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THE SIGNIFICANCE OF CONGENITAL PES CALCANEO-VALGUS IN THE ORIGIN OF PES PLANO-VALGUS IN CHILDHOOD

Preliminary report

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A number of authors (*Erlacher, Gocht, Mau, Timmer* etc.) have indicated that congenital pes calcaneo-valgus can give rise to pes plano-valgus when the children begin to bear weight. Clearly this is not a question of the rare congenital plano-valgus flat foot which shows severe abduction and extention of the forefoot, with the head of the talus standing plantar-luxated and with even plantar flexion of the calcaneus.

In congenital pes calcaneo-valgus the foot lies against the lower leg, or can be extended without resistance until it impinges against the leg. In so doing, no luxation occurs in the talo-navicular joint and the calcaneus accompanies the extension. In the pronounced cases of pes c-v-c one finds a spontaneous abnormal valgus position of the heel. In other cases, the valgus is first demonstrable with maximum extension of the foot. Abduction of the forefoot is usually of mild degree. In contrast to the congenital pes plano-valgus, the foot can be restored to a normal position without great resistance. Plantar flexion occasionally is reduced.

The frequency of pes c-v-c among newborn children is reported to be over 30 %. The figures vary and even over 50 % is reported. Early treatment in infancy has been proposed with fixation of the feet in plantar flexion and supination in order to eliminate the abnormal calcaneo-valgus position and to prevent the development of pes plano-valgus when the children begin to walk.

No follow-up examination of congenital calcaneo-valgus feet until the weight-bearing age seems to have been made. Such a study could show with certainty whether the occurrence of pes plano-valgus among these children is greater than in a control group. Moreover, there is no study regarding the value of the proposed treatment, that is, if in addition to correcting the calcaneo-valgus position it also prevents the appearance of pes plano-valgus in the weight-bearing age.

To answer the question of the significance of pes calcaneo-valgus congenitus in the origin of pes plano-valgus, the orthopeadic department in Jönköping with the cooperation of the obstetrical department, has examined all the newborn children during a two year period (1946–1948).

The signs of congenital calcaneo-valgus have been differentiated in the following way:

Valgus.

The feet are examined from behind. The angle of spontaneous valgus position is measured in degrees between the long axis of the leg and the heel, by means of a transparent protractor. In this case (Plate no. 1) there is no obvious valgus position.

Plate no. 1.

Next the foot is dorsiflexed maximally, that is, the forefoot is forced up as far as possible against the lower leg. Plate no. 2 shows that a 15° valgus is produced in the heel of the right foot.

To test for maximal valgus, the heel is pushed laterally by pressure on the medial side, and at the same time the forefoot is held extended and forced laterally, that is, into abduction. In this position the maximum valgus is produced.

Plate no. 2.

Plate no. 3.

Hyperextensibility.

The knee joint is extended and the forefoot is forced against the leg as far as possible (Plate no. 4).

Plate no. 4.

Plantarflexion.

The foot is plantarflexed and care is taken that the heel accompanies the movement (Plate no. 5). Plantar flexion of at least 50° is considered normal.

Plate no. 5.

Abduction of the forefoot.

The plantar aspects of the feet are examined while the ankle and subtalar joints are held in neutral position. Even with a slight degree of abduction, a convex medial bulging occurs at the level of the talo-navicular joint (Plate no. 6). Greater degrees of abduction can be measured by the angle between the long axes of the forefoot and hind-foot.

Plate no. 6.

The total number of newborn infants examined was 2735. The findings of congenital pes calcaneo-valgus among these infants have been divided into three groups with the degree of maximum valgus as the determining factor.

Group 1 consists of cases with valgus of 20° and over, group 2 of between 10° and 15°, and group 3 of valgus up to 5° (and uncertain valgus) and group 4 all the newborns with no signs of pes calc.-valg. con. (see table 1).

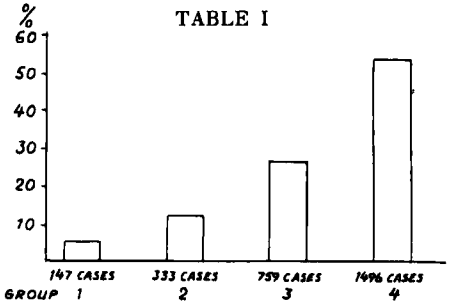


TABLE I

All cases with any degree of pes calcaneo-valgus cong. were requested to come for examination until a little more than a hundred in groups 1 to 3 had been collected. Thereafter only the pronounced cases belonging to group 1 were sent for. Division of the cases into three groups was undertaken in order to separate with certainty the important from the unimportant findings. A random-picked control group was later chosen out of that part of the whole material which showed no signs of pes calc. valg. cong. (fourth group). The comparison of the frequency of pes plano-valgus in the weight-bearing age ought to give an idea if any significant difference is developing between group 1 and group 4.

Conclusions regarding the weight-bearnig appearance are more uncertain than described above in infants, especially where children of one year old are concerned. The often markedly developed fat pads particularly complicate an opinion regarding the longitudinal arch.

The findings in pes plano-valgus have been graded in the following way:

Marked degree of pes plano-valgus.

a. Valgus of some degree and complete flattening of the long arch on standing.

b. Valgus of 10° or more on standing and some degree of depression of the longitudinal arch.

Moderate degree of pes plano-valgus.

Up to 5° valgus on standing and moderate depression of the longitudinal arch.

Uncertain findings.

Only an intimation of valgus or flattening of the long arch (uncertain findings) and otherwise clearly unremarkable feet.

Despite the relatively large risk of uncertainty using the above criteria a sufficiently large difference should be found between cases with an important degree of pes plano-valgus and those with normal feet (or uncertain findings).

An objective examination for measuring the degree of the abnormal weight-bearing position is, of course, very desirable. This has been done successfully by *Schwartz* and *Health,* and later by *Karpovitch* and *Wilklow.*

A new method based on a strain-gauge is at present being tried by the author.

A preliminary report is given here of a follow-up examination of one year old children who had recently begun to walk and also of children of two years of age. Yearly control until the age of four or five is clearly necessary to obtain a comprehensive idea of the development of the feet.

Table II shows the frequency of pes plano-valgus at one year of age in the groups 1 to 4 in percentage columns. Table III shows the frequency at two years of age.

Tables II and III reveal that children with calcaneo-valgus feet of severe degree in infancy (group 1: 20° of valgus or more) show a significantly higher percentage of pes plano-valgus at one year of age (42.6 %) when compared to those children who were normal in infancy (group 4: 9.5 %).

This difference in frequency decreases markedly at two years of age because the previously normal children (group 4) present an increased number of pes plano-valgus (23.8 %) whereas group 1 continues unchanged (43.1 %).

Children with mild degrees of calcaneo-valgus feet (group 3: up to 5° valgus) continue almost completely the same as group 4 which consists of children with no signs of pes calcaneo-valgus congenitus. Group 2 with moderate findings of calcaneo-valgus in infancy (10–15° valgus) lies closer to group 1.

TABLE II

Examination at one year of age.

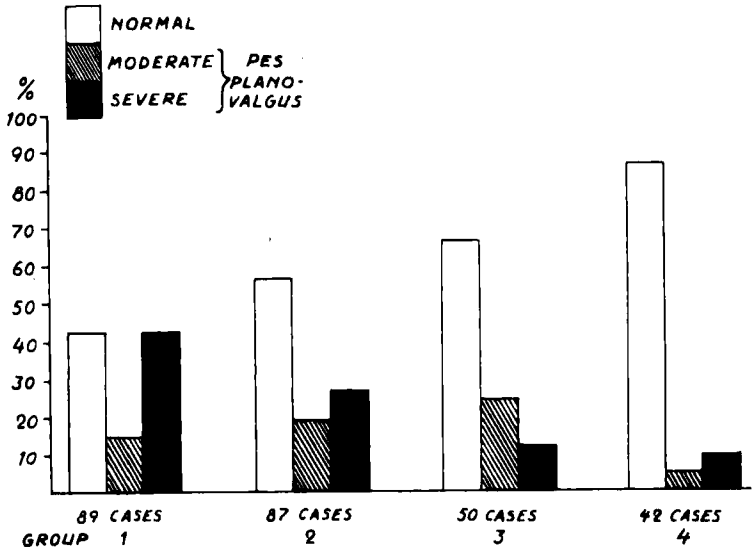
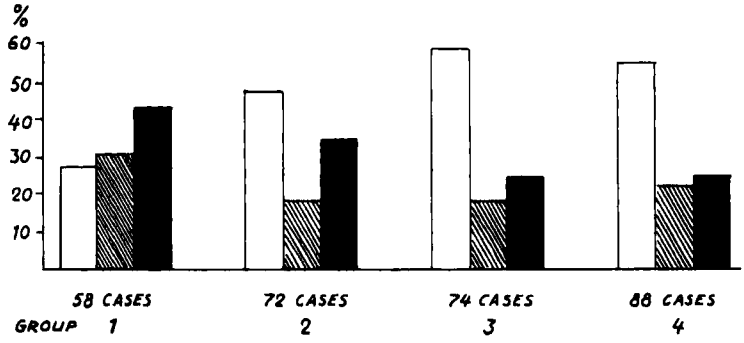


TABLE III

Examination at two years of age.



SUMMARY

Pes calcaneo-valgus congenitus of severe or moderate extent seems to hold an increased risk of later pes plano-valgus. The difference in comparison with a random-picked control group is relatively large at one year of age (42 % against 9 %) and decreases remarkably at two

years of age (43 % against 23 %) for the reason that the control group shows an increasing frequency of pes plano-valgus.

It remains to be seen if any essential difference in frequency will be found with later follow-up examinations.

RESUME

Le pied bot calcanéen valgus ou congénital d'étendue grave ou modérée paraît comporter un risque accru de pied plat valgus ultérieurement. La différence avec un groupe de contrôle choisi au hasard est relativement importante à l'âge d'un an (42 % contre 9 %) et diminue notoirement à l'âge de deux ans (43 % contre 23 % pour) la raison que l'on observe dans le groupe de contrôle une fréquence accrue du pied plat valgus.

Il reste à voir si l'on trouvera une différence essentielle de la fréquence à des examens ultérieurs.

ZUSAMMENFASSUNG

Pes calcaneo-valgus congenitus schweren oder mässigen Grades scheint eine erhöhte Gefahr eines späteren pes plano-valgus in sich zu tragen. Der Unterschied im Vergleich mit einer Kontrolgruppe ist im ersten Lebensjahre verhältnismässig gross (42 % gegen 9 %) aber nimmt im zweiten Lebensjahre bedeutend ab (43 % gegen 23 %) da die Kontrolgruppe eine zunehmende Häufigkeit von pes plano-valgus aufweist.

Es bleibt zu sehen, ob bei späteren Kontrolluntersuchungen ein wesentlicher Unterschied zwischen diesen Gruppen gefunden wird.

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