig. 8.**4 days after birth.*

Case II: Similar displacement as in Case I, Fig. 1.

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<sup>1</sup> I am grateful to Dr. Sophus von Rosen for the opportunity given me to report his case.



*Fig. 9.*

*5 and a half weeks after birth.*

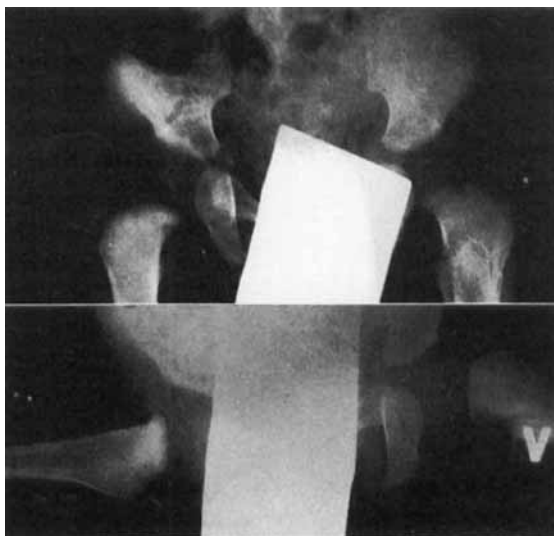
Case II: Callus and periosteal separation indicating repair of a separation of the epiphysis. Similar alterations as in Case I, Figs. 3 and 4, twenty days and seven weeks after birth.

was necessary.—Four days later a swelling of the left femur was observed; X-ray—Fig. 8—indicated “no sign of fracture”. No treatment was given.

The baby was sent to the orthopaedic department 9.1.1959 as the swelling had not subsided. Slight outwards rotation in left hip and a firm swelling around the trochanter were observed. It was felt that the hip was not dislocated and leg lengths were equal. X-ray—Fig. 9—five and a half weeks after birth indicated that a separation of the upper femoral epiphysis had taken place, due to callus formation around the upper end of the femur.

The girl was seen at the out patient clinic with regular intervals. To begin with some reduction in inward rotation of the left hip was noticed. The girl did not walk before one and a half year of age. At the last examination when she was 4 years of age no limitation of hip movement was demonstrable and leg lengths were equal.

X-rays were taken 3 and a half months after birth—Fig. 10—8 and a half months—Fig. 11—one and a half year—Fig. 12—and 4 years and two months after birth—Fig. 13. The radiographic series shows a remodelling process with broadening of the neck and metaphysis and a varus deformity with backwards-open angulation of the femoral neck similar to the development as in Case I.



*Fig. 10.*

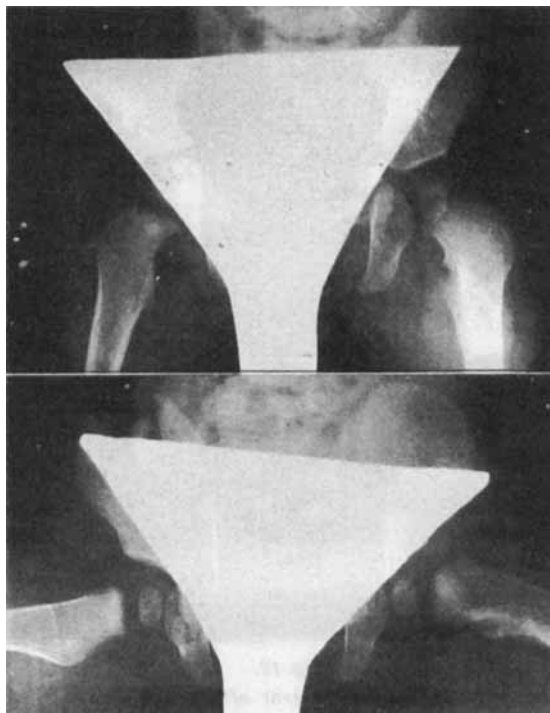
*3 and a half months after birth.*

Case II: Some deformity in varus and a backwards-open angulation as in Case I, Fig. 5, four months after birth.

The end result after four years, however, is only a minor deformity in varus; Lauenstein's projection has not been employed so it is not known whether the backwards angulation during growth has been reduced to a similar degree as in Case I.

#### DIAGNOSIS

We have been unable in the literature to find any report of a traumatic hip dislocation proved to be an obstetrical lesion. *Nathan* (1928) and *Puppel* (1930) have reported on a single case each, and believe they have proved that such a condition exists. However, their case histories and radiograms are similar to the above reported cases, and with no doubts their cases have been instances of traumatic separation of the upper femoral epiphysis. *Elizalde* (1946) has reported on two cases he believes are fracture dislocations due to obstetrical trauma. He realises that in his two cases there was a fracture or a separation of the epiphysis in the upper end of femur, but he is of the opinion that additional a dislocation of the hip had taken place. His illustrations and the course of the disease, however, does not prove that such was the case. Both children were treated by closed "reduction" of the hip and put in plaster in the so called Lorenz II position for 45 days.



*Fig. 11.*

*8 and a half months after birth.*

Case II: Same deformity, similar to Case I, Fig. 6, seven months after birth.

*Lorenz* in his monograph on congenital dislocation of the hip (1920) is of the opinion that a traumatic obstetrical hip dislocation does not exist as he had not seen a single one among his around 1,000 cases of congenital hip dislocations.

*Harrenstein* (1929) and *Michail, Theodorou, Houliaras & Siatis* (1958) believe, as we do that the above reported cases and a further series from the literature are not obstetrical traumatic hip dislocations. *Harrenstein* performed on two still born children experiments in order to produce a hip dislocation. In both instances a separation of the upper epiphysis was produced but no dislocation in the hip joints occurred.

It can be concluded that a traumatic hip dislocation during delivery has never been reported.—The diagnosis of a traumatic separation of the upper femoral epiphysis is based upon the history of delivery, *functio laesa*, clinical fracture signs related to the upper end of femur



*Fig. 12.*

*1 and a half year after birth.*

**Case II: Broadening of the neck and metaphysis with some varus-retroversion deformity.**



*Fig. 13.*

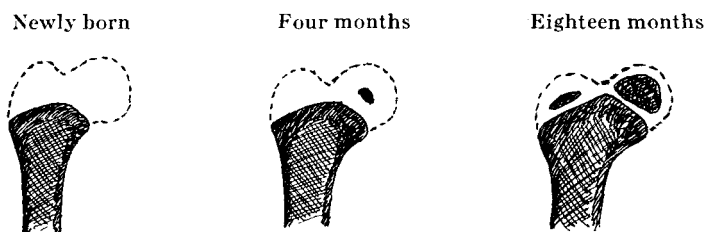
*4 years and 2 months after birth.*

**Case II: A slight varus deformity can still be seen with some broadening of the neck and metaphysis.**

contrasting with the X-rays which does not show any diaphyseal fracture but a dislocation lateral and upwards of the femoral shaft in relation to the acetabulum. Calcification in the haematoma, callus and periosteal separations are early confirmatory signs on the radiograms.

#### TREATMENT

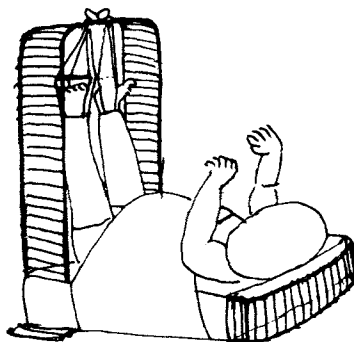
The cases reported in the literature have been treated on different lines. In some cases treatment has been like in our Case I: positioning in abduction with—or without—traction. In other cases traction has been established in vertical direction with the hip flexed. Early results have been more or less satisfactory in both groups. More than two years' observation has not been reported in the literature. The initial reduction of the fracture-separation in our case was not very good, and a varus deformity and a backwards-open angulation of the grown neck of the femur developed in a similar way as in Case II where no treatment was given. *Harrenstein's* experiments accordingly indicates that the separation between the upper epiphysis and the diaphysis of the femur in the new born is followed by a displacement of the epiphysis in a similar way as in adolescent coxa vara ("slipped epiphysis"). The "upper fragment" displaced, however, will be of different size according to the age. Fig. 14 indicates the position of the epiphyseal plate in the new born: distal to the trochanter major and proximal to the trochanter minor so that only the medial part of the neck in relation to the minor trochanter is ossified and in osseous connection with the diaphysis. During further growth trochanter major and the head of femur are separated from the collum by a joint epiphyseal plate. First around the age of two years isolated epiphyseal plates for the trochanter major and the head of the femur are established.



(After *Trueta, J. B. J. S.*, May 1957).

*Fig. 14.*

Position of the epiphyseal plates in the upper end of femur at different ages.

*Fig. 15.*

The conventional Gallow splint recommended for use also in traumatic obstetrical separation of the upper femoral epiphysis.

The displacement of the upper femoral epiphysis in the new born which includes almost the whole neck, the major trochanter and the head is backwards and medially as in adolescent coxa vara. The ordinary birth fracture in the upper part of the femoral shaft gives rise to a similar deformity, and it is therefore suggested that an obstetrical separation of the upper femoral epiphysis should be treated as treatment conventionally is for such a fracture. Fig. 15 indicates the conventional gallow splint for vertical extension. During the application of this perpendicular traction it is probably wise to try to reduce the backwards-open angulation by pulling or pressing backwards on the upper end of the femur. In contrast to ordinary obstetrical diaphyseal fractures perfect reduction around the epiphyseal plate is necessary to prevent permanent deformity. Some reduced anteversion of the neck of femur is still present four years after injury in the reported Case I (Fig. 7) and some varus in Case II (Fig. 13). We do not know whether a fairly early osteoarthritis of the hip is called for because of such slight deformities. Granted, the final outcome as to permanent deformity is not known, it is, nevertheless, the author's opinion that a treatment so easy to perform should be given.

#### INCIDENCE

Only around 40 cases in the literature we have seen can be assessed as traumatic obstetrical separation of the upper femoral epiphysis. In the textbooks (*Böhler, Watson-Jones, Blount*) the lesion is not specifically mentioned. In *Thyge Madsen's* report on fractures in the new

born (1955) the lesion has not been found among 800 fractures on 100,000 births. Based upon the literature *Thyge Madsen* reports that the lesion is rare, even more infrequent than the traumatic separation of the lower femoral epiphysis. One can presume that the lesion concerned very seldom is diagnosed, but it is questionable whether the lesion is so rare as the literature suggests. It is possible, perhaps even likely that a fracture-separation in the upper femoral epiphyseal plate sometimes is overlooked due to minor displacement and quick recovery of function. It is suggested that cases met with later in childhood of monolateral coxa vara with no gross structural alterations of the column or around the epiphyseal subcapital plate might have been of traumatic origin during birth.

#### SUMMARY

Two case histories of traumatic separation of the upper femoral epiphysis during delivery are given. Problems of diagnosis, treatment and incidence of the lesion are discussed.

#### RESUME

Il est donné l'histoire de deux cas de séparation traumatique de la partie supérieure de l'épiphyse fémorale durant la délivrance. Les problèmes du diagnostic, du traitement et de la fréquence de ces lésions sont discutés.

#### ZUSAMMENFASSUNG

Zwei Krankengeschichten von traumatischer Abtrennung der proximalen Femurepiphyse während der Geburt werden gebracht. Probleme der Diagnose, der Behandlung und des Vorkommens dieser Beschädigung werden besprochen.

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