

VON ROSEN, SOPHUS:

SOME CASES OF CONGENITAL TIBIAL
PSEUDARTHROSIS

The congenital tibial pseudarthrosis or tibial curvature is certainly not a common deformity, but it is encountered now and then in orthopedic practice. In the infancy of the patient the parents discover that one of his legs has grown crooked and lags more or less in its development. Roentgenography shows sclerosis of the bone at the site of the tibial bend with a more or less deep notch in the shaft of the bone or in established pseudoarthrosis with a more or less extensive defect in the osseous substance. The fibula is whole and relatively straight, or it may also be the site of a similar curvature or defect.

The congenital tibial curvature and pseudarthrosis are different forms of the same malformation, which is taken to depend on the developmental disturbances. In cases of congenital tibial curvature it happens not infrequently that the fragile sclerotic bone breaks; a pseudarthrosis will then develop at the site of the fracture. The same takes place if the bone is broken on purpose, in order to effectuate a correction of the deformity.

Haglund therefore advises emphatically against such attempts of correction, and other orthopedists have likewise had sad experiences with this measure.

The treatment of congenital tibial pseudarthrosis is connected with extraordinarily great difficulties if the treatment is to result in stabilization of the pseudarthrosis through osseous healing. This holds true whether the pseudarthrosis really is congenital or whether it originates from a fracture of a congenital tibial curvature. Different operations for the pseudarthrosis have been tried, and generally the results have been

equally discouraging. Haglund goes so far as to say that "the cases in which recovery is recorded after osteoplasty are extremely uncertain". In his treatment of such cases he therefore employs a supporting bandage because with this form of treatment, in the course of time the pseudarthrosis may develop into a fairly stable synesmosis, enabling the leg to function as a "support".

No doubt the bandaging therapy may in some cases lead to a fairly satisfactory functional result, but in many cases this does not hold true. This applies to very angular curvatures and pseudarthroses, besides the cases in which the leg is lagging in development and hence is considerably shortened. In cases of marked angularity most orthopedists will feel greatly inclined at least to make an attempt at operative treatment by means of osteoclasis or osteotomy in order to effectuate a correction of the deformity, even though they realize the difficulties in obtaining a healing of the bone. In cases where the leg is greatly shortened, I think, it is quite obvious that a relatively early amputation leads to the best functional result, and that this method of treatment, therefore, is the most preferable.

At the meeting of the Scandinavian Orthopedic Association in Gothenburg 1938 Stenport gave an account of 7 cases of congenital tibial pseudarthrosis treated in the Orthopedic Clinics in Stockholm and Hälsingborg since 1918. In 6 of these cases operative treatment after various methods had been applied once or more times, resulting in osseous healing only in one case. This one patient had been operated on by Stenport with insertion of a bone bridge consisting of tibial corticalis, os purum, os novum and periosteum. Nine months had passed since the operation, and the pseudarthrosis was fully consolidated. In the following discussion, Langenskiöld recommended in cases of pseudarthrosis involving the tibia alone to implant the upper part of the fibula into the proximal fragment of the tibia ad modum Holm. Silfverskiöld has reported a case in which he performed osteotomy below the pseudarthrosis with correction of the deformity, when weight was then placed on the leg it

pressed the ends of the pseudarthrosis against each other, resulting in consolidation of the pseudarthrosis.

My own experiences with congenital pseudarthrosis are based on four cases. In all these cases the pseudarthrosis developed post partum, after correction of a congenital curvature. So it really would have been more correct to entitle my paper "Some Cases of Congenital Tibial Curvature".

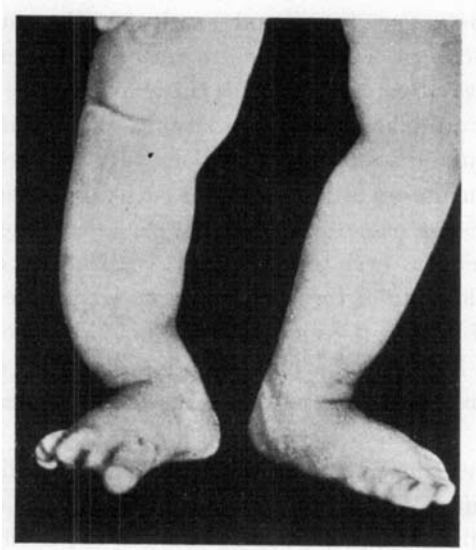


Fig. 1.

Case 1.

This patient is a boy, born 1931. When he was a few months old his mother noticed that his right leg was crooked. She took the boy to the Kristansstad County Hospital where I had occasion to treat him. He presented a curvature of the right leg which I corrected by means of osteoclasis. The fracture failed to heal. The leg was kept in plaster until the boy was 18 months old. He was then referred to the Orthopedic Clinic in Hälsingborg, to be provided with a supporting bandage. When the boy was 3 years old an attempt was made in the Orthopedic Clinic to make the pseudarthrosis heal by trimming of the fragments.

(The case of this boy is Case 6 in Stenport's report of 1938.) But the pseudarthrosis failed to heal. In 1939 amputation was performed at the site of the pseudarthrosis because the leg was lagging considerably in development and showed a shortening of 10 cm.

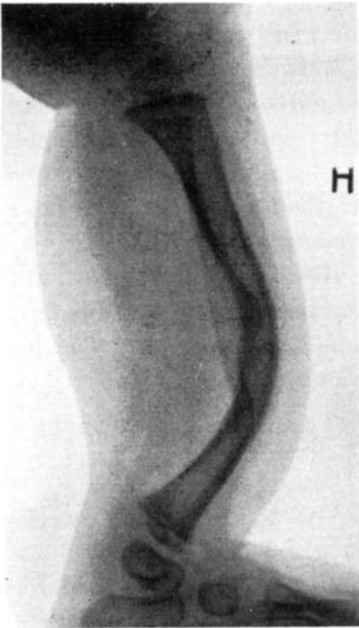


Fig. 2.

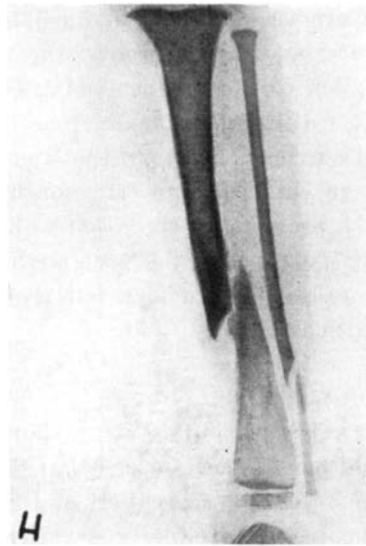


Fig. 3.

Case 2.

This patient is a boy, born 1930. At birth his right leg noticed to be crooked. When he was one year old the parents brought him to the Orthopedic Clinic in Härnösand. The right leg then presented a marked bend, with the convexity pointing forwards (Fig. 1). Roentgenography showed curvature of the fibula as well as the tibia with typical sclerosis of the osseous substance (Fig. 2). Sjögren, the chief surgeon of the clinic, performed osteoclasty. The deformity was corrected but a pseudarthrosis developed (Fig. 3). When the boy was two years old Sjögren

tried to obtain healing by trimming and drilling of the pseudarthrosis ends. But the pseudarthrosis failed to heal. When the boy was $3\frac{1}{2}$ years old, I operated on him. The left leg was then 6—7 cm. shorter than the right. In order to obtain a good fixation of the bone fragments and keep the leg extended I constructed a special extension apparatus by means of two extensible metal rods, fastened distally by means of a nail through the calcaneus, proximally by means of a nail through the femoral metaphysis. After the pseudarthrosis ends were fixed in this way, a groove was made in them, and two narrow bone bridges were inserted in this groove, the material from these bridges being taken from the other tibia. The entire extension apparatus was then encased in plaster together with the leg. Two months later the extension apparatus was removed, whereafter the leg was kept in plaster for 10 months and afterwards in bandage, yet the pseudarthrosis failed to heal. The last time I saw this boy, $1\frac{1}{2}$ years ago, the pseudarthrosis had not healed yet. The leg was 8 cm. too short, but the boy was able to walk fairly well with bandage.

Case 3.

This patient is a girl, born 1929. When she was two weeks old her mother noticed that the left leg was crooked. At the age of 3 years a correction of the deformity was performed in the local hospital. One year later the parents brought the patient to the Orthopedic Clinic in Härnösand. The leg was then still in plaster. Roentgenography showed pseudarthrosis of the tibia with a diastasis of a few millimeters (Fig. 4). The patient was provided with a leather bandage. When the girl was $5\frac{1}{2}$ years old I operated on her. Two bone bridges, taken from the other tibia, were inserted in a groove chiselled through the pseudarthrosis, whereafter the leg was kept in plaster for 10 months. Four months after the operation the leg appeared to be firmly straight, but subsequently it again commenced to fail. After this the girl was given a leather bandage which she used till she was 8 years old. Then I operated on her again in the same way as before, and this time with better progress. The leg was kept in

plaster for 3 months; then in leather bandage for one year. The last time I saw this girl, two years after the operation, the pseudarthrosis appeared to have healed firmly. The leg was only 2 cm. shorter than the good one (Fig. 6).

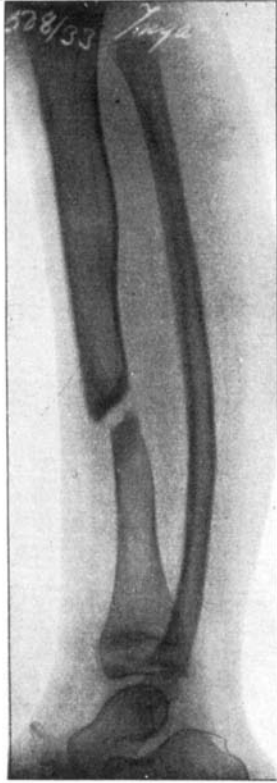


Fig. 4.

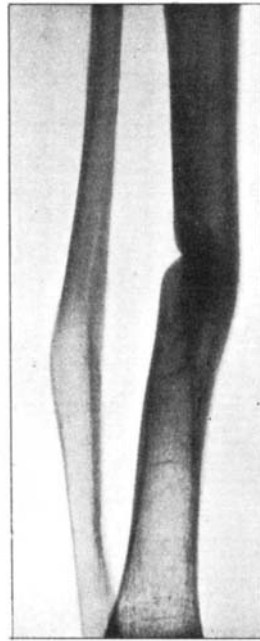


Fig. 5.

Case 4.

This patient is a woman, born in 1917. In early childhood her right leg was noticeably crooked. At the age of 6—7 years her parents consulted an orthopedist (Professor Waldenström) who advised against operative treatment. In 1934, when the girl was 17 years old, the deformity was corrected by Silfverschiöld; the result was a pseudarthrosis. In June 1940 the patient con-

sulted me. About three fingers' breadth above the ankle-joint the right leg presented a bent, with the concavity anteriorly. At this site there was distinct mobility in the sagittal plane as well as the frontal; and the leg was shortened 5 cm. Roentgeno-

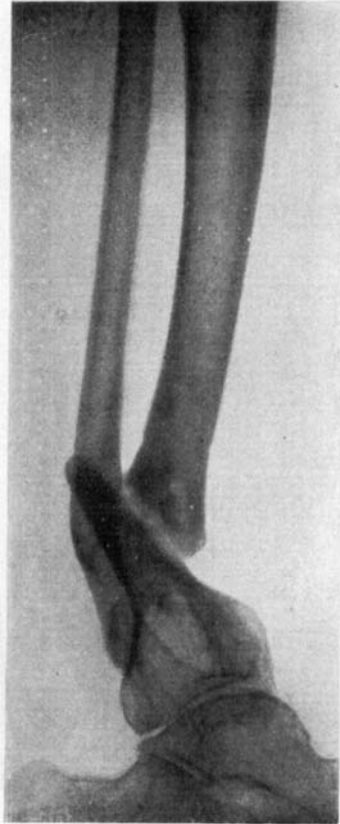


Fig. 6.

graphy showed a pseudarthrosis with sclerotic fragments (Fig. 7). Probably on account of my experiences in the preceding case (Case 3), I recommended a new attempt to get the pseudarthrosis consolidated. On 29/6/1940 I operated on the patient with the same technique as employed in the preceding case—insertion of bony bridges taken from the other tibia in a furrow chiselled

through the pseudarthrosis. The leg was then kept in plaster for 6 months, since then, in leather bandage. In 1940 the pseudarthrosis appeared to have healed firmly, and this was also the case on recent reexamination. Roentgenography shows a fairly

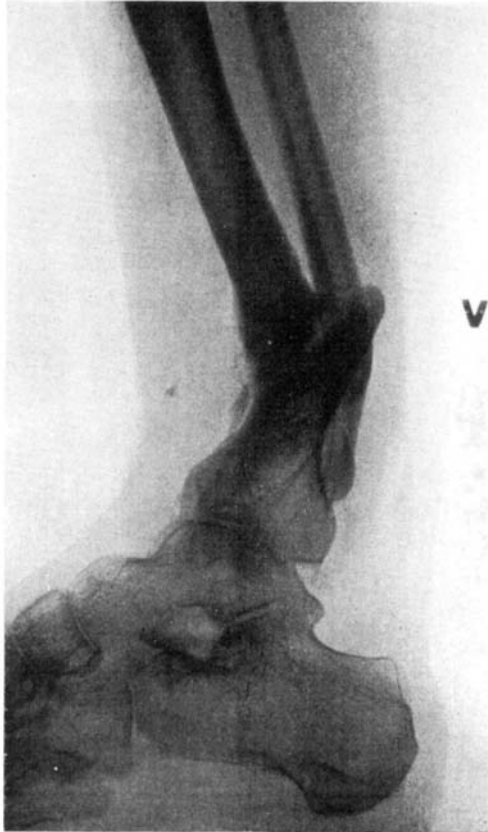


Fig. 7.

strong new-formation of bone in the neighborhood of the pseudarthrosis, even though no bridging callus formation can be made out with certainty (Figs. 8 and 9). In my opinion, however, it may be taken for granted that the pseudarthrosis has healed for this reason: the patient states herself that her leg now al-

ways feels solid, and in the roentgenograms it can be ascertained that the bone above and below the site of the pseudarthrosis has now assumed the structure of normal bone. The marked atrophy and spottedness seen previously have now disappeared. This

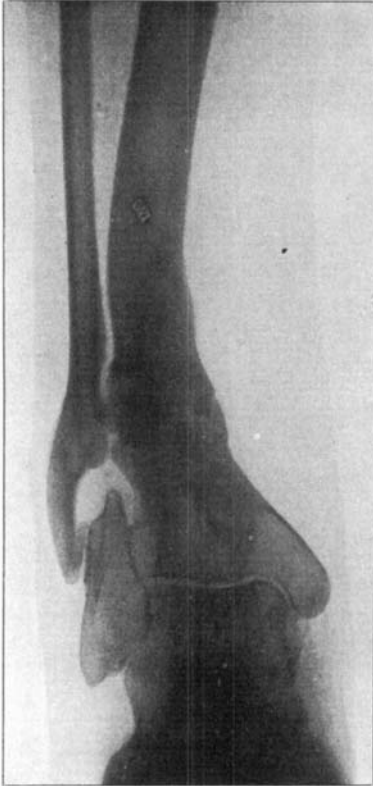


Fig. 8.



Fig. 9.

summer the patient has been bathing a good deal and thus walked about without a bandage the greater part of the day. Naturally, the sclerotic end of the shaft of the bone is exposed to great strain, and I am considering, therefore, the advisability of performing an osteotomy below the sclerotic area, in order to correct the deformity and thus make the weight of the body fall more straight through the entire long axis of the bone.

The cases reported here fully confirm the experience that osteoclasts or osteotomy on a congenital tibial curvature generally lead to a refractory pseudarthrosis. These cases show, however, that such a pseudarthrosis also can be made to heal. In these operations I have modified and employed the procedure and sometimes the result has not been a consolidation of the bone, while in other cases a firm stability of the leg has been obtained. This appears to indicate that the operative technique is not the only decisive factor. Other factors play, at any rate, some role in the outcome. Naturally the question suggests itself whether the point of time for the operation might not be of some significance to the result. It seems not improbable that it will be preferable to perform the operation in a period when the child is growing strongly, as the factors which influence and promote the growth may quite conceivably have a favorable influence on the osseous consolidation. This may perhaps have been the underlying favorable condition in my Case 3, in which the strong new-formation of bone was established soon after the girl was operated on for the second time, at the age of 8 years. That endocrine factors may have played some role in Case 4 may perhaps be assumed in view of the circumstance that the patient sought treatment for her defect mostly because she recently had become engaged.

Through the kindness of the former and present chiefs of the Orthopedic Clinic in Lund, Drs. Frising and Friberg, I am able to report an additional case of congenital tibial pseudarthrosis which further corroborates the view that it is important to choose a suitable point of time for the operative treatment of pseudarthrosis.

Case 5.

The patient is a young woman, born in 1918. When she was 7 months old her parents noticed that her right leg was crooked. She was brought to the Surgical Clinic in Lund, where roentgenography showed, immediately below the middle of the tibia "a transverse defect in the bone, 7—8 mm. in width, with fairly sharply defined, although irregular, edges, with distinct deform-

ing deposits...". After correction of the deformity the leg was placed in plaster (Fig. 10). Later, at the age of 1½ years, she was admitted to the Orthopedic Clinic, where the pseudarthrosis was treated operatively by Frising. The bone fragments

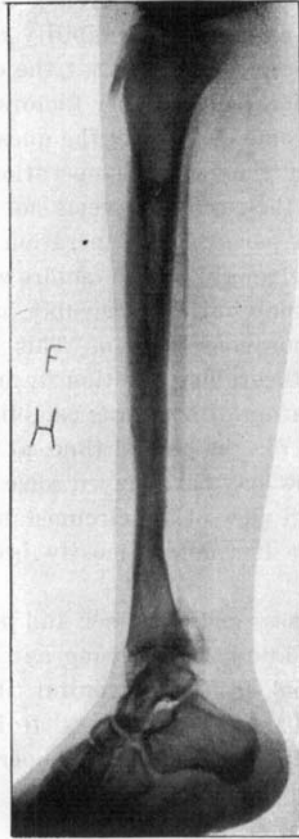


Fig. 10.

were trimmed and impacted wedge-like; in addition they were fixed by means of a silver wire. The pseudarthrosis did not heal. At the age of 5 years the girl was operated on again, this time with drilling of the fragments, into the medullary cavity and implantation of a wedge of bone taken from the fibula on the

other side. The transplant took hold by healing in both tibial fragments, but pseudarthrosis developed nevertheless in the transplant. At the age of 6½ she was operated on for the third time by Frising. This time the juncture for the operation was chosen with a view to the circumstance that the girl then had entered a period of marked growth. A bridge of tibia was wedged into the distal fragment and placed subperiosteally on the outside of the proximal fragment where it was fixed with catgut. After 5 months the pseudarthrosis was found to have consolidated. And it has remained firm since.