PROCEEDINGS OF THE NORTHERN ORTHOPEDIC ASSOCIATION AT ITS XX MEETING IN OSLO, NORWAY 1st—2nd JULY 1939.

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The meeting was opened by the chairman, surgeon in chief *Eivind Platou.*

P. G. K. BENTZON AND E. THOMASEN, AARHUS:

ON THE TREATMENT OF CONGENITAL CLUBFOOT, ESPECIALLLY THE RELAPSING CASES

(Authors' abstract)

In order to gain a fair idea of the effectivity of the methods hitherto employed in Denmark for treatment of congenital clubfoot, in the Orthopedic Hospital at Aarhus (O.H.A.) we have made a statistical account of all the cases of clubfoot examined and treated in this hospital from its opening in September 1936 to the end of May 1939.

In this period we have observed 131 patients with a total of 194 clubfeet. This total includes all the patients applying to the dispensary of the hospital—that is, not only the patients treated primarily in the hospital but also older patients who previously had been under treatment somewhere else, and adult patients who never had been under rational treatment for their deformity and now were admitted merely to be provided with orthopedic footwear. So a detailed analysis of the therapeutic results would require a classification of these patients into various groups, whereas the material may very well be treated in toto with a view to certain statistical data of a more general character.

Thus the material comprises 94 male patients and 37 female —corresponding to about 72 per cent males and about 28 per

cent females. This sex distribution is quite in harmony with the figures reported some years ago by Monberg in his studies on a Danish clubfoot material (about 76 per cent males and 24 per cent females). Of the total clubfoot material the deformity involved the left foot in 98 cases, the right in 96, being bilateral in 63. Inquiry about the ocurrence of clubfoot among the relatives of the patients was not carried through completely. Among the 81 patients whose case records give information about this question, 11 answered in the affirmitive. Of these 11 patients, in whom there might thus be some reason to reckon with a hereditary etiological factor, 8 presented bilateral clubfoot—something that might suggest that hereditary clubfoot most often is bilateral.

Before considering this material with a view to the therapeutic results, it will be necessary from the total 131 patients to rule out 15 (with 22 clubfeet altogether), as these patients were adults who either had not gone through any correction treatment proper (9 patients with 15 clubfeet), or had been treated with the Phelps operation a good many years ago when this method was employed not infrequently (6 patients). These 6 patients had altogether 9 clubfeet, in two the foot now presented a satisfactory form, while the rest were either rocker-feet or bad relapses of clubfoot.

As to the remainder of the material—116 patients with 172 clubfeet—the treatment to which they had been submitted primarily in the O.H.A. or previously elsewhere might be said to have been fairly uniform in principle and practice. The treatment of clubfoot as carried out in Denmark during the last decades is based on the principles established by Slomann in the first decade of this century. In "Nordisk Lærebog i Kirurgi" (edition of 1922), in the section on diseases of the foot, Slomann gives an account of this method of treatment that has been followed essentially in the Orthopedic Hospital, Copenhagen, and by the orthopedists who got their training in this hospital or in the Slomann Clinic, Copenhagen. The "principal" treatment takes place as soon the child is 1 year old, and most often it is carried out in two stages. The first stage consists in blood-

less correction over a wedge after the principles given by Lorenz, with correcting plaster bandage for 2—3 weeks. The second stage of the operation, which is open, consists in extension of the Achilles tendon, arthrotomy on the posterior wall of the talocrural and talocalcaneal joints and strong downward traction of the heel by means of Slomann's heel retractor (modified by Guildal). Slomann also employed preliminary treatment with redressing manipulations during the first year of life—most often the mother was instructed to carry out these manipulations—but he did not attach any great importance to this treatment. In the Orthopedic Hospital, Copenhagen, this preliminary treatment is carried out more systematically, as the city patients are brought to the dispensary for ambulatory treatment with redressing manipulations performed by nurses trained in this form of treatment. In this way—sometimes with the additional aid of intermediate plaster bandaging—it often is possible to get the suppination and inflexion factors corrected so completely that, when the child is one year old, it will suffice to lengthen the triceps by downward traction of the heel-nay; in cases where the equinus factor primarily is pronounced but slightly this preliminary correction may even be so successful that no operative treatment is required.

In O.H.A. a relatively greater number of the patients live so far away from the hospital that a visit to the dispensary means quite a journey. For this reason we let the mothers perform the correcting manipulations in the first year of life, and this treatment is further supported by employment of an external movable redressing splint that is renewed about every three months.

In both hospitals the after-treatment consists in employment of boots with external lifts under the heel and sole and leather night-bandages that keep the foot in pronation and dorsal flexion. Mention may be made of certain minor differences in the treatment adopted in Copenhagen and in Aarhus—in Copenhagen, for instance, the lengthening of the triceps is combined with activation of the pronation by passing the triceps tendon round th e peroneal tendons (as described by Berntsen).

Considering the 116 patients remaining after the above-mentioned 15 cases are ruled out, we have to classify 16 of the patients in a group by themselves, as they are children who have not yet reached the age of one year and are still undergoing the preliminary treatment. This group includes 2 patients who died at home from intercurrent diseases, in their first year of life, before any radical treatment was instituted.

There then remain 100 patients with 147 clubfeet in whom the therapeutic result may be estimated. It is to be mentioned, however, that not all of those hundred patients were treated strictly after the schema outlined above.

In 1 case the preliminary treatment was given in the first year of life, but the patient (a girl) did not return for further treatment till she was 7 years old, when she was submitted to a wedge operation for the severe equinovarus deformity.

In 10 patients with 16 clubfeet a more or less thorough preliminary treatment in the first year of life was followed by bloodless redressing at the age of one year, without operative downward traction of the heel. It seems reasonable to reckon that the primary equinus factor in these patients had been pronounced but little—and it seems more likely that in a couple of these cases the deformity consisted entirely in congenital metatarsus varus. After this treatment, given in the orthopedic service of the Aarhus Hospital, the patients were provided with leather night-bandages, and on examination in the O.H.A. they showed no tendency to relapse. The remaining 4 patients with 7 clubfeet were treated in general hospitals, and they were given no after-treatment with leather night-bandages. They all presented a relapse, and they had to undergo secondary redressing and, in 3 cases, wedge osteotomy on the tarsus.

The remaining 89 patients with 130 clubfeet were all given a præliminary treatment (more or less thorough) in their first year of life, and subsequently they were submitted to lengthening of the Achilles tendon etc. Of these patients, 14 with 20 clubfeet received this treatment in some hospital without any special orthopedic service, and particular data on the details of the treatment have not been available. In 2 of them the lengthening

of the Achilles tendon had to be repeated (on 3 feet). Of the 20 clubfeet in this group 17 required later treatment, involving wedge osteotomy in 12.

44 patients with altogether 66 clubfeet had been treated in various orthopedic services (Orthopedic Hospital, Copenhagen; Dr. Erik Jensen's Clinic, Aarhus; the Slomann-Bentzon Clinic, Copenhagen). Of these 66 clubfeet 33 (50 %) showed such marked relapse that there were indications for secondary bloodless redressing or for cuneiform tarsectomy—the latter measure was indicated for 33 clubfeet, and it was performed on 23 of these.

The remaining 31 patients with 44 clubfeet are the ones who received their entire treatment after the above-mentioned principles in the O.H.A. within the past period of three years. So the observation period for these cases is rather short. Still, 6 patients with 8 clubfeet have shown such a pronounced relapse that redressing had to be repeated, even twice on one particularly refractory clubfoot, which probably will show subsequent indications for wedge operation. 3 patients with 5 clubfeet still present some degree of metatarsus varus—that is, tendency to a moderate relapse. A point common to all the 9 patients (13 clubfeet) with relapse is the fact that the preliminary treatment in their first year of life was very incomplete; most of them did not appear for treatment till they were nearly one year old.

This account claims by no means to be taken as a systematic after-examination, but it makes it sufficiently clear that the relapse percentage is high for the supination and inflexion factors (relapse of the equinus deformity is very rare and is hardly ever seen after the very thorough operative treatment employed in the orthopedic clinics against this deformity). The outcome of this account is to be taken as an urgent request to revise our present treatment of clubfoot, with particular importance being attached to a thorough performance of the very early treatment.

Of the 34 tarsal wedge osteotomies mentioned in this account 15 were performed in the O.H.A. In order to avoid the unfa-

vourable shortening of the foot resulting from ordinary cuneiform tarsectomy, the operation has been modified so that only the lateral part of the osteotomy is made wedge-shaped; from the apex of the wedge, placed about in the middle of the tarsus, at the third cuneiform, the operation is continued as a simple osteotomy, proceeding obliquely backwards and medially through the navicular and the head of the talus. When the lateral wedge is "closed" after the osteotomy, the distal part of the foot is turned on the apex of the wedge and the medial parts of the foot become lengthened a little. This gives a better correction of the form of the foot, and the whole foot will not be shortened to any extent worth mention.