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CONGENITAL CALCANEOVALGUS

With Special Reference to Treatment and its Relation to Other Congenital Foot Deformities

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Congenital calcaneovalgus is a rather common foot deformity. At birth the foot in seen to be lying in acute dorsiflexion with the dorsum of the foot touching the anterior tibia; there is an increased valgus of the hindfoot, and some contracture of the dorsiflexors may be seen. It is generally agreed, that most of these cases require no treatment. (Wetzenstein 1970, Klassen 1971).

The purpose of the present report has been to evaluate the prognosis of this condition compared to other congenital foot deformities and to estimate if treatment has had any influence on the final result.

MATERIAL AND METHODS

During the years 1961–1968, 86 infants with 125 calcaneovalgus feet were seen, among these 39 (45 per cent) were bilateral, 24 right-sided and 23 left-sided. There were 50 (58.1 per cent) girls and 36 (41.9 per cent) boys.

At the initial examination within the first weeks of life slight to moderate contractures of the foot dorsiflexors were found in 42 (34 per cent) of the feet.

Except for slight insufficiency of the triceps muscle no pareses were found. Radiographic evaluation has not been used routinely either in the initial examination or during treatment, thus only 14 of the calcaneovalgus feet were radiographed.

Pregnancy and delivery were uncomplicated except for 5 cases of breech presentation and 2 cases of caesarean section.

In 6 cases the following associated abnormalities were found: 3 metatarsus varus, 1 vertical talus, 1 syndactylia and 1 congenital dislocation of the hip.

Treatment, consisting in gentle manipulations and elastic bandage, was instituted in 50 per cent of the cases, thus 61 (49 per cent) of the calcaneovalgus feet were treated. 57 per cent of the feet with contractures were treated.

Duration of treatment was 3–5 weeks.

All cases were seen for examination at the age of about 12 months.

RESULTS

At follow-up in January 1972, 75 of the cases with 110 calcaneovalgus feet (88 per cent) were seen. The age at examination was 3–11 years, 50 per cent of the patients were more than 6 years of age.

Among the physical findings our interest was focused upon residual valgus of the hindfoot. In order to achieve a numerical expression of this factor the following methods were used.

All cases were photographed. Prior to this a line was drawn from the midpoint of the heel following the midaxis of the achilles tendon continued in the midaxes

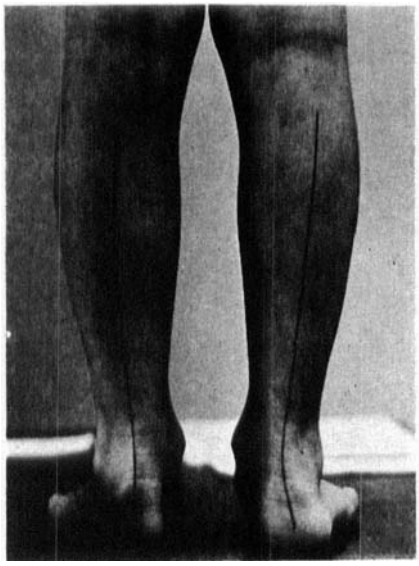

Figure 1. Case no. 18. Girl age 8 years with right-sided calcaneovalgus. Photograph used for measuring hindfoot valgus. The deviation of the heel line from the mid-axis line of the lower leg is taken as the degree of valgus.

of the lower leg. This line was drawn with the child lying on its knees and with the foot corrected to neutral position. Then the photograph was taken with the child standing with weight on both feet and a few centimeters between the medial malleoli. As seen in Figure 1 the degree of the hindfoot valgus is measured as the deviation of the heel-line.

Subjective complaints were very moderate; only 5 children mentioned tiredness and tenderness in the feet after a long walk.

Physical examination without weightbearing showed no decreased mobility in ankle- or subtalar joint. In 5 cases some hypermobility was seen.

The medial arch of the foot was normal in all cases.

No atrophy or muscular insufficiency or hypoplasia of the feet was seen in any of the cases.

No gait abnormalities were found.

Physical findings during weightbearing were normal except for some residual valgus of the hindfoot. Based on the photographs the material is separated into group 1, with valgus 0–10 degrees and group 2 above 10 degrees. 75 per cent (83 calcaneo valgus feet) were found in group 1.

Figure 2 illustrates the findings in 40 unilateral cases; 45 per cent (18 cases) showed a valgus more pronounced than on the normal side, 12.5 per cent showed a slightly decreased valgus.

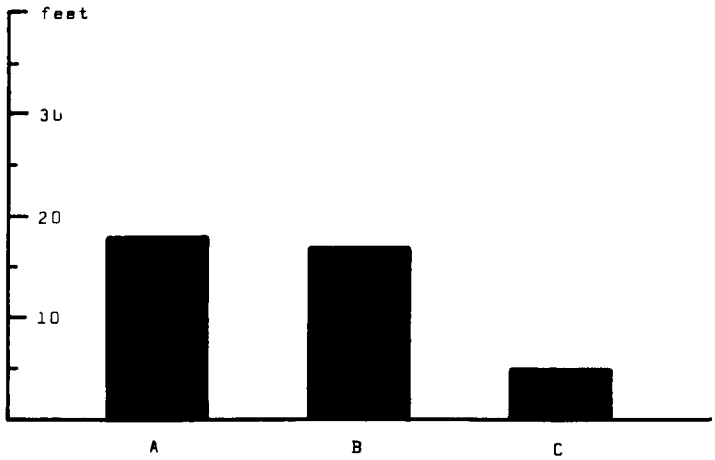

Figure 2. 40 unilateral cases of calcaneovalgus, compared with the normal side, show in 18 (45 per cent) a valgus degree more pronounced than on the normal side (A); in 17 (42.5 per cent) no difference is found (B), and in 5 (12.5 per cent) a slightly decreased valgus is seen (C).

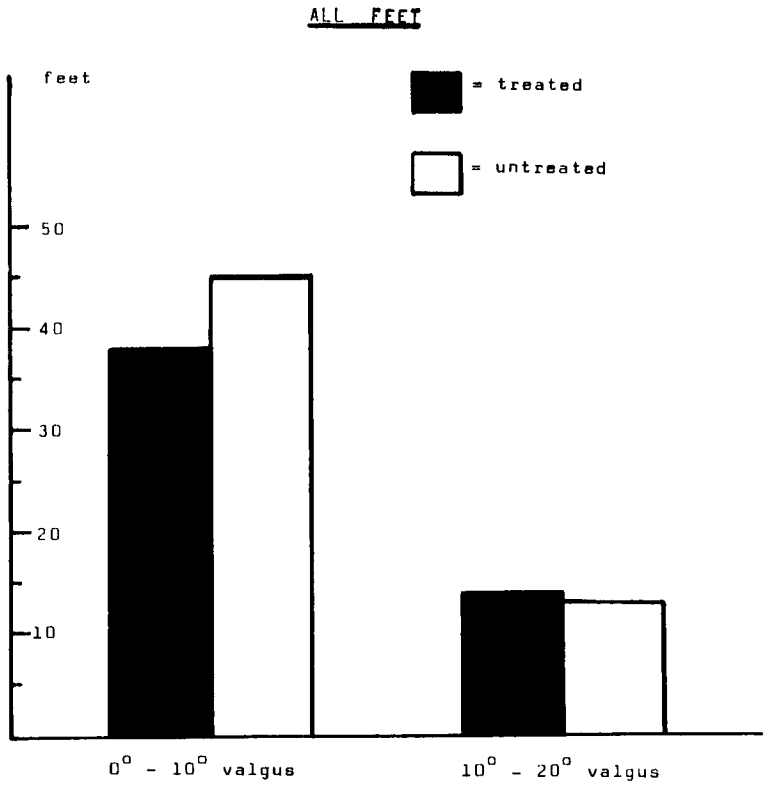

Figure 3. Comparison between treated and untreated cases: 73 per cent of the treated and 78 per cent of the untreated feet show a valgus of 0–10 degrees. 27 per cent of the treated and 23 per cent of the untreated show a valgus between 10–20 degrees.

Comparison between treated and untreated cases showed no difference in the degree of valgus (Figure 3).

As seen from Figure 4 the severity of contractures at the initial examination had no influence on the final result. The degree of hyperlaxitas was also examined and in 52 cases (69 per cent) some hyperlaxitas in knees, elbows or fingers was seen.

DISCUSSION AND CONCLUSION

Congenital calcaneovalgus is essentially different from other congenital idiopathic foot deformities from the point of view of treatment as well as prognosis.

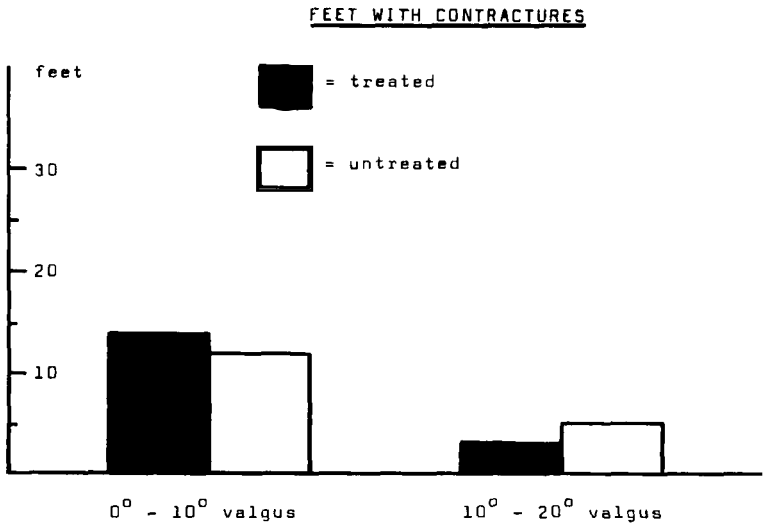

Figure 4. Comparison between treated and untreated cases with contractures: 82 per cent of the treated and 71 per cent of the untreated feet show a valgus of 0–10 degrees. 18 per cent of the treated and 29 per cent of the untreated show a valgus of 10–20 degrees.

Our material shows some confusion concerning the diagnosis as only 13 per cent were referred with a correct diagnosis. However the diagnosis should cause no difficulty as the appearance of the congenital calcaneovalgus is so different from other foot deformities. Only the rare vertical talus might present problems in differential diagnosis, but it is distinguished by elevation of the heel and the rocker bottom appearance.

Congenital calcaneovalgus is the most common foot deformity and when moderate degrees are included an incidence of 30–50 per cent is reported (Wetzenstein 1970). Hereditary predisposition in 68 per cent of cases is reported by Giannestras (1970). Calculations of incidence and hereditary predisposition on the basis of this material have been omitted. As many of the cases improved spontaneously within the first weeks of life, the results of these calculations have been unreliable.

That prognosis, as indicated above, is good is generally agreed. Most cases end up with completely normal feet, but in some cases this deformity leads to later development of static abnormalities with increased valgus of the hindfoot and in some cases lowered medial arch (Wetzenstein 1970).

After a period of observation of 3–11 years the only abnormal finding

was increased valgus. Among 40 unilateral cases 45 per cent showed a valgus angulation of the hindfoot, more pronounced than on the normal side.

The exceptionally good prognosis compared to other congenital foot deformities may be explained by the changes found at birth. Though the foot is lying in extreme dorsiflexion with moderate increased valgus of the hindfoot, the contractures found in the foot dorsiflexors and skin are not very pronounced.

The most important point however is that no luxation is found. This is contrary to findings in congenital club foot (Reimann 1967) and vertical talus. This implies that no secondary adaptive bone changes or hypoplasia of the ossification centers are found at birth. This is verified by early radiographic findings in this condition.

Consequently only a few radiographs have been taken in the present material, all confirming normal findings (Templeton et al. 1965).

The absence of luxation and secondary bone changes explains why many cases improve spontaneously. Different methods of treatment are reported. In cases with marked contractures, Støren (1967) and Giannestras (1970) used corrective casts. In cases with moderate contractures manipulations have been used (Støren 1967).

As mentioned by Wetzenstein (1970) no reports of comparative investigations between treated and untreated cases have been published. Based on the present series it has been possible to compare treated and untreated cases. Among 125 calcaneovalgus feet 49 per cent were treated with manipulations and elastic bandage; 51 per cent of the cases were untreated and followed by regular examinations. In the 2 groups 39 per cent and 28 per cent, respectively, had marked contractures. At follow-up no significant difference was found between treated and untreated cases, and the severity of the contractures found at birth had no influence on the final results.

Based on our experience we find it reasonable in cases with severe contractures (where plantarflexion is restricted to right-angle position) to use gentle manipulations to accelerate the course. The absence of secondary adaptive bone changes indicates that retention of the foot in a corrected position, for instance in casts, is unnecessary.

It is concluded that congenital calcaneovalgus, which is the most common congenital foot deformity, has an extremely good prognosis and that treatment is rarely indicated. This is explained by the absence of luxation and secondary adaptive changes at birth. This indicates that the deformity occurs late in pregnancy possibly in connection with constitutional hyperlaxity.

SUMMARY

Based on a clinical material of 86 patients with 125 calcaneovalgus feet the prognosis and the indication for treatment has been evaluated. The age at follow-up was 3–11 years. At the initial examination within the first weeks of life 34 per cent of the feet had contractures. Forty-nine per cent of the feet were treated with gentle manipulations and elastic bandages. The average duration of treatment was 3–5 weeks.

At follow-up most feet were normalized. Only residual valgus of the hindfoot was seen in some cases, thus 75 per cent had a valgus of 0–10 degrees and 25 per cent had a valgus of 10–20 degrees. In unilateral cases 45 per cent showed a valgus more pronounced than on the normal side.

Comparison between treated and untreated cases showed no difference in the degree of valgus. Also the severity of contractures seen at the initial examination did not influence the final result.

The excellent prognosis compared with other congenital foot deformities is explained by absence of luxation in the hind- and midfoot at birth and consequently no secondary adaptive bone changes have developed.

In the present series no difference was found between treated and untreated cases.

REFERENCES

Giannestras, N. J. (1970) Recognition and treatment of flatfeet in infancy. *Clin. Orthop.* **70**, 10–29.

Klassen, R. A. (1971) *The yearbook of orthopedics and traumatic surgery.* Year Book Medical Publishers, Chicago, p. 26.

Reimann, I. (1967) *Congenital idiopathic club foot.* Thesis. Munksgaard, Copenhagen.

Støren, H. (1967) Congenital convex pes valgus with vertical talus. *Acta orthop. scand.*, Suppl. 94, 21–27.

Templeton, A. W., McAlister, W. H. & Zim, I. D. (1965) Standardization of terminology and evaluation of osseous relationships in congenitally abnormal feet. *Amer. J. Roentgenol.* **93**, 374–381.

Wetzenstein, H. (1970) Prognosis of pes calcaneo-valgus congenitus. *Acta orthop. scand.* **41**, 122–128.

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