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PES PLANO-VALGUS STATICUS JUVENILIS AND ITS OPERATIVE TREATMENT

By

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Pes plano-valgus staticus juvenilis designates the growing foot that shows the typical distortions when loaded but is of normal clinical and roentgenological appearance when unloaded—at least in the early stage of the condition.

It is the commonest type of pes plano-valgus and the commonest deformity of the foot. Owing to this frequency of the disease and the secondary pathological changes occurring later in life, the condition often represents a considerable medical and social problem.

The primary cause of the deformity is still obscure. Most authors believe it to be a disproportion between the strength of the muscles and ligaments of the feet and the weight to be carried (*Bardenheuer* 1910, *Brinkmann* 1939, *Milch* 1942). Since the condition is so common, some authors believe it might be due to constitutional weakness of these structures (*Miller* 1927, *Hohmann* 1951 and others). This line of thought is supported by the familial occurrence of the disease, which was also seen in the present material (*vide infra*).

Niederecker (1950, 1959) stressed the rôle of muscle anomalies in the causation of the condition and discusses a statically unfavourable insertion of the musc. tibialis anterior and musc. peroneus tertius as well as the occurrence of a musc. peroneus quartus. Other authors, such as *Hoke* (1931), suggest the possibility of muscle incoordination as an etiological factor. *Timmer* (1924), *Erlacher* (1942) believe the cause to be a congenital pes calcaneo-valgus. *Wetzenstein* (1960) expresses a similar line of thought. *Böhm* (1930) suggests inhibition of the normal development of the ankle joint, *Harris & Beath* (1948) speak of congenital anomaly of talus and calcaneus while *Stracker* (1953) believes neurogenic factors to be responsible. *Kidner* (1929)

pointed out that prehallux may play a rôle in this connection. *Priester* (1958) suggests endocrine disorders.—Opinions on the primary cause of the condition thus vary widely, but fall largely within 2 main groups namely, a constitutional weakness of the ligaments and muscles and secondly a congenital developmental disorder.

The divergence of opinions of the cause of the disease has resulted in difference of opinion concerning adequate treatment. Most cases respond to conservative treatment during childhood and adolescence. *Schäffer* (1951), *Hackenbroch* (1961) even believe that in some cases the foot becomes normal even without treatment. Many cases are treated with foot supports and exercise of the foot muscles. Some authors claim that the use of a support is nonphysiological and recommend foot exercises only (*Nordenfelt* 1942).

In some cases, however, the condition is refractory to even prolonged conservative treatment. It is in these cases that surgery may be considered. It is true that some authors are reluctant to operate upon the growing static plano-valgus foot. It is, however, known that this abnormal loading of the foot with pathological displacement of the foot bones will, if untreated, result in structural changes of the skeleton and soft tissues with fixation of the distortion and increasing symptoms. Various authors therefore believe operation to be indicated in cases not responsive to long conservative treatment (*Hohmann* 1931, 1951, *Lange* 1951, *Erlacher* 1955, *Niederecker* 1959, *Hackenbroch* 1961 and others). Most of these operations are to be regarded as prophylactic and performed in order to facilitate further normal development of the foot. The primary indication for operation of these feet is never cosmetic.

The operations for pes plano-valgus staticus juvenilis fall into 3 groups, namely, 1) intervention on the ligaments, 2) on the tendons, 3) on the bones. Even combinations of all 3 types have been described.

Of the first group, mention might be made of *Hohmann*'s (1931) method with reinforcement of ligaments on the medial side of the tarsus, a similar operation is recommended by *Milch* (1942).

The purpose of the operations on the tendons is mainly to strengthen the supinating components of the foot in relation to the pronating and to raise the medial longitudinal arch. *Gocht* (1905) medialized the insertion of the Achilles tendon, *Hübscher* (1910) shortened the flexor hallucis longus tendon to which he sewed part of the tibialis posterior tendon. A widely used tendon operation is transposition of the insertion of the tibialis anterior tendon to os naviculare, an operation first

described by *Müller* (1903) and since by *Young* (1939), *Dinklage* (1950), *Schäffer* (1951), *Breitenfelder* (1953) and others. *Niederecker* (1932, 1959) and *Penners* (1959) transposed the tibialis anterior and medialized the peroneus tertius.

Of operations on bones with or without intervention on soft tissues in the growing static plano-valgus foot, arthrodesis of different joints at the vertex of the medial longitudinal arch (*Miller* 1927, *Schede* 1929, *Hoke* 1931) and arthrodesis of the talocalcaneous joints (*Leavitt* 1943) deserve mentioning.

Arthrodesis is, however, less suitable because, like osteotomy, it may disturb the further growth of the young foot. On the other hand, it has been stressed by other workers in this field that operations on the soft tissues only are insufficient in severe cases (*Hoffmann–Kuhnt* 1950, *Hackenbroch* 1961).

The ideal operation would therefore be one that prevents pathological displacement without interfering unnecessarily with the resilience of the young foot and the growth of its bones, but which nevertheless makes the foot stable enough to prevent recurrences. *Chambers* (1946) tried to prevent displacement between the talus and calcaneus by lifting the lateral part of the facies articularis post. of the calcaneus, a measure which *Grice* (1952) believed to be insufficient in severe valgus.

Grice (1952, 1955) performed extra-articular talocalcaneal arthrodesis but his series consisted of pes plano-valgus paralyticus only. *Picard & Mimran* (1961), who used *Grice*'s method, had no cases of static plano-valgus feet in in their material either.

It is clear from the literature that opinions differ as to the most suitable age for the operation of the condition. Of the authors, who prefer operations on the soft tissues, *Young* (1939) did not operate until the children were 10 years of age, *Milch* (1942) between 8–15 years, *Dinklage* (1950) preferably between 6–7 years, *Breitenfelder* (1953) between 11 and 15 years, *Niederecker* (1959) from the end of the fifth year, *Penners* (1959) from 6–12 years. As to treatment with operation on the bones, average age of the patients in *Miller*'s (1927) material was 12 years and *Hoke* (1931) was reluctant to operate upon children below 8 years.

AUTHOR'S SERIES

During 1954–1961 we operated upon 54 growing feet for static plano-valgus at the Orthopaedic Clinic, Lund. All of these cases had failed to

respond to conservative treatment and some cases showed signs of progression despite treatment. The operation is regarded as prophylactic, performed to prevent later organic deformities. None of the cases were operated upon for cosmetic reasons.

METHODS

The purpose of the standard method is to correct and prevent pronation-abduction position of the loaded calcaneus, which the author believes to be the primary cause of the other distortions. A bone block is placed in the tarsal sinus to prevent pronation-abduction of that part of the foot under the talus. The method is largely that described by *Grice* (1952, 1955). He aimed to produce extra-osseous talocalcaneal arthrodesis by autogenous bone grafts. His material consisted entirely of feet with paralytical plano-valgus. In the present material talocalcaneal arthrorisis was produced by the insertion of homogenous grafts from the bone bank.

The tarsal sinus is exposed from the lateral aspect of the foot. The soft tissues are removed from the sinus in to the ligamentum interosseum. The surface of the calcaneus is scarified. Homogenous cortical bone is shaped into wedges. The calcaneus is placed in supination, plantar flexion and adduction. At the same time, an attempt is made to force the calcaneus ventrally under the talus. The wedges are placed in the tarsal sinus with the base laterally and the proximal end dorsally in relation to the distal end (Fig. 1).

Inserted in this way the wedges are almost perpendicular to the axis of motion of the subtalar joints and are locked in position when the heel is placed in midposition in which it is afterwards fixed in plaster (*Grice* 1955).

In 24 of the feet, the operation on the bones was extended to include transposition of the insertion of the tendon of the tibialis anterior to the os naviculare. The line of pull of this muscle passes through the axis of motion of the talotarsal

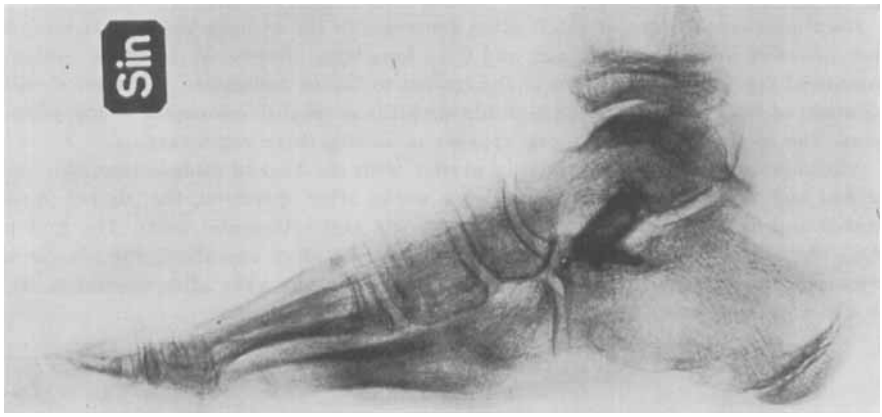


Fig. 1.
Position of bone grafts. (Foot No. 54).

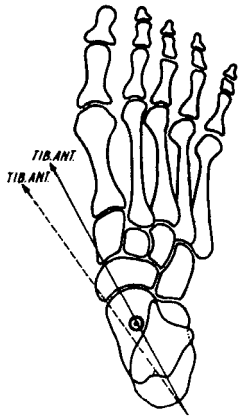


Fig. 2.
Line of pull of Musc. tibialis anterior before (uninterrupted line) and after operation (interrupted line). Essentially after Niederecker.

joints (Fig. 2). The muscle therefore acts as a pronator as well as a supinator. I plano-valgus the direction of pull of the tendon lies laterally to axis of rotation of the talotarsal joints and the pronating effect of the muscle is then predominant.

By transposition of the insertion of the tendon to os naviculare, the direction of pull of the tendon is shifted medially to the axis of rotation of the talotarsal joints which increases its supinatory and decreases its pronatory effect. The tendon is in addition attached to the vertex of the longitudinal medial arch, which increases its arch raising effect (Fig. 2).

The tendon of the tibialis anterior is loosened by an incision on the medial edge of the foot from its insertion on the os cuneiforme I and os metatarsale I. A vertical groove is then made in the tuberositas ossis naviculare. The tendon is placed in the groove and fixed there under tension with nylon sutures.

Roentgenological signs of ossification processes in the os naviculare pedis are not demonstrable until 4 years of age, and for a long time afterwards this bone consists mainly of cartilage. On fixation of the tendon to the os naviculare, attempts should be made to interfere as little as possible with the normal development of the young bone. The method described above appears to satisfy these requirements.

After operation the foot is fixed in plaster with the heel in midposition, the foot arched and the forefoot in pronation. Six weeks after operation, the plaster is removed and casts are made for Lange's supports and orthopedic boots. The foot is then immobilized in a walking cast. 8 to 10 weeks after operation, the plaster is removed. The patient then uses Lange's support for one year after operation. Active foot exercises are given.

MATERIAL

The 54 feet of the material had all been treated for a long time conservatively with special supports, foot gymnastics and sometimes special shoes before operation

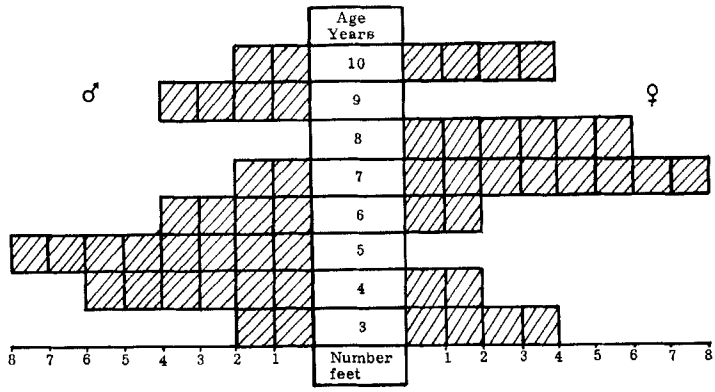


Fig. 3.
Age at operation. Sex incidence.

was considered. The duration of this pre-operative treatment was 4 years, on the average.

The patients' ages at the time of operation varied between 3 years 9 months and 10 years 10 months. The mean age was 6.3 years. 28 of the feet belonged to boys, 26 to girls (Fig. 3).

Thirty (55.5 per cent) of the feet caused local symptoms before operation. 22 of the feet were painful when loaded, in 8 feet there were symptoms from the feet as well as from the lower legs.

In 26 feet (48.1 per cent) one or more of the other members of the family were described as having a similar condition.

In all of the cases the condition was bilateral as were all of the operations.

None of the patients had had any previous disease of interest

AFTER-EXAMINATION—RESULTS

All of the feet were after-examined. The interval between the operation and the after-examination was 4 months to 7 years. This interval was 1 year or more for 50 feet, more than 2 years for 34 (Fig. 4).

The patients' ages at the time of the after-examination varied between 5 years and 14 years 8 months. 24 of the feet were above 10 years at the time of the after-examination. At the after-examination the feet were studied clinically, roentgenologically, photographically and pedographically.

The position of the loaded heel was studied in the way illustrated in Fig. 5. The vertical longitudinal axis of the heel was determined by the method of *Lanz & Wachsmuth* (1935).

Roentgenograms were taken of the loaded foot. Measurements were made of the angle in the roentgenogram which the longitudinal axis

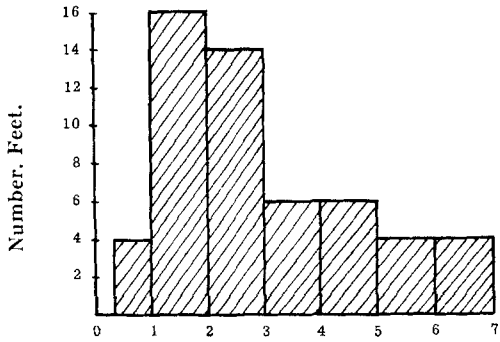


Fig. 4.
Duration of observation (Years).

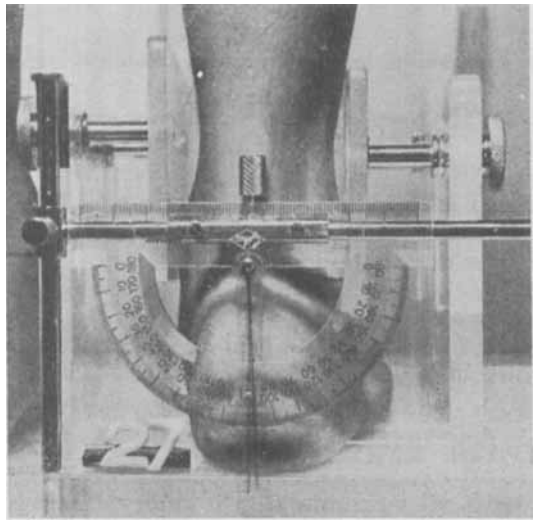


Fig. 5.
Method of measuring pronation of heel.

of the talus formed with the floor (TF angle). Tomograms in the frontal plane were taken of the calcaneus to evaluate its position when the foot was loaded.

Freiberg's method of pedography was used.

Of 30 feet, that had caused symptoms before operation (*vide supra*), 21 were now symptom-free. Six feet were still sometimes painful but less than before the operation. One foot was more painful, while 2 had been operated too recently to permit evaluation.

In 48 feet the valgus position of the loaded heel was 5°, or less, which

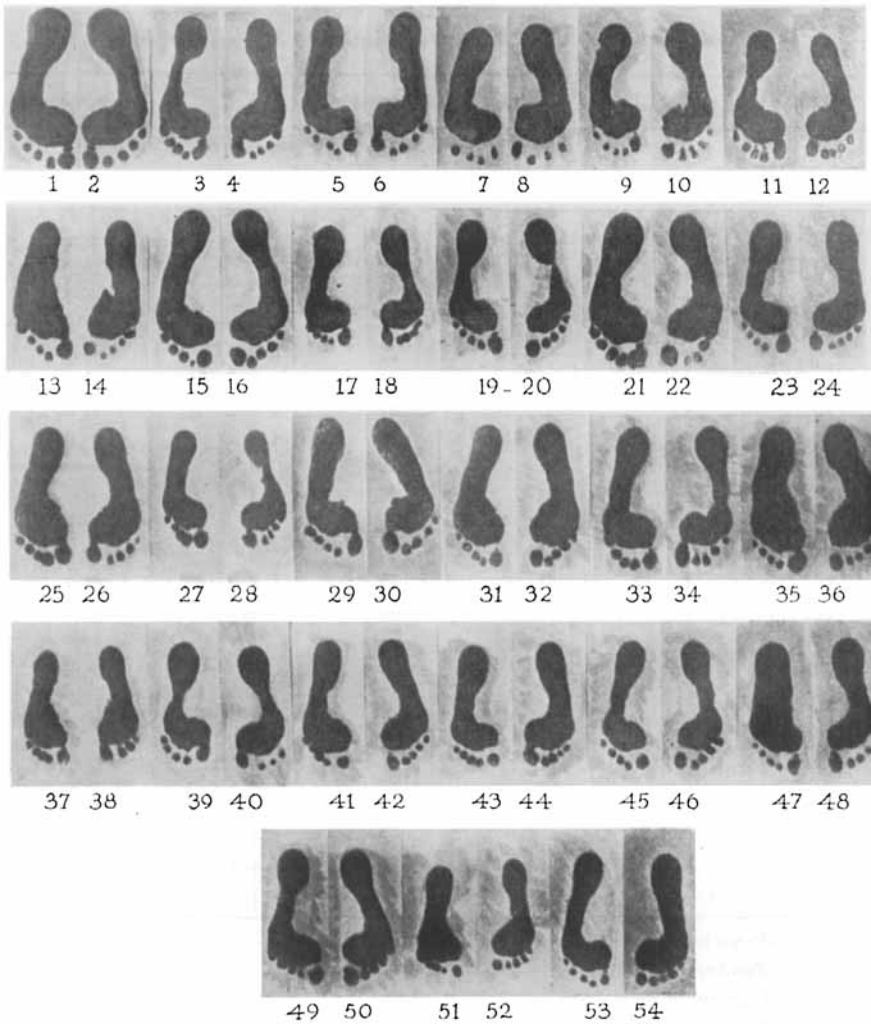


Fig. 6.
Pedographs of operated feet at review.

may be regarded as normal (*Lanz & Wachsmuth* 1935). In 3 feet 10–15° valgus was found and in 3 slight varus.

In 51 feet the depression of the loaded medial longitudinal arch was less marked than before operation. In 42 of these the curvature of this arch was judged as normal (Fig. 6). In 3 feet the arch was still completely depressed when loaded (Feet 13, 35, 47 (Fig. 6)), in 9 it was still partially depressed (Feet 14, 25, 26, 36, 37, 38, 48, 51, 52 (Fig. 6)).

TABLE 1

Pes Plano-Valgus Staticus Juvenilis Results of 54 Operated Feet.

Foot no.	Type of operation	Result	Foot no.	Type of operation	Result
1	1 + 2	+++	28	1 + 2	+++
2	1 + 2	+++	29	1 + 2	+++
3	1 + 2	+++	30	1 + 2	+++
4	1 + 2	+++	31	1	+++
5	1	+++	32	1	+++
6	1	++	33	1	+++
7	1 + 2	+++	34	1	+++
8	1 + 2	+++	35	1	+
9	1	+	36	1	++
10	1	+++	37	1 + 2	++
11	1	+++	38	1 + 2	++
12	1	+++	39	1	+++
13	1	+	40	1	+++
14	1	++	41	1	+++
15	1	+++	42	1	+++
16	1	+++	43	1 + 2	+++
17	1	+++	44	1 + 2	+++
18	1	+++	45	1	+++
19	1	+++	46	1	+++
20	1	+++	47	1 + 2	+
21	1 + 2	+++	48	1 + 2	++
22	1 + 2	+++	49	1 + 2	+++
23	1	+++	50	1 + 2	+++
24	1	+++	51	1 + 2	++
25	1	++	52	1 + 2	++
26	1	++	53	1 + 2	+++
27	1 + 2	+++	54	1 + 2	+++

1 = Bone block operation.
2 = Tendon transference.
1 + 2 = Combined operation.
+++ = Good.
++ = Improved.
+ = Poor.

TOTAL

Good	40	22	..... Bone block op.
		18	..... Combined
Improved	10	5	..... Bone block op.
		5	..... Combined
Poor	4	3	..... Bone block op.
		1	..... Combined

As mentioned, the subluxation of the talus and the depression of the medial longitudinal arch of the foot are judged also by the TF angle. In the 42 feet with a normal medial longitudinal arch the mean TF angle was 22°. In the 9 feet that showed partial depression of the arch at the after-examination the angle was, on the average, 30°. In the feet with a total depression of the arch, the average TF angle was 36°.

The functional results were classified according to whether the children took part in school-gymnastics or not. Regarding 36 feet, the answer was in the affirmative, regarding 6 the children were still below school age, and 2 of the feet had been operated upon too recently to permit evaluation of the functional results of the operation. Ten feet were such as to exempt the children from school-gymnastics.

The after-examination showed that in 5 of the feet the bone graft had been absorbed. In one of these feet, the loaded heel showed 10° valgus and the medial longitudinal arch was low. The medial longitudinal arch was completely depressed in one and partly in another. The remaining 2 feet were of normal physical and roentgenological appearance when loaded, 5 years 6 months and 4 years 9 months, respectively after the operation.

The after-examination showed that in addition to the desired prevention of pronation-abduction, supination of the talocalcaneal joints had disappeared from 7 feet. In these cases then, the operation had produced talocalcaneal arthrodesis ad modum *Grice* (1952, 1955).

Table 1 summarizes the results, as judged by the after-examination. The following criteria were used for the loaded foot:

Good: Normal medial longitudinal arch. 5° valgus or less of heel. No symptoms or less accentuated. *Improved:* Partial normalization of medial longitudinal arch. 5°–10° valgus of heel. Symptoms unchanged.

Poor: Total depression of medial longitudinal arch. More than 10° valgus of heel. Symptoms increased.

It is clear from Table 1 that the results obtained in 4 feet were regarded as poor. In one, the bone graft had been completely absorbed 4 years, 5 months after operation. In one the heel was in slight varus position with increased symptoms. Regarding one foot the patient had not complied with instructions given and used the supports for only 4 months.

DEMONSTRATION OF CASES

Feet Nos. 27 and 28. Figs. 7, 8, 9, 10. Operation at 4 years 4 months with arthrorisis and transposition of tendon. Fig. 7: The loaded, com-

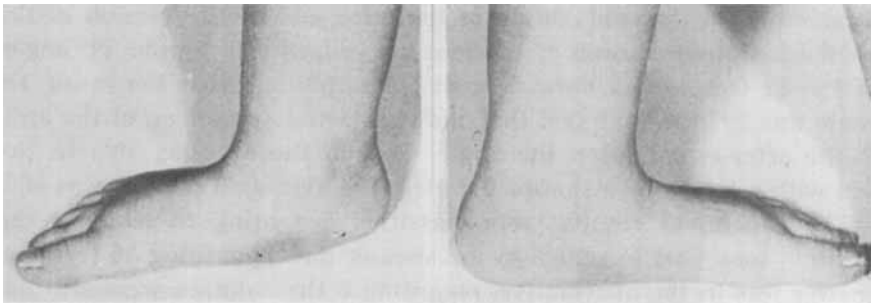


Fig. 7.
Foot No. 27 (r) and 28 (l). Before operation.

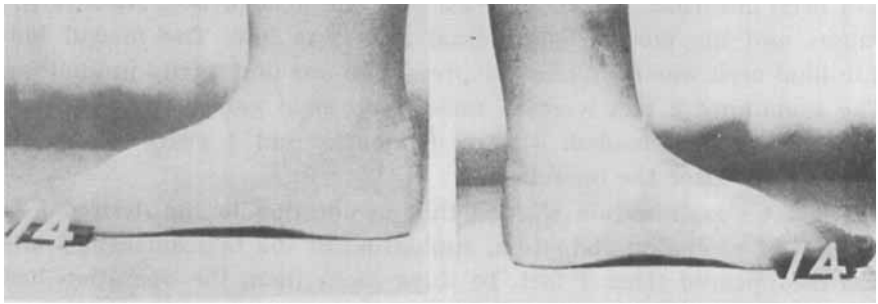


Fig. 8.
Foot No. 27 (r) and 28 (l). At review.

Fig. 9. *Fig. 10.*

Fig. 9. Foot No. 27 (r) and 28 (l). At review.
Fig. 10. Foot No. 27 (r) and 28 (l). Pedograph at review.

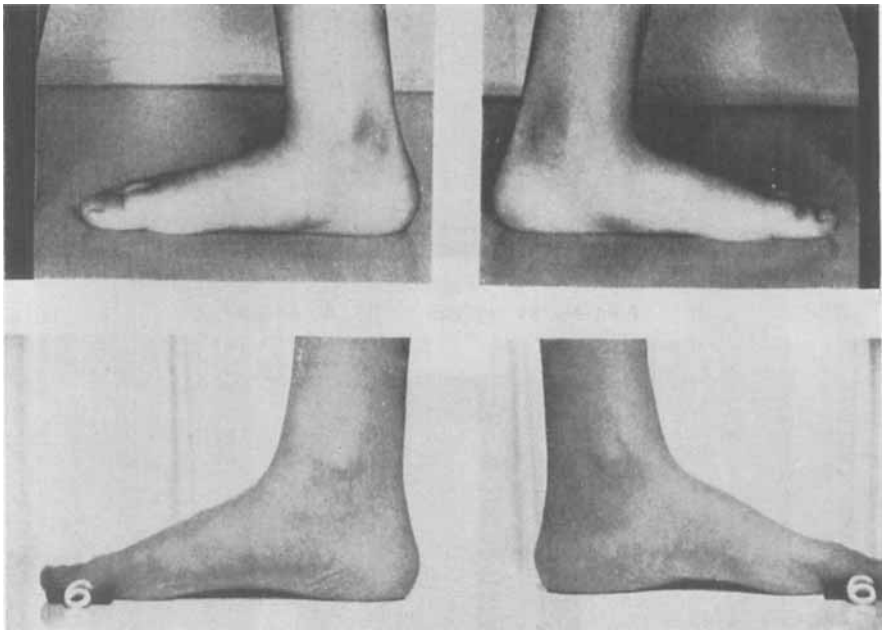


Fig. 11.
Foot No. 11 (r) and 12 (l). Before operation.
Fig. 12.
Foot No. 11 (r) and 12 (l). At review.

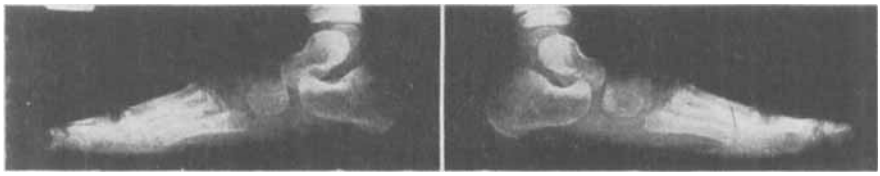


Fig. 13.
Foot No. 11 (r) and 12 (l). Before operation.

pletely depressed medial longitudinal arches. Figs. 8, 9, 10 were taken at after-examination 2 years 8 months after operation. The medial longitudinal arches are reconstructed (Fig. 8), the loaded heels assume an almost normal position (Fig. 9) and the pedograph is normal (Fig. 10).

Feet Nos. 11 and 12. Figs. 11, 12, 13, 14, 15, 16, 17. Operation at 4 years 6 months. Arthrorisis only. Fig. 11: Depression of longitudinal arches before operation; Fig. 12: The same feet 4 years 8 months after operation. Fig. 13: Pre-operative roentgenograms of the loaded feet.

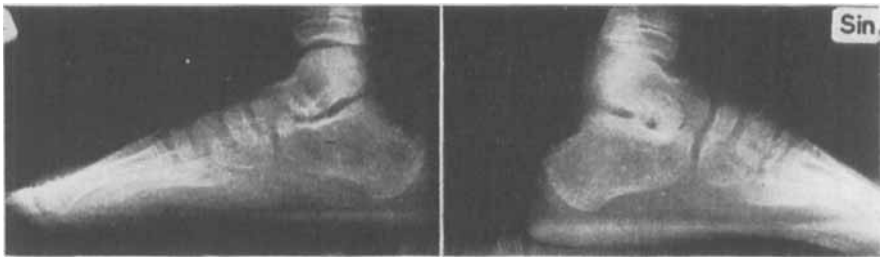


Fig. 14.
Foot No. 11 (r) and 12 (l). At review.

Fig. 15.
Foot No. 11 (r) and 12 (l). Before operation.

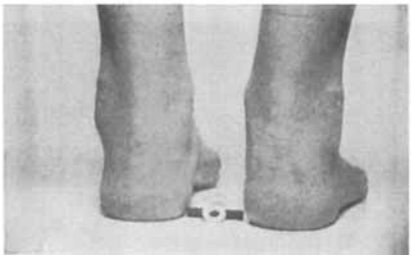


Fig. 16.

Fig. 17.

Fig. 16. Foot No. 11 (r) and 12 (l). At review.
Fig. 17. Foot No. 11 (r) and 12 (l). Pedographs at review.

The TF angle is 40° on the right side, and 45° on the left. At the after-examination (Fig. 14), the TF angles are 30° and 22°, respectively. Fig. 15: The pre-operative valgus of the loaded heels. Fig. 16: Post-operatively the heels are in midposition. Fig. 17: The normal post-operative pedograph.

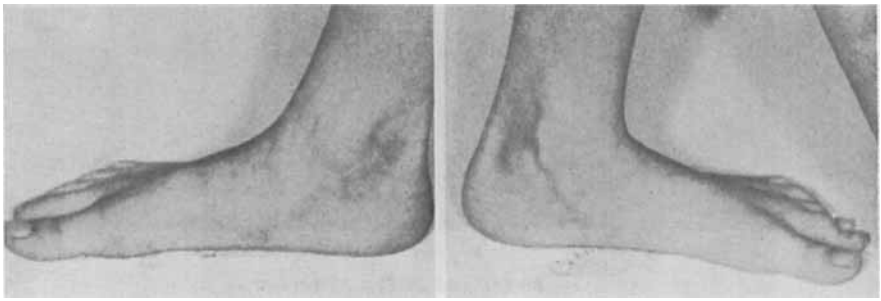


Fig. 18.
Foot No. 29 (r) and 30 (l). Before operation.

Fig. 19.
Foot No. 29 (r) and 30 (l). At review.

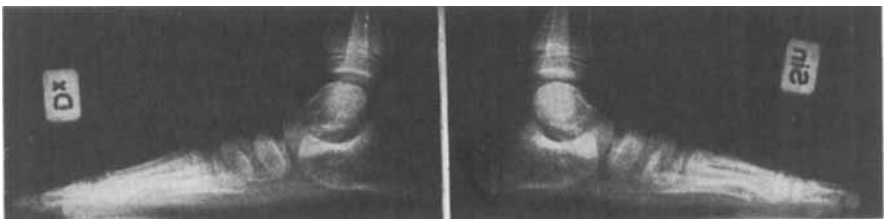


Fig. 20.
Foot No. 29 (r) and 30 (l). Before operation.

Feet 29 and 30. Figs. 18, 19, 20, 21, 22, 23. Operation at 6 years 4 months. Combined operation. Before operation, the loaded medial longitudinal arches are depressed (Fig. 18). At after-examination 2 years 3 months after the operation the arches are reconstructed (Fig. 19). Figs. 20, 21 illustrate the skeleton of the loaded foot. The TF angle before operation (Fig. 20) was 35° on the right side and 42° on the left.

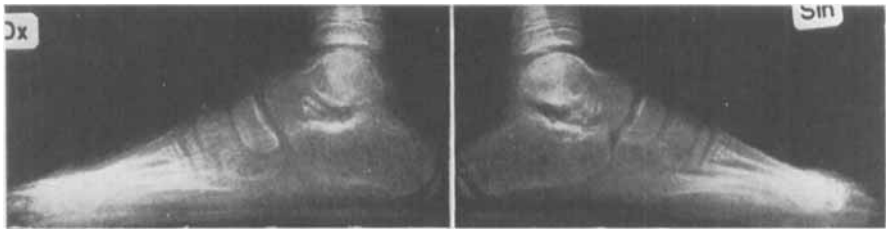
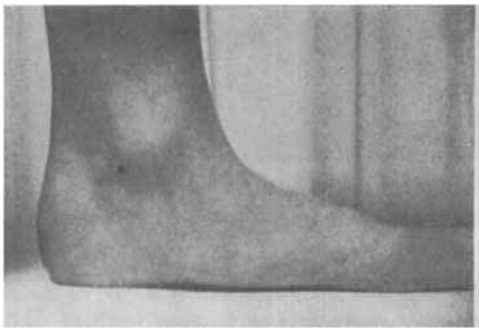


Fig. 21.
Foot No. 29 (r) and 30 (l). At review.

Fig. 22. *Fig. 23.*
Fig. 22. Foot No. 29 (r) and 30 (l). At review.
Fig. 23. Foot No. 29 (r) and 30 (l). Pedographs at review.



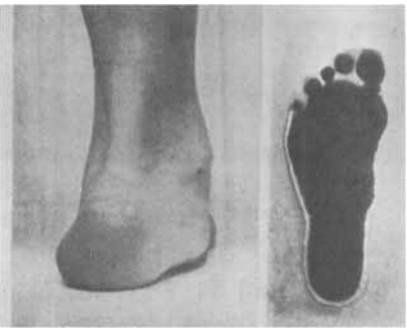


Fig. 24. *Fig. 25.* *Fig. 26.*
Foot No. 54 with pedograph. Before operation.

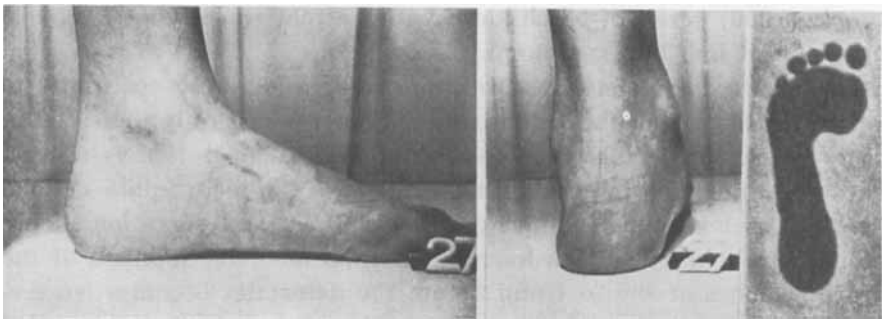


Fig. 27. *Fig. 28.* *Fig. 29.*

Foot No. 54 with pedograph. At review.
(Postoperative roentgenogram of foot No. 54 see Fig. 1).

At the after-examination the angles were 25 and 22°, respectively (Fig. 21). Fig. 22: Normal position of the heel at after-examination and Fig. 23: Normal pedograph at the same time.

Foot 54. Figs. 24, 25, 26, 27, 28, 29. Operation at 10 years 4 months. Combined operation. Fig. 24: The completely depressed loaded longitudinal arch before operation, which is also apparent from the pedograph in Fig. 26. Fig. 25: Pronounced valgus position of the calcaneus before operation. Figs. 27, 28 and 29 were taken 4 months after the operation. The medial longitudinal arch is now reconstructed (Fig. 27). The heel is loaded in midposition (Fig. 28) and the pedograph is normal (Fig. 29).

DISCUSSION

Though most cases of pes plano-valgus staticus juvenilis respond to conservative treatment, some are refractory. Judging from the literature there is now an increasing tendency to treat these cases surgically to prevent later permanent deformities.

Intervention on the soft tissues alone is regarded by many authors as insufficient for severe cases. Osteotomy and arthrodesis of the growing foot bones, which consist partly of cartilage, are believed to be unsuitable because it may interfere with the normal growth of the skeleton.

As for the symptoms in children with pes plano-valgus staticus, it is widely believed that most cases are symptom-free. In the present material 30 (55.5 per cent) of 54 feet produced symptoms. The material was, however, selected. It might, however, be stressed that in *Bren-*

ning's (1960) series of 58 children with flatfoot (mostly 6–7 years of age) almost half had symptoms.

In the present material the results of operation were not found to vary with the age of the patients. Since operation is only indicated in cases refractory to long conservative treatment, operation is not regarded as indicated in children below 4 years. No incorrigible skeletal deformities develop below this age. On the other hand, operation should be performed early enough to secure normal later development of the growing bones of the foot and before the deformity becomes irreversible. Operation before the age of 12 is therefore indicated. After this age the foot becomes structurally more compact and then there is a greater risk that it will no longer be possible to correct the distortions.

In 7 of the feet, the after-examination showed not only impaired pronation, but also impaired supination. One of these feet showed slight varus, the others could be loaded without deformation. Since it is, however, desirable to interfere as little as possible with the normal function of the foot, attempts should be made to avoid such an unnecessary elimination of supination partly by not scarifying the lower surface of the talus, partly by interposition of soft tissue between the proximal end of the transplant and the talus. Fixation of the distal end of the graft to the calcaneus is the only fixation that should be aimed at.

In 42 feet in which the longitudinal arch was judged as being normal when loaded the average TF angle was 22°. This is in accord with *Niederecker*'s (1959) finding of an average angle of 23° in normals.

Twenty-four of the feet belong to patients who at the time of the after-examination were above 10 years, the oldest was barely 15 years. Roentgen or clinical examination revealed nothing to suggest that the operation had disturbed growth of any of the feet.

The results of operation were judged as good for 40 feet (74.1 per cent) improved for 10 (18.5 per cent) and poor for 4 (7.4 per cent) (Table 1).

The after-examination revealed no certain difference between the results obtained in those feet submitted to arthrorisis alone and those in which the operation was extended to include transposition of the tendon (Table 1). In order to keep traumatization to a minimum, it would therefore appear that talocalcaneal arthrorisis with homogenous bone transplant alone is satisfactory in the treatment of this type of pes plano-valgus. It affects only the pronation-abduction of the foot. Its spares the growing foot because it is extra-articular and extra-

osseous. It aims at normalizing the inter-relationship between the foot bones when the foot is loaded and thus contributes to a more physiological development of the bones, muscles and ligaments of the static juvenile plano-valgus foot.

SUMMARY

1. Pes plano-valgus staticus juvenilis is the commonest deformity of the foot. In the beginning it is a static deformity which leads to organic pathological changes.

2. The primary cause of the disease is not known with certainty but it is widely believed that a disproportion exists between the weight to be carried and the development of the muscles and ligaments.

3. Most feet of this type are improved by conservative treatment. Some, however, are refractory to such therapy. There is an increasing tendency to operate upon such refractory cases to enable subsequent normal development of the foot.

4. The material consisted of 54 feet with plano-valgus staticus juvenilis, refractory to conservative treatment. The duration of conservative treatment before operation was 4 years on the average. The patients' ages at the time of operation were barely 4 years to barely 11 years, with a mean age of 6.3 years. 28 feet belonged to boys, 26 to girls.

5. Operative methods: Arthrorisis talocalcanea with insertion of homogenous transplant from the bone bank into the tarsal sinus. The bone block prevents pronation-abduction of the foot plate below the talus. In 24 feet the operation on the bones was extended to include transposition to the os naviculare of the insertion of the tibialis anterior tendon. The transposition increases the supinating and arch-lifting effect of the muscle.

6. The interval between operation and the after-examination varied between 4 months and 7 years. It was 1 year or more for 50 feet and more than 2 years for 34. The age at the time of the after-examination ranged from 5 years to almost 15 years with 24 feet above 10 years.

7. At the after-examination the feet were studied clinically and roentgenologically (with measurement of the TF angle and tomography of the calcaneus), photographically and pedographically. Of 30 feet, which had had symptoms before the operation, 21 were symptom-free at the after-examination. The results of the operation were judged as good for 40 feet (74.1 per cent), improved for 10 (18.5 per cent) and poor for 4 (7.4 per cent).

8. The results of operation were not found to vary with age of the patients. The most suitable age for operation appears to be between 4 and 12 years.

9. Clinical and roentgenological examination revealed nothing suggesting that the operation had caused disorders of growth.

10. No difference was found with certainty between the results obtained in feet operated upon with arthrorisis alone and those, in which the operation was extended to include transposition of the tendon.

Arthrorisis talocalcanea performed with homogenous graft from the bone bank is regarded as a satisfactory operation for pes plano-valgus staticus juvenilis not responding to conservative treatment.

RESUME

1. Le pied plat valgus statique chez les enfants est la déformité du pied la plus commune. Au début, c'est une déformité statique qui conduit à des altérations pathologiques organiques.

2. On ne connaît pas avec certitude la cause primaire de la maladie, mais on croit généralement qu'il existe une disproportion entre le poids à supporter et le développement des muscles et des ligaments.

3. La plupart des pieds de ce type s'améliorent à la suite d'un traitement conservateur. Certains sont cependant réfractaires à cette thérapie. On a de plus en plus tendance à opérer ces cas réfractaires, afin de permettre par la suite un développement normal du pied.

4. Le matériel d'observation étudié ici comprend 54 pieds plats valgus statiques chez les enfants réfractaires au traitement conservateur. La durée du traitement conservateur avant l'opération avait été de 4 ans en moyenne. L'âge des malades au moment de l'opération a varié entre 4 et 11 ans, avec un âge moyen de 6,3 ans, 28 pieds appartenant à des garçons, 26 à des filles.

5. Méthode d'opération: arthrorisis talocalcanea avec insertion de transplantation homogène de la banque des os dans le sinus tarsal. Le bloc osseux empêche la pronation-abduction de la plante du pied au-dessous du tarse. Dans 24 pieds, l'opération des os a comporté également la transposition à l'os naviculaire de l'insertion du tendon tibial antérieur. La transposition accroît l'effet de supination et d'élévation de la voûte opéré par le muscle.

6. L'intervalle entre l'opération et l'examen complémentaire a varié entre 4 mois et 7 ans. Il a été d'un an ou plus pour 50 pieds et de plus

de 2 ans pour 34. L'âge à l'époque du réexamen a varié entre 5 et 15 ans et a été de plus de 10 ans pour 24 pieds.

7. Au réexamen, les pieds ont été étudiés cliniquement et radiologiquement (avec la mensuration de l'angle TF et tomographie du calcanéum), photographiquement et pédographicalement. Sur 30 pieds présentant des symptômes avant l'opération, 21 étaient libérés de symptômes au moment du réexamen. Les résultats de l'opération ont été jugés bons pour 40 pieds (74,1 pour cent), améliorés pour 10 (18,5 pour cent) et médiocres pour 4 (7,4 pour cent).

8. Les résultats de l'opération n'ont pas varié avec l'âge des malades. Le meilleur âge pour l'opération semble être entre 4 et 12 ans.

9. L'examen clinique et radiologique n'a rien décelé qui puisse laisser supposer que l'opération ait produit des troubles de la croissance.

10. Il n'a pas été trouvé de différence certaine dans les résultats obtenus pour les pieds opérés par arthrorisis seule et ceux dans lesquels l'opération a comporté aussi la transposition du tendon.

L'arthrorisis talocalcanea exécutée avec greffe homogène de la banque des os est considérée une opération satisfaisante pour le pied plat valgus statique chez l'enfant ne réagissant pas au traitement conservateur.

ZUSAMMENFASSUNG

1. Pes planovalgus staticus juvenilis ist die häufigste Verbildung des Fusses. Im Beginn ist er eine statische Deformitet, die zu organischen, pathologischen Veränderungen führt.

2. Die ursprüngliche Ursache der Erkrankung ist nicht mit Sicherheit bekannt, aber man nimmt weithin an, dass es sich um ein Missverhältnis zwischen dem zu tragenden Gewicht und der Entwicklung der Muskeln und Bänder handelt.

3. Die meisten derartigen Füsse werden durch konservative Behandlung gebessert. Einige jedoch lassen sich durch eine derartige Behandlung nicht beeinflussen. Es besteht eine zunehmende Neigung derartige widerspenstige Fälle zu operieren, um eine folgende normale Entwicklung des Fusses zu ermöglichen.

4. Das Material besteht aus 54 Füssen mit pes planovalgus staticus juvenilis, die einer konservativen Behandlung Widerstand leisteten. Die Dauer der konservativen Behandlung vor der Operation was durchschnittlich 4 Jahre. Das Alter der Patienten zur Zeit der Operation

war 4 bis 11 Jahre, mit einem Durchschnittsalter von 6,3 Jahren. Es handelte sich um 28 Knaben- und 26 Mädchenfüsse.

5. Operative Methoden: Arthrorisis talocalcanea mit Einfügung eines homogenen Transplantates von der Knochenbank in den tarsalen Sinus. Der Knochenblock verhindert Pronation-Abduktion der Fussplatte unterhalb des Talus. In 24 Füssen wurde die Operation an den Knochen durch die Einbeziehung einer Transposition des Ansatzes der Sehne des m. tibialis anterior auf das os naviculare erweitert. Die Verpflanzung erhöht die supinatorische und Fussgewölbe erhöhende Wirkung des Muskels.

6. Der Zeitraum zwischen der Operation und der Nachuntersuchung schwankte zwischen 4 Monaten und 7 Jahren. Er war 1 Jahr oder mehr in 50 Füssen und mehr als 2 Jahre in 34. Das Alter zur Zeit der Nachuntersuchung reichte von 5 bis nahezu 15 Jahren. 24 Füsse waren älter als 10 Jahre.

7. Bei der Nachuntersuchung wurden die Füsse klinisch und röntgenologisch (mittels Messung des TF Winkels und Tomographie des Calcaneus), fernerhin fotographisch und pedographisch studiert. Von 30 Füssen, die vor der Operation Symptome aufwiesen, waren 21 symptomfrei bei der Nachuntersuchung. Die Ergebnisse der Operation wurden in 40 Füssen (74,1 Prozent) als gut angesehen. 10 (18,5 Prozent) wiesen eine Besserung auf und 4 (7,4 Prozent) hatten ein schlechtes Resultat.

8. Die Ergebnisse der Operation waren nicht vom Alter des Patientens abhängig. Das geeignetste Operationsalter scheint das zwischen 4 und 12 Jahren zu sein.

9. Klinische und röntgenologische Untersuchung enthüllte nichts das als eine Wachstumsstörung als Operationsfolge zu deuten wäre.

10. Es wurde kein sicherer Unterschied zwischen den Ergebnissen bei Füssen, die mit alleiniger Arthrorisis oder mit der erweiterten, die Sehnentransposition umfassenden Operation behandelt wurden, gefunden.

Arthrorisis talocalcanea, mit einem homogenen Spahn von einer Knochenbank ausgeführt, wird als eine zufriedenstellende Operation in Fällen von pes planovalgus staticus juvenilis, die auf konservative Behandlung nicht ansprechen, angesehen.

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