

G. ODELBURG-JOHNSON, VEJBYSLÄTT:

DIFFERENT TYPES OF TUBERCULOSIS OF THE HIP IN CHILDREN

Tuberculous osteoarthritis in children attacks a soft, richly vascularized skeleton with relatively small articular surfaces which are lined in the joint cavity with a thick layer of articular cartilage, and separated from the diaphysis by the epiphyseal cartilage. The inflammatory process rapidly involves the soft bone, destroying large areas of it. Through damage to the epiphysis and epiphyseal cartilage the process causes disturbances in the further growth of the skeleton. Owing to these conditions, osteoarthritis in childhood is apt to produce relatively greater defects than a similar process in an adult in whom the skeleton has a firmer structure, besides being made up by larger parts. In children, on the other hand, the plasticity of the skeleton and its possibilities for additional growth at the undamaged epiphyseal lines give a capacity for adjustment and correction of deformities that is wanting in the adult skeleton.

Tuberculosis of the hip is clinically more variable in children than in adults. Sorrel differentiates between three stages in the development of tuberculous coxitis in children, and he characterizes their roentgenographic features as follows:

In the first stage, the initial stage of tuberculous coxitis, there is a loss of lime salts involving the entire hip region. The contours of the joint and the articular cartilages are preserved, Shenton's line is broken (?). Additional growth of the femur is disturbed, so that the shaft of the bone involved is narrower and its corticalis thinner than on the normal side.

The second stage usually appears during the second year of illness. The bony atrophy is more pronounced, the spongiose

structures of the joint components are blurred, and the bony contours of the joint show defects, ill-defined in outline. The femur is dislocated cranially and often subluxated laterally, the articular cartilage being destroyed. The disturbances in the growth of the shaft of the femur are still more pronounced.

The third stage does not appear at the earliest before the end of the second year of illness. Now roentgenography shows limitation of the process and beginning repair. The destroyed areas are sharply defined, partly with sclerotic borders. There is an increase in the lime content, the spongiose structures become more distinct and stronger, undergoing gradual changes and adjustment in keeping with the new conditions for carrying of weight.

The cases to be reported here are examples of the following different types of tuberculous coxitis: a) Coxitis with primary destruction of the acetabulum. b) Coxitis with primary luxation. c) Focus in the neck of the femur with perforation into the joint. d) Sequestration of the capital epiphysis.

a. Coxitis with Primary Destruction of the Acetabulum.

CASE 1. Girl, born 1925. No. 140/37.

Previously swelling of the inguinal lymph glands on the left side; histological examination of an extirpated gland showed the presence of tuberculosis.

In November 1933 the patient was admitted to the hospital (Crownprincess Victoria's Seashore Sanatorium, Barkåkra, Vejbyslätt) presenting a limp in the left hip with reduction of the mobility. She was treated with traction and fixation of the hip in plaster. On October 13, 1935, she was discharged, with only an insignificant reduction in the mobility of the left hip. (Inward rotation = 0° ; flexion to 100° ; otherwise free mobility.) No limp. The left leg was then 1 cm. longer than the right.

At Christmas 1936 the hip began to trouble her again. On readmission to the hospital in May 1937, the left hip was fixed in flexion and adduction, the left leg being 2 cm. longer than the right.

Roentgenography: 25/11—33: Diffuse atrophy; contours of the joint and articular cartilage preserved.

13/5—35 (Lauenstein position): The capital epiphysis of the left femur is lower and more flat than that of the right, its anterior contour being sharp, concave. The outline of the acetabulum is unbroken and sharply defined; articular cartilage preserved.

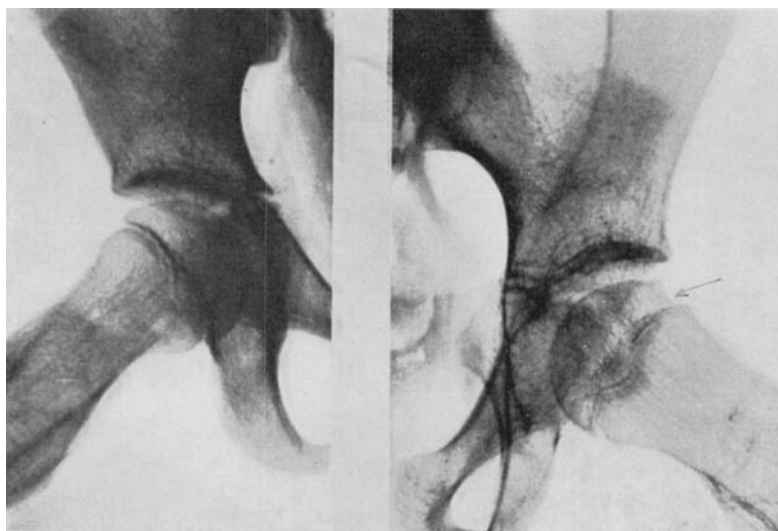


Fig. 1.

Case 1. Both hips in Lauenstein position of both hips: Left capital epiphysis lower than the right; its anterior contour is concave.

26/7—35: Left capital epiphysis appears irregular, but sharply outlined. The osseous structures are more pronounced. The trochanteric epiphysis is narrow and drawn out.

2/6—37: Destruction of the roof of the acetabulum; flattening of the capital epiphysis, which is pushed up into the area of acetabular destruction.

CASE 2. Girl, born 1930. No. 69/36.

Limp in the right hip since November 1933; admitted to this hospital in October 1934, when the right hip was kept in adduction.

Treatment with traction and fixation in plaster; subsequently leather brace.

Roentgenography: 30/10—34: Atrophy of the right hip. Articular contours and cartilage preserved. The shaft of the femur is narrow with thin corticalis.

17/12—35: Marked atrophy; moderate destruction of the



Fig. 2.

Case 2. Atrophy of the hip region and femur. The articular contours and cartilage are preserved. The shaft of the femur is narrow, with thin corticalis.

roof of the acetabulum without distinct borders; contour of the head of the femur frayed; femur pushed up into the area of acetabular destruction.

12/5—37: Extensive destruction of the acetabulum, with sclerotic borders. The head of the femur is preserved essentially, forced up into the area of acetabular destruction. The neck of the femur and the trochanter show roundish areas of lesser density in the structure of the spongiosa. The corticalis of the shaft of the femur is thick and sclerotic.

In August 1937 the patient is up, walking about with a leather bandage, free from symptoms. Fibrous ankylosis in good position.

b. Coxitis with Primary Luxation.

CASE 3. Boy, born 1931. No. 171/36.

From 1932 to 1934 the patient was hospitalized for luxating coxitis; reposition.

In September 1935 the patient was admitted to this hospital for tuberculosis of the left hip with extra-articular pseudarthrosis. Unbloody reposition was made tentatively, but it resulted in further absorption of bone from the acetabulum and the upper part of the femur and forming of a fistula. Finally, no weight could be put on the extremity.

On October 8, 1936: Resection and intratrochanteric osteo-



Fig. 3.

Case 3. Luxation of the hip with the head of the femur above the lateral margin of the acetabulum; at the site of contact, an area of bone destruction in the ilium.

tomy, with fixation of the shaft of the femur in the acetabulum. After this operation, the fistula has healed, and now the patient can put weight on the leg. In September 1937 he is walking about with a leather bandage, without any particular inconvenience. The hip is now kept in 10° abduction and 20° flexion, with a flexion mobility of about 15° .

Roentgenography: 7/5—32: Marked atrophy of the left hip with great swelling of the soft parts; no destruction of bone. Femur luxated, with the head above the lateral margin of the acetabulum.

18/6—32: Position unchanged; a little destruction of bone in the area of contact between the head and the ilium.

30/11—32: The capitular epiphysis has disappeared; no change in the destructive process in the acetabulum. Luxation.

28/10—36 (the patient is in plaster after the operation): The shaft of the femur is fixed in marked abduction in the excavated acetabulum.



Fig. 4.

Case 3. Upper part of the femur in broad contact with the lateral part of the acetabulum. Lime content good; bone structures well-defined.

Slight deposits of bone on the lateral surface of the femur.

25/8—37: Broad contact between the upper end of the femur and the lateral part of the new-formed acetabulum. The trochanteric fragment is fused to the upper end of the shaft. Lime content good; bony structures fairly clear. The bony contours are irregular but fairly well defined.

(The shaft of the femur has been displaced rather far to the side, probably by the psoas tendon. In similar cases, osteotomy of the lesser trochanter has prevented a lateral dislocation of the upper end of the femur.)

c. Focus in the Neck of the Femur with Perforation into the Joint.

CASE 4. Boy, born, 1934. No. 289/36.

In February 1936 a tuberculous focus was diagnosed in the neck of the left femur, and patient was admitted to this hospital. The left hip was swollen markedly, and the mobility reduced. Puncture of the hip-joint turned out negative. The patient was treated with traction and fixation in plaster.

Roentgenography: 10/2—36: Left hip showing marked bony atrophy, with swelling of the surrounding soft parts. Tuberculous focus (size of shell-almond) seen laterally in the neck of the femur. Capitular epiphysis preserved; lateral subluxation of the femur; thickening of the shaft of the femur through deposits of periosteal bone.

29/10—36: The head of the femur is deformed, and the articular cartilage is lowered. Laterally in the roof of the acetabulum, at its contact with the head of the femur, there is a destructive process, measuring about 1 cm. in depth.

(In November 1936, under anaesthesia: Careful correction of the subluxation.)

26/5—37: The flattened remnant of the capitular epiphysis is resting against the medial part of the roof of the acetabulum; at their area of contact there is a destructive process, measuring about 0.5 cm. in depth. Calcified abscesses are seen distally around the joint.

27/5—37: Two spondylitic foci are demonstrated, together with paravertebral abscess formation.

At this writing (October 1937) the patient is still in the hospital.

CASE 5. Boy, born 1925. No. 102/36.

Limp in the right hip since the autumn 1934.

In March 1935, when the patient was admitted to this hospital, he presented a very slight reduction in the mobility of the right hip. He was treated with traction and fixation in plaster. An abscess of the thigh was punctured.



Fig. 5.

Case 4. A remnant of the capital epiphysis is located in the medial part of the acetabulum, in contact with a superficial area of bone destruction in the acetabulum. In the lateral part of the roof of the acetabulum, where the head of the femur was located before, the ilium shows a deep area of destruction.

Roentgenography: 11/5—35: Bony atrophy of the right hip; articular contours and cartilage preserved. The medial corner of the neck of the femur shows a thinning of the bone with blurred borders.

4/6—36: The medial part of the neck of the femur presents a sharply defined and calcified focus. Large destructive process in the central part of the acetabulum, sharply defined, with excavation of the floor of the acetabulum towards the pelvis, probably with perforation. The head and the neck of the femur are preserved to a considerable extent; the upper end of the femur is displaced medially.

3/3—37: Well-defined destruction of the acetabulum. The remnant of the head of the femur is resting against the excavated bottom of the acetabulum. Lime content good; osseous structures clear.

The hip is clinically firm; and the patient returns home with a leather brace.

CASE 6. Girl, born 1930. No. 19/36.

In November 1932 she was admitted to another hospital, with a tuberculous focus in the neck of the left femur. In November 1933 she was admitted to this hospital with tuberculosis of the left hip. She was treated with traction and fixation in plaster, subsequently leather brace.

Roentgenography: 5/4—33: Fairly well-defined tuberculous focus medially in the neck of the left femur. Articular contours of the hip-joint intact; articular cartilage preserved.

10/11—33: Bony atrophy; blurring of the articular contours; lowering of the articular cartilage. Deposits of periosteal bone on the narrow shaft of the femur, the corticalis of which is very thin.

4/6—34: Considerable destruction proximally in the capital epiphysis; areas of destruction medially and laterally in the roof of the acetabulum.

29/10—36: Increase in lime content; structures more clearly defined. No change in the remnant of the head of the femur, which is resting against an area of denser bone located central-

ly in the roof of the acetabulum, limited by thinner areas. (Sequestrum in the roof of the acetabulum?) Otherwise the acetabular destruction is well-defined.

The patient was free from symptoms at her discharge from the hospital with fibrous ankylosis of the hip in a good position.



Fig. 6.

Case 6. A remnant of the head of the femur is in contact with an area of dense bone, located centrally in the roof of the acetabulum and surrounded by areas of rarified bone.

On reexamination, in October 1937, she is still free from symptoms, and there is no change in the state of her hip.

d. Sequestration of the Capital Epiphysis.

CASE 7. Girl, born 1925. No. 84/36.

In the summer 1933 she began to limp in her right hip, and she was treated in another hospital for "suspected Perthes' disease".

In December 1934 she was admitted to this hospital with a

pronounced reduction in the mobility of the right hip. Here she was treated with traction and fixation in plaster, subsequently leather brace.

Roentgenography: 5/4—34. Right hip: Contour of the head of the femur sharply defined; articular cartilage lowered. Outline of the acetabulum irregular, partly sclerotic.

23/11—34: Slight defect in the lateral contour of the head of the femur.



Fig. 7.

Case 7. Acetabular contours irregular; articular cartilage lowered. The head of the femur is more dense than the surrounding bone; its articular contour is sharply defined except for a blurred defect laterally.

9/1—35: Articular cartilage destroyed; atrophy of the acetabulum and of the neck of the femur; *the head of the femur is more dense than the surroundings*, and its articular contour sharply defined.

25/6—35: Very pronounced atrophy. Of the capital epiphysis

only a small sclerotic remnant is left. Extensive destruction of the acetabulum, with blurred borders.

11/3—37: Capital epiphysis completely disappeared. Femur pushed up into the acetabular destruction which is well-defined. Lime content good; osseous structures clear.

Clinically the hip is firm; and the patient is discharged with a leather brace.

In children tuberculosis of the hip joint is usually osteogenous. It may take a course with sequestration as well as with caries. Abscess and fistula formation are common complications. Usually there is but a slight tendency to production of new bone. In infants, however, deposits of periosteal bone are made sometimes on the shaft of the femur and in the trochanteric region in the early stages of the disease. The soft atrophic bone is subject to the effect of mechanical factors, the weight of the body in erect position as well as contracture of muscles during confinement to bed. The capital epiphysis will become compressed, flattened and deformed as in Case 1. In other cases the bone destruction is promoted and aggravated through pressure (Cases 3 and 4). Reduction in the longitudinal growth of the affected extremity is common in tuberculous coxitis; increased longitudinal growth as in Case 1 is a particularly uncommon phenomenon, according to Sinding-Larsen.

All treatment must be based upon the fact that tuberculous coxitis associated with bone destruction leads either to ankylosis or to pseudarthrosis. The ankylosis may be osseous or fibrous. An osseous ankylosis in good position gives good function, with only a very slight risk of relapse. Here I use the term "good position" in the following sense: Flexion, at least 15°, and not over 30°; middle rotation or outward rotation up to 20°; abduction varying between 5° and 15°, depending upon the extent of the bone destruction and the real shortening resulting herefrom.—A fibrous ankylosis implies a greater risk of relapse. The risk of a secondary change of position necessitates the employment of a fixation bandage for a considerable length of time.—An "intra-articular pseudarthrosis" with a greater or smaller remnant of the neck and

head of the femur articulating with an acetabulum enlarged through bone destruction will usually have a limited scope of mobility. There is always a risk of contracture with secondary displacement, and also a risk of relapse.

An "extra-articular pseudarthrosis" with the upper end of the femur dislocated outside the acetabulum, articulation against the posterior upper part of the ilium gives a very marked shortening. Insufficiency of the hip with positive Trendelenburg is most frequent. Relapses with discharging fistulas are frequent. Extra-articular pseudarthrosis develops especially after coxitis in early childhood with extensive bone destruction and, especially, after coxitis with primary luxation.

SUMMARY

The author reports seven cases of tuberculous coxitis in children, illustrating the following types of this disease.

- a) Coxitis with primary destruction of the acetabulum.
- b) Coxitis with primary luxation.
- c) Focus in the neck of the femur with perforation into the joint.
- d) Sequestration of the capital epiphysis.

The author points out that in the early stages of tuberculous coxitis, weight put on the extremities as well as muscular contracture may contribute to the deformity of the atrophic bony components of the joint and also to the development of bone destruction in adjacent parts of bones. It is pointed out, moreover, that "extra-articular pseudarthrosis" usually develops after coxitis in early childhood, and that this morbid condition often is the final stage of infantile coxitis with primary luxation.