

TIBIA VARA

(*Osteochondrosis deformans tibiae*)

By

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We have chosen to use the above terms, such as *Blount* (3) uses in his paper from 1937, in order to retain a common nomenclature. (*Renander* (16), *Lamur & Weissman* (9)).

In European literature we find as far back as 1924 many different names, several of them pointing to the etiology, for instance: *Genu varum* on the base of the defect in the tibial epiphysis with *exostosis cartilaginaria*, *epiphysitis tibiae*, *deformans* and *hemiatrophie congenitale de l'epiphyse tibiale superieure*. The most commonly used term in Scandinavia to day is probably *Blount's disease* or *Blount-Barber's syndrome*.

But the term *tibia vara* is not significant. It says nothing about the localisation of the bending, and therefore is too general. Curvation of the diaphysis has nothing to do in this connection. Neither excludes the termination rickets, *chondrodystrophical* conditions and results after *osteomyelitic* processes in the vicinity of the epiphysis. The term *osteochondrosis deformans tibiae* was first inaugurated by *Blount*, who also suggested that a more significant name would be *osteochondrotrophopati* as the nature of the disease probably is a disturbance of the growth of both cartilage and bone. The term *osteochondrosis* is used by *Howorth* (5) and by *Köhler* (8).

With regard to the frequency of the illness it must be emphasized that it is difficult to get exact figures, but outside orthopedic departments it may be seen now and then in clinics of general surgery. In the literature we have found a total of 75 cases, but in Norway alone the authors know that in orthopedic hospitals there are greater series which until now have not been studied and published.

In this country the illness has been discussed in The Norwegian Surgical Association after lectures by *Eivind Jensen*, *Magnus Dahle & Ivar Alvik* (6), and in The Norwegian Association of Medical Radiology by *Johs. Slørdahl* (19).

Osteochondrosis deformans tibiae is a disturbance of the growth of the medial part of the upper end of tibia, and involves epiphysis, epiphyseal cartilage and the surrounding part of the metaphysis. Similar changes in the normal growth have also been demonstrated in the lower end of femur and tibia.

Owing to this disturbance of growth the medial part of the epiphysis does not develop as it should, but becomes more or less wedge-shaped. The structure of the bone appears to be normal. Some authors suggest that similar changes occur in the epiphyseal bone as those seen in coxa plana, but for this we do not find any support evidence, neither in our own series nor in other series, which we have had the opportunity to see, and in the major part of the literature we have found no suggestions in this direction.

The epiphyseal line seems to be normal in the lateral part, corresponding to the normal part of the epiphyseal line but medially it is as a rule broader and more irregular. The metaphysis exhibits a more or less pronounced beak-like prominence medially. The metaphyseal bone shows an irregular structure not infrequently with small cartilage islands in it and with small osseous islands near the surface,—more or less marked.

Microscopic studies by Blount and later by *Langenskiöld* (10) reveal that the most characteristic in the epiphyseal line and the prominent part of the metaphysis are islands of cartilage cells, which show a stronger tendency for growth than the topography should demand. The assemblages of cartilage cells are irregular in distribution, not columnar. In some places one finds cartilage with very few cells, but with great calcium deposits, while other places are characterised by softening and invasion of granulation tissue.

It seems to be a fact that the illness is more frequent in girls than in boys, and very often it is found that the children are fat and overweight.

SHORT CASUISTIC

Case no. 1. Girl, seven years. Father had bow legs as a boy, but not as adult. X-ray control showed no sign of osteochondrosis tibiae. A cousin had tibia vara (our case no. 2). No pathological history in the pregnancy, the child was normally nour-

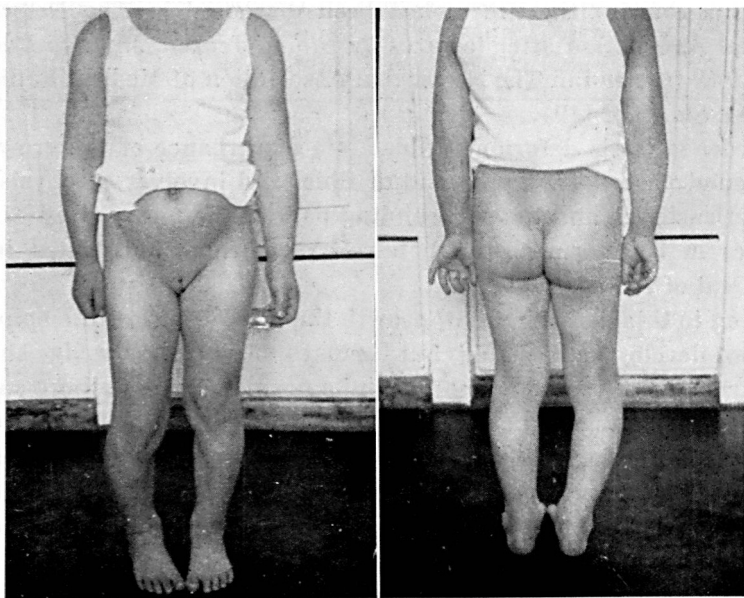


Fig. 1.

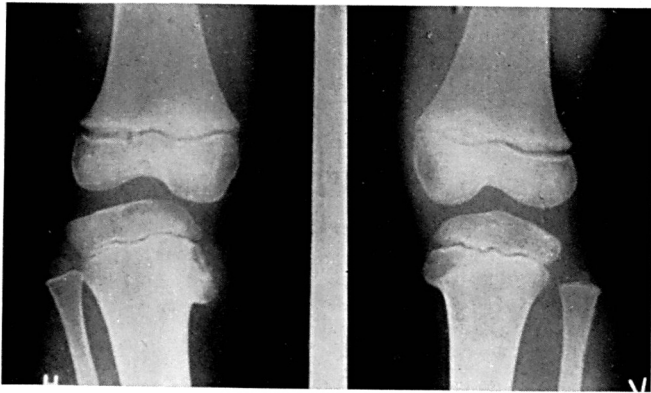
ished both in the lactation period and later. Cod liver oil from 2 years old. General investigation: No pathological signs.

As the child started walking, it showed increasing bow leg deformation, especially on the right side. During the last months before the consultation it had complained of pains in the region of the right knee. The parents themselves had found some prominence on the medial side of the knee, just below the joint. The examination revealed typical bow legs, with marked varus position of the right tibia—the bowing chiefly in the epi- and metaphysis—and the medial condyle of tibia prominent. Fig. 1.

X-ray examination both knees (25.III.1955): The medial part of the epiphysis of tibia is showing like the rest a normal structure of the bone, but is less developed and wedge-shaped, so that there is a marked varus position, which is further strengthened by a varus-deformation in the metaphysis. The epiphyseal line is ended too nearly medially. The metaphysis carries a spur, directed medially and downwards, and its upper, medial surface is irregularly outlined. In the soft tissues above this surface small, osseous bodies can be seen which seem to be incorporated in the cartilage. The changes are symmetrical, but strongest on the right side.

Diagnosis: "Blount's Disease" (Fig. 2).

The patient was admitted into the Country Hospital of Gjøvik, surgical department, 23.V.1955. No signs of rickets. Ca in blood 10.3 mg. per cent, phosphorus 3.3 mg. per cent, Pirquet negative. Arthrography, 24.V.1955 on the right knee. This investigation, which the authors have not been able to find described before, showed a most astonishing fact, which will be discussed later (Fig. 3).

*Fig. 2.**Fig. 3.*

The joint line sloped in its medial third steeply downwards, the cartilage as the osseous part of the epiphysis not being developed here. The contrast fluid followed the slant medially to the niveau of the epiphyseal line. Still further the meniscus medially was bigger than usual compared with the lateral meniscus.

In doubt a corrective osteotomy was performed on the right side, the 6.VI.1955, on the tibia and fibula.

After several investigations following the dismissal from the hospital it was stated on the 7.I.1956 that the patient had exactly the same deformity as before the



Fig. 4.



Fig. 5.

operation. New control 26.IV.1956: The calf of the right side moved more in the varus direction than before the operation. It was now found necessary to counter-influence the varus-movement by a plaster of Paris cast, and up till the present time the patient is wearing this.

Case no. 2. Girl, 5 years old, cousin of case no. 1. All was normal in pregnancy and the first year, from then on she became over-weight, and as she started walking, showed an increasing varus deformity of both calves. This lasted for four years, and then successively waned. X-ray-investigation in 1948 showed a typical Blount's disease (Fig. 4).

The patient had no treatment, and X-ray-checks, 2.VI.1955, showed considerable decline of the varus deformity. The epiphyseal lines closed, medial parts of epiphyses were fully developed, with a slight varus position in the metaphyses (Fig. 5).



Fig. 6.

Case no. 3. Boy, 8 years old, no. 2 of three children. An older sister was said to have been over-weight and to have had bow-legs, but to be normal after 2 years. The boy himself showed bow legs, which were increasing, as he started walking at the normal time. X-ray investigation 9.VIII.1951 (three years old): "The distal metaphysis of femur, and the upper metaphysis of tibia are on both sides bowed somewhat in medial direction, causing pronounced varus deformity at the knee regions. Both the lower epiphysis of femur and the upper in tibia are less developed in their medial half than in their lateral, and the medial parts of the corresponding metaphyses are formed as beaklike prominences. No signs of rickets" (Fig. 6).

A year later the varus deformity had successively waned. New X-ray investigation, 4.VII.1955, showed normal picture of the bone.

DISCUSSION

The question of the etiology has not yet been answered satisfactorily. Howorth & collaborators and *Caffey* (4) describe it together with vascular diseases of bone. This thought is not new. In 1929 *Nilsson* (15) mentions that it has a certain resemblance with the alterations found in coxa plana, but that the illness is of the same nature as this, he will not say. *Rall* (17) declares in 1934 the same. Blount says that his compatriot *S. L. McCurdy* (14) in Pittsburgh described a typical case of tibia vara, which he named Perthes illness in the knee-joint. Blount says further that one perhaps may presuppose the etiology to be a low virulent infection, such as several authors have thought to be the cause of coxa plana, but he adds that to put tibia vara in the same chapter as Calvé-Legg-Perthes illness does not solve the etiological problem, as the etiology of this disease is not known. *Barber* (1, 2) too, mentions the resemblance with coxa plana.

The authors on the contrary urge that there are further essential differences between coxa plana and tibia vara, and that these are so substantial, that it is possible to exclude a common etiology from the roentgenograms.

In the tibia we have not seen structural alterations in the developed part of the epiphysis and as far as we know, these have never been described in the literature, nor that the above comes to compression and deformation as in coxa plana. In tibia vara spontaneous healing very often occurs even in severe cases (cf. our cases nos. 2 and 3), but in coxa plana this very seldom occurs if there has been a demonstrable deformation.

Still further coxa plana develops in an epiphysis which is normal, but in tibia vara there is a retardation of growth in the medial part of the epiphysis from the beginning.

Valentin (21) mentions in 1922 a case where a low-virulent infection (Pirquet $\div$ and WR $\div$) caused a varus deformity in the upper epiphysis of the tibia, and further that *Kirmisson, Wilms & Bailleul* (7) proposed that infection in the upper epiphysis of the tibia often caused bending in a varus or valgus-direction. We all know that this is not uncommon.

Lülsdorf (12) characterized the disease in 1931 as an epiphysitis, depending on a low-virulent infection, where tuberculosis and lues in his series could be excluded, but in the treatment he seemed to regard it as a disturbance of growth.

In 1931 *Rocher & Rondie* (18) report that there seems to be no inflammatory cause, but a disturbance of growth of the same nature as that in luxatio coxae congenita.

In the opinion of the authors there seem to be no usual signs of an inflammation as etiology, but *Langenskiöld* and before him *Blount* have in biopsies from the epiphyseal cartilage and from the beaklike prominence of the epiphysis found growth of granulation tissues, rich on capillaries. But this may perhaps as well be taken as a sign of regeneration rather than infection, and it seems to be obvious that the two investigators have explained this picture in the direction of regeneration.

Mau (13) assumed in 1924 that the varus position was caused by a cartilaginous exostosis. We cannot desist from citing a part of his X-ray description "... On the contrary the roentgenogram shows a complete absence of the medial condyle of the tibia. Immediately after eminentia intercondyloidea the outlines of the epiphysis fall steeply to the epiphyseal line. From this point is found an irregular osseous prominence pointing downwards, and is only to be taken as a cartilaginous exostosis. The epiphyseal line is not broader than usual, but irregularly wave-contoured" (Fig. 7).

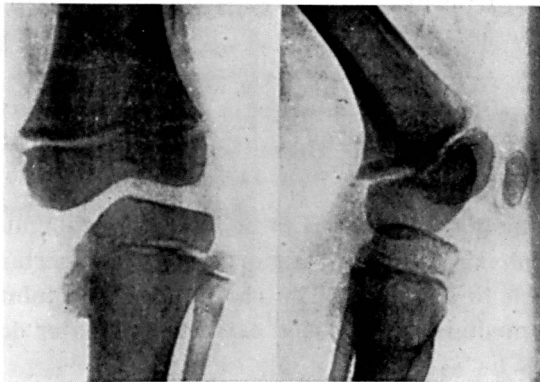


Fig. 7.

Barber mentions that changes are occasionally found in the lower epiphysis of femur similar to those in the upper tibia epiphysis.

Thrap-Meyer (20) has in a note to the authors founded on his relatively big series of cases declared:

"That the same pathological anatomical process often occurs in the lower epiphysis of femur and (less frequent) in the lower epiphysis of tibia do I mean I have seen several times."

Likewise that a broader zone of growth may not seldom be seen medially in the distal femur epiphysis with strong varus-deformations in the upper epiphysis of tibia and/or metaphysis".

Case 3 shows changes as mentioned above.

As stated before the arthrography showed considerable disagreement with the illustration by Blount, which is to be seen in several papers on the subject (Fig. 8).

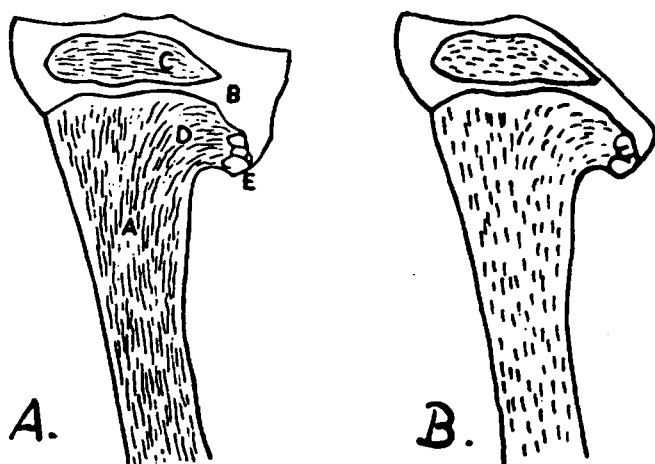


Fig. 8.

A after Blount, B after our arthrography.

After this drawing there ought to be normal cartilaginous preformation of the epiphysis, but after our arthrography (certainly only one) there is no such to be found. The cartilage of the joint slants fairly parallel to the medial wedgeformed ossification center downwards and medially.

This circumstance seems in our opinion to be very important for the selection of conservative or surgical treatment. It may hardly be of any purpose to perform a corrective osteotomy when this cartilage is lacking. Our case no. 1 was operated on and showed ideal position as long as the right limb did not bear weight, but as she got up the varus-deformity immediately returned. We believe we can recommend that an arthrography of the knee should be performed before it is

decided if one should operate or not, *and that there should be no operation when a cartilaginous medial condyle is lacking.*

Further we believe that a conventional arthrography should be of great interest in clarifying the pathology morphologically. Should this investigation, performed on several cases, show that the disease is mostly characterized by the lack of the cartilaginous medial condyle, the consequence ought to be that the treatment goes the more conservative way. The authors have the impression that the therapy is becoming more and more conservative primarily (*Leonard & Cohen*) (11).

Until the progress of the disease has stopped, we believe that it is right to wait and observe the case, increasing correction of deformity by splint or plaster cast.

Several authors have made a distinction between an infant and an adolescent form. The latter is supposed to start in 5-6 year age group.

Our cases all represent the infant form, and it may be questioned if there is any reason for this distinction. In both forms the skeleton is growing, and there seems to be no roentgenological difference.

SUMMARY

The authors call attention to tibia vara or osteochondrosis deformans tibiae as being a not uncommon disease, and discuss the terminology and etiology. After a very short casuistic, they describe an arthrography and a rather important result of this. They propose to perform arthrography to determine whether surgical or conservative treatment should be given, and recommend this procedure for clarifying the anatomical changes and morphology.

RESUME

Les auteurs attirent l'attention sur le tibia vara ou ostéochondrose déformante tibiale comme n'étant pas une maladie très rare. Ils en discutent la terminologie et l'étiologie. Après une casuistique très succincte, ils décrivent une arthrographie qui a donné un assez bon résultat. Ils proposent de pratiquer l'arthrographie pour établir s'il convient d'appliquer un traitement chirurgical ou conservateur et recommandent ce procédé pour élucider les altérations anatomiques et la morphologie.

ZUSAMMENFASSUNG

Die Verfasser weisen auf tibia vara oder osteochondrosis deformans tibiae hin, eine Erkrankung, die nicht selten beobachtet wird, und besprechen ihre Terminologie und Ätiologie. Nach einer sehr kurzen kasuistischen Mitteilung, beschreiben sie eine Arthrographie, die vorgenommen wurde und ein wichtiges Ergebnis derselben. Sie schlagen die Untersuchung mittels Arthrographie vor, um zu entscheiden ob man bei der Behandlung chirurgisch oder konservativ vorgehen soll und empfehlen Arthrographie zur Aufklärung der anatomischen Veränderungen und der Morphologie.

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